# Fin Fish Culture I

Hatch and initial ponding

# What a production level CTU chart looks like

Chum CTU BY09 (2).xls [Read-Only] [Compatibility Mode] - Microsoft Excel

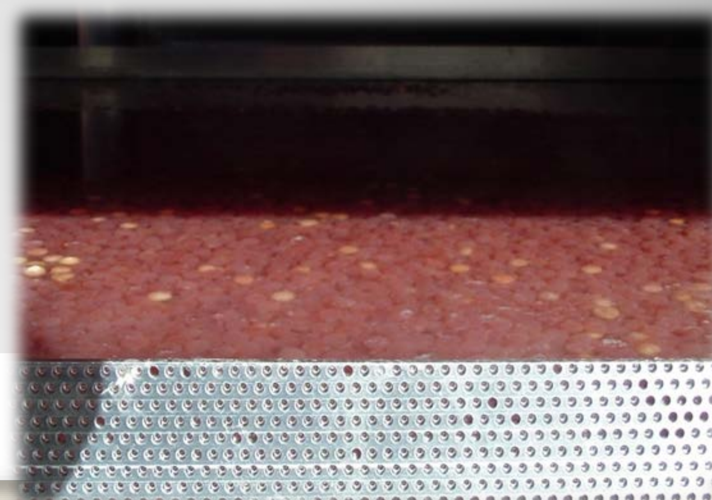
| | B | C | D | E | G | H | I | J | K | L | M | N | O | P | Q | R | S | T | U | V | W | X | Y | Z | AA |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | **Medvejie Hatchery** | | | | | | | | | | | | | | | | | | | | | | | | |
| 2 | **Chum** | | **BY 09** | | | | **Cumulative Temperature Units** | | | | | | | | | | | | | | | | | | |
| 5 | **As of:** | | | | | Brood | | | | DI | Brood | Brood | | | | | Brood | | | | SJ1 | SJ2 | SJ3 | HF | HF |
| 6 | 12/8/09 | | | | R1 | R2 | R3 | R4 | R5 | R6 | R7 | R8 | R9 | R10 | R11 | R12 | R13 | R14 | R15 | R16 | R17 | R18 | | Reg | Reg |
| 7 | Spawning Date | | | | 9/1 | 9/2 | 9/3 | 9/4 | 9/7 | 9/8 | 9/9 | 9/10 | 9/11 | 9/14 | 9/15 | 9/16 | 9/17 | 9/21 | 9/25 | 9/30 | 8/29 | 9/5 | 9/19 | | |
| 9 | Current CTU's | | | | 594 | 631 | 577 | 565 | 556 | 582 | 574 | 567 | 533 | 489 | 481 | 473 | 511 | 442 | 427 | 428 | 591 | 569 | | 643 | 643 |
| 10 | CTU Diff btwn lots | | | | | -37.4 | 53.6 | 12.4 | 8.8 | -25.7 | 7.6 | 7.2 | 33.7 | 44.6 | 8.0 | 8.0 | -38.3 | 68.7 | 15.5 | -0.6 | -163.0 | 21.2 | | | 0.0 |
| 26 | Elapsed Days | | | | 99 | 98 | 97 | 96 | 93 | 92 | 91 | 90 | 89 | 86 | 85 | 84 | 83 | 79 | 75 | 70 | 102 | 95 | | 40156 | 40156 |
| 29 | | Ambient | Cold | Heated | | | | | | | | | | | | | | | | | | | | | |
| 30 | Date | Temp | Temp | Temp | R1 | R_2 | R_3 | R_4 | R_5 | R_6 | R_7 | R_8 | R_9 | R_10 | R_11 | R_12 | R_13 | R_14 | R_15 | R_16 | SJ | SJ | SJ | HF Reg | HF Reg |
| 43 | 12-Sep | 8.0 | | | 96.8 | 88.7 | 80.6 | 72.5 | 48.2 | 40.1 | 32.0 | 24.0 | 16.0 | | | | | | | | | | | | |
| 44 | 13-Sep | 8.0 | | | 104.8 | 96.7 | 88.6 | 80.5 | 56.2 | 48.1 | 40.0 | 32.0 | 24.0 | | | | | | | | | | | | |
| 45 | 14-Sep | 8.0 | | | 112.8 | 104.7 | 96.6 | 88.5 | 64.2 | 56.1 | 48.0 | 40.0 | 32.0 | 8.0 | | | | | | | | | | | |
| 46 | 15-Sep | 8.0 | | | 120.8 | 112.7 | 104.6 | 96.5 | 72.2 | 64.1 | 56.0 | 48.0 | 40.0 | 16.0 | 8.0 | | | | | | | | | | |
| 47 | 16-Sep | 8.0 | | | 128.8 | 120.7 | 112.6 | 104.5 | 80.2 | 72.1 | 64.0 | 56.0 | 48.0 | 24.0 | 16.0 | 8.0 | | | | | | | | | |
| 48 | 17-Sep | 8.0 | | | 136.8 | 128.7 | 120.6 | 112.5 | 88.2 | 80.1 | 72.0 | 64.0 | 56.0 | 32.0 | 24.0 | 16.0 | 8.0 | | | | | | | | |
| 49 | 18-Sep | 7.9 | | | 144.7 | 136.6 | 128.5 | 120.4 | 96.1 | 88.0 | 79.9 | 71.9 | 63.9 | 39.9 | 31.9 | 23.9 | 15.9 | | | | | | | | |
| 50 | 19-Sep | 8.0 | | | 152.7 | 144.6 | 136.5 | 128.4 | 104.1 | 96.0 | 87.9 | 79.9 | 71.9 | 47.9 | 39.9 | 31.9 | 23.9 | | | | | | | | |
| 51 | 20-Sep | 7.5 | | | 160.2 | 152.1 | 144.0 | 135.9 | 111.6 | 103.5 | 95.4 | 87.4 | 79.4 | 55.4 | 47.4 | 39.4 | 31.4 | | | | | | | | |
| 52 | 21-Sep | 7.7 | | | 167.9 | 159.8 | 151.7 | 143.6 | 119.3 | 111.2 | 103.1 | 95.1 | 87.1 | 63.1 | 55.1 | 47.1 | 39.1 | 7.7 | | | | | | | |
| 53 | 22-Sep | 7.8 | | | 175.7 | 167.6 | 159.5 | 151.4 | 127.1 | 119.0 | 110.9 | 102.9 | 94.9 | 70.9 | 62.9 | 54.9 | 46.9 | 15.5 | | | | | | | |
| 54 | 23-Sep | 8.0 | | | 183.7 | 175.6 | 167.5 | 159.4 | 135.1 | 127.0 | 118.9 | 110.9 | 102.9 | 78.9 | 70.9 | 62.9 | 54.9 | 23.5 | | | | | | | |
| 55 | 24-Sep | 8.0 | | | 191.7 | 183.6 | 175.5 | 167.4 | 143.1 | 135.0 | 126.9 | 118.9 | 110.9 | 86.9 | 78.9 | 70.9 | 62.9 | 31.5 | | | | | | | |
| 56 | 25-Sep | 7.5 | | | 199.2 | 191.1 | 183.0 | 174.9 | 150.6 | 142.5 | 134.4 | 126.4 | 118.4 | 94.4 | 86.4 | 78.4 | 70.4 | 39.0 | 7.5 | | | | | | |
| 57 | 26-Sep | 7.7 | | | 206.9 | 198.8 | 190.7 | 182.6 | 158.3 | 150.2 | 142.1 | 134.1 | 126.1 | 102.1 | 94.1 | 86.1 | 78.1 | 46.7 | 15.2 | 7.7 | | | | | |
| 58 | 27-Sep | 7.5 | | | 214.4 | 206.3 | 198.2 | 190.1 | 165.8 | 157.7 | 149.6 | 141.6 | 133.6 | 109.6 | 101.6 | 93.6 | 85.6 | 54.2 | 22.7 | 15.2 | | | | | |
| 59 | 28-Sep | 7.3 | | | 221.7 | 213.6 | 205.5 | 197.4 | 173.1 | 165.0 | 156.9 | 148.9 | 140.9 | 116.9 | 108.9 | 100.9 | 92.9 | 61.5 | 30.0 | 22.5 | | | | | |
| 60 | 29-Sep | 7.2 | | | 228.9 | 220.8 | 212.7 | 204.6 | 180.3 | 172.2 | 164.1 | 156.1 | 148.1 | 124.1 | 116.1 | 108.1 | 100.1 | 68.7 | 37.2 | 29.7 | | | | | |
| 61 | 30-Sep | 7.2 | | | 236.1 | 228.0 | 219.9 | 211.8 | 187.5 | 179.4 | 171.3 | 163.3 | 155.3 | 131.3 | 123.3 | 115.3 | 107.3 | 75.9 | 44.4 | 36.9 | | | | | |
| 62 | 1-Oct | 7.0 | | | 243.1 | 235.0 | 226.9 | 218.8 | 194.5 | 186.4 | 178.3 | 170.3 | 162.3 | 138.3 | 130.3 | 122.3 | 114.3 | 82.9 | 51.4 | 43.9 | | | | | |
| 63 | 2-Oct | 7.0 | | | 250.1 | 242.0 | 233.9 | 225.8 | 201.5 | 193.4 | 185.3 | 177.3 | 169.3 | 145.3 | 137.3 | 129.3 | 121.3 | 89.9 | 58.4 | 50.9 | | | | | |
| 64 | 3-Oct | 6.8 | | | 256.9 | 248.8 | 240.7 | 232.6 | 208.3 | 200.2 | 192.1 | 184.1 | 176.1 | 152.1 | 144.1 | 136.1 | 128.1 | 96.7 | 65.2 | 57.7 | | | | | |
| 65 | 4-Oct | 6.5 | | | 263.4 | 255.3 | 247.2 | 239.1 | 214.8 | 206.7 | 198.6 | 190.6 | 182.6 | 158.6 | 150.6 | 142.6 | 134.6 | 103.2 | 71.7 | 64.2 | | | | | |
| 66 | 5-Oct | 6.7 | | | 270.1 | 262.0 | 253.9 | 245.8 | 221.5 | 213.4 | 205.3 | 197.3 | 189.3 | 165.3 | 157.3 | 149.3 | 141.3 | 109.9 | 78.4 | 70.9 | | | | | |
| 67 | 6-Oct | 7.0 | | | 277.1 | 269.0 | 260.9 | 252.8 | 228.5 | 220.4 | 212.3 | 204.3 | 196.3 | 172.3 | 164.3 | 156.3 | 148.3 | 116.9 | 85.4 | 77.9 | | | | | |
| 68 | 7-Oct | 6.8 | | | 283.9 | 275.8 | 267.7 | 259.6 | 235.3 | 227.2 | 219.1 | 211.1 | 203.1 | 179.1 | 171.1 | 163.1 | 155.1 | 123.7 | 92.2 | 84.7 | | | | | |
| 69 | 8-Oct | 6.8 | | | 290.7 | 282.6 | 274.5 | 266.4 | 242.1 | 234.0 | 225.9 | 217.9 | 209.9 | 185.9 | 177.9 | 169.9 | 161.9 | 130.5 | 99.0 | 91.5 | | | | | |
| 70 | 9-Oct | 6.9 | | | 297.6 | 289.5 | 281.4 | 273.3 | 249.0 | 240.9 | 232.8 | 224.8 | 216.8 | 192.8 | 184.8 | 176.8 | 168.8 | 137.4 | 105.9 | 98.4 | | | | | |
| 71 | 10-Oct | 6.8 | | | 304.4 | 296.3 | 288.2 | 280.1 | 255.8 | 247.7 | 239.6 | 231.6 | 223.6 | 199.6 | 191.6 | 183.6 | 175.6 | 144.2 | 112.7 | 105.2 | | | | | |
| 72 | 11-Oct | 6.8 | | | 311.2 | 303.1 | 295.0 | 286.9 | 262.6 | 254.5 | 246.4 | 238.4 | 230.4 | 206.4 | 198.4 | 190.4 | 182.4 | 151.0 | 119.5 | 112.0 | | | | | |
| 73 | 12-Oct | 6.8 | | | 318.0 | 309.9 | 301.8 | 293.7 | 269.4 | 261.3 | 253.2 | 245.2 | 237.2 | 213.2 | 205.2 | 197.2 | 189.2 | 157.8 | 126.3 | 118.8 | | | | | |
| 74 | 13-Oct | 6.9 | | | 324.9 | 316.8 | 308.7 | 300.6 | 276.3 | 268.2 | 260.1 | 252.1 | 244.1 | 220.1 | 212.1 | 204.1 | 196.1 | 164.7 | 133.2 | 125.7 | | | | | |
| 75 | 14-Oct | 6.8 | | | 331.7 | 323.6 | 315.5 | 307.4 | 283.1 | 275.0 | 266.9 | 258.9 | 250.9 | 226.9 | 218.9 | 210.9 | 202.9 | 171.5 | 140.0 | 132.5 | | | | | |
| 76 | 15-Oct | 6.8 | | | 338.5 | 330.4 | 322.3 | 314.2 | 289.9 | 281.8 | 273.7 | 265.7 | 257.7 | 233.7 | 225.7 | 217.7 | 209.7 | 178.3 | 146.8 | 139.3 | | | | | |
| 77 | 16-Oct | 6.0 | | | 344.5 | 336.4 | 328.3 | 320.2 | 295.9 | 287.8 | 279.7 | 271.7 | 263.7 | 239.7 | 231.7 | 223.7 | 215.7 | 184.3 | 152.8 | 145.3 | | | | | |
| 78 | 17-Oct | 6.0 | | | 350.5 | 342.4 | 334.3 | 326.2 | 301.9 | 293.8 | 285.7 | 277.7 | 269.7 | 245.7 | 237.7 | 229.7 | 221.7 | 190.3 | 158.8 | 151.3 | | | | | |
| 79 | 18-Oct | 5.8 | | | 356.3 | 348.2 | 340.1 | 332.0 | 307.7 | 299.6 | 291.5 | 283.5 | 275.5 | 251.5 | 243.5 | 235.5 | 227.5 | 196.1 | 164.6 | 157.1 | | | | 405.6 | 405.6 |
| 80 | 19-Oct | 6.0 | | | 362.3 | 354.2 | 346.1 | 338.0 | 313.7 | 305.6 | 297.5 | 289.5 | 281.5 | 257.5 | 249.5 | 241.5 | 233.5 | 202.1 | 170.6 | 163.1 | | | | 411.6 | 411.6 |
| 81 | 20-Oct | 6.7 | | | 369.0 | 360.9 | 352.8 | 344.7 | 320.4 | 312.3 | 304.2 | 296.2 | 288.2 | 264.2 | 256.2 | 248.2 | 240.2 | 208.8 | 177.3 | 169.8 | | | | 418.3 | 418.3 |
| 82 | 21-Oct | 6.6 | | | 375.6 | 367.5 | 359.4 | 351.3 | 327.0 | 318.9 | 310.8 | 302.8 | 294.8 | 270.8 | 262.8 | 254.8 | 246.8 | 215.4 | 183.9 | 176.4 | | | | 424.9 | 424.9 |
| 83 | 22-Oct | 6.9 | | | 382.5 | 374.4 | 366.3 | 358.2 | 333.9 | 325.8 | 317.7 | 309.7 | 301.7 | 277.7 | 269.7 | 261.7 | 253.7 | 222.3 | 190.8 | 183.3 | | | | 431.8 | 431.8 |

BY09 Chum CTU's | Mark Record | Mark Summary

Start | FT122-KD1 CRN: 8667... | http://www.sirius.com - ... | Inbox - Microsoft Outlook | Les 11 Hatch | Microsoft PowerPoint - [L... | Unsafe Eject | Microsoft Excel

# Hatch

- Typical TU's are about 450 – 650 depending on specie and water temperature.
- Cease formalin treatments prior to hatch
- Formalin at concentrations used to treat eggs is lethal to fry
- After hatch is complete it may be necessary to remove dead eggs shells. Easily done in NOPAD trays.



# Egg removal from hatch screen

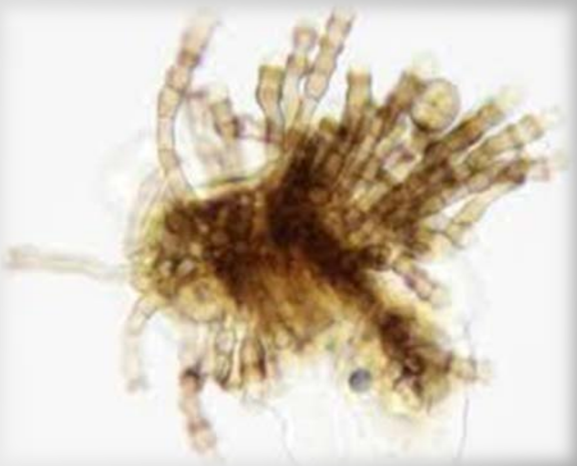
- Dead eggs left behind are a source for fungus.
- Prevention is best but, if you must, can treat with formalin – risky!
- Usually a losing battle.
- Some manual removal can be done.  Not too hard in Heath trays.

# Incubator Care after Hatch

- Keep the lights off in the hatchery! (Why?)
- Insure adequate water flow
- Watch for signs of mortality, routinely check development of alevins.
- You really have very little control of what is happening aside from providing ample clean water.

# Common Diseases of Fry Encountered During Incubation

- Gas Bubble Disease
- Bacterial Gill Disease (BGD)
- White Spot/Coagulated Yolk
- Phoma Herbarum

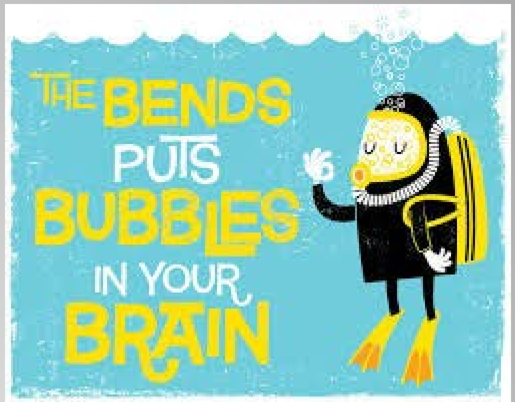


Woods Manual

# Gas Bubble Disease

# Gas Bubble Disease

- Due to high total gas pressure and the presence of excess nitrogen, bubbles form in the bloodstream of the affected fish.
- Leads to tissue damage as a result of lack of oxygenated blood flow




Treatment

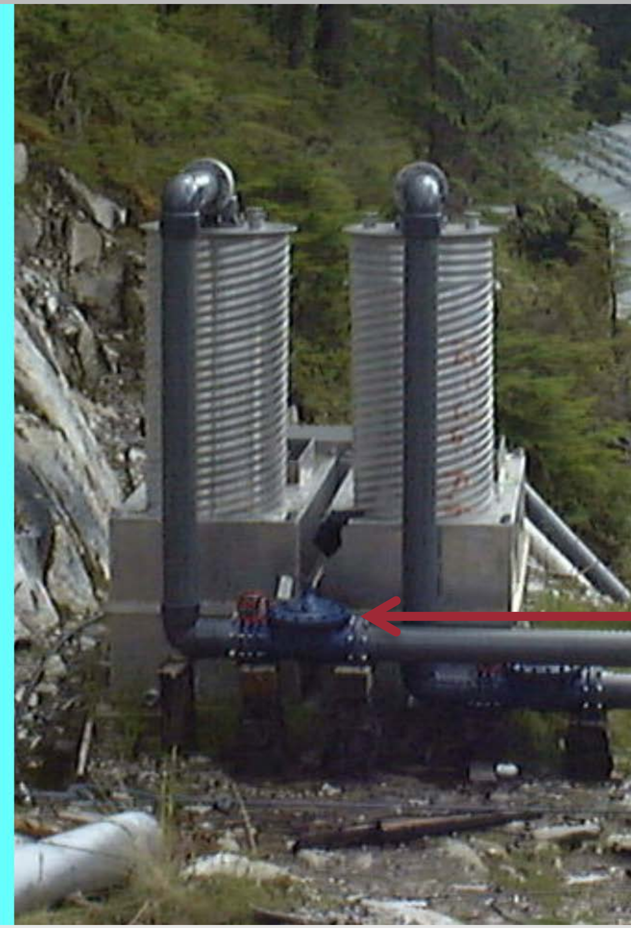
Treat the water to remove excess gas.

How do you do this?

## Packed

## Column

- Some aeration occurs with a packed column but usually less than 1ppm.
- Nitrogen is generally easily removed as it is more soluble in water than oxygen
- Packed column is a passive device useful for reducing Total gas

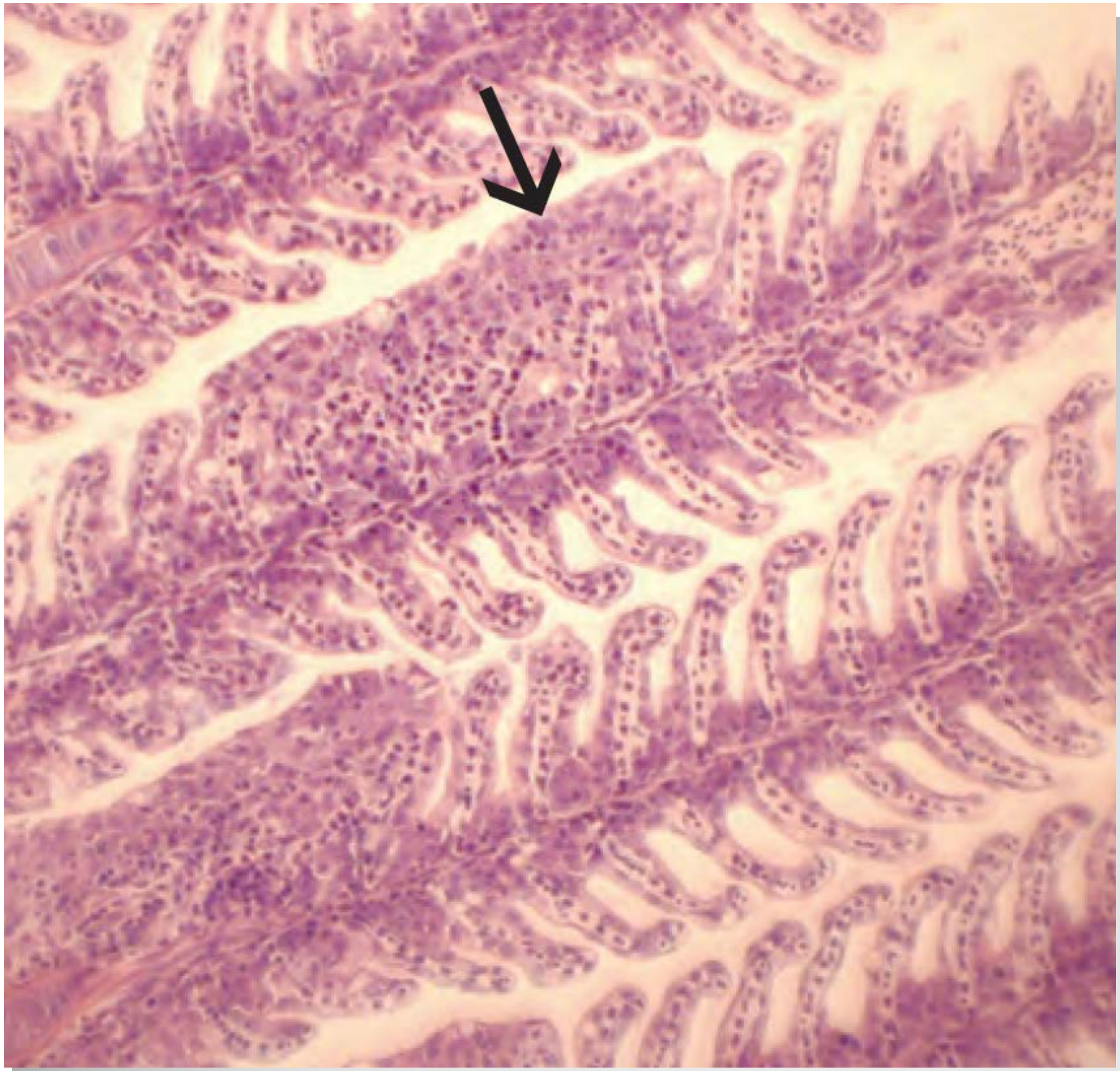


Pressure relief valve

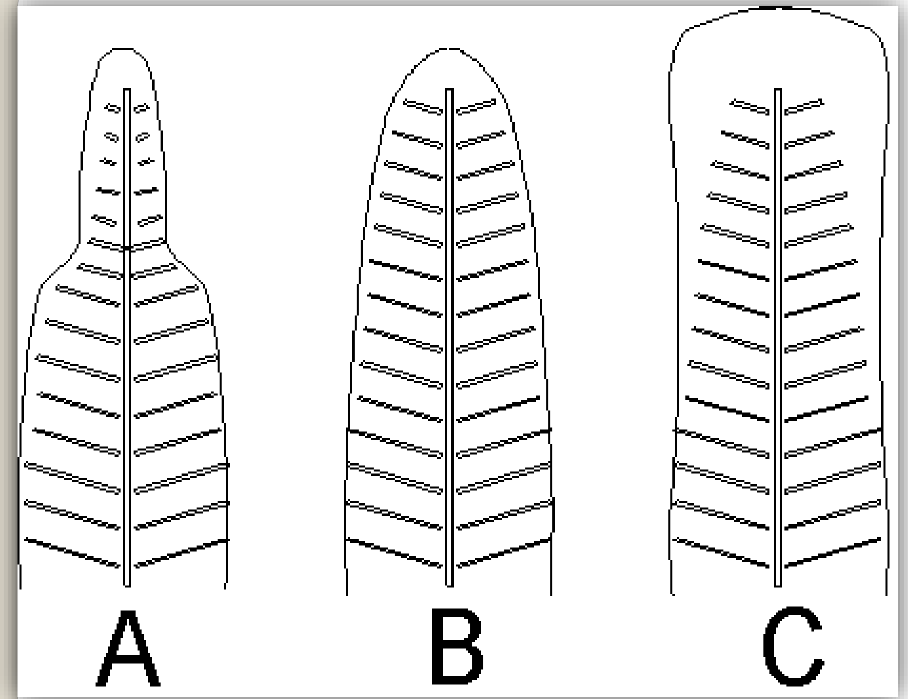
# Degassing to avoid gas bubble disease

# Bacterial Gill Disease

- BGD is one of the most common diseases found in hatchery fish.
- Gill filaments become infested with large numbers of long thin filamentous non-specific Flexibacter and Flavobacter.
- In response to the bacteria the fish produces additional epithelial cells resulting in fusion or clubbing of the gill filaments.
- The gill irritation results in loss of oxygen exchange to blood stream through the gills and results in death.
- The bacteria is ubiquitous in hatchery water supplies and infestations are common in Alaska hatcheries.
- The disease is easily treated but if unchecked, mortality can be swift and severe especially in sac fry during incubation.



# BGD – gill filaments under a scope




**Symptoms-** During incubation symptoms are not visible. Routine checks prior to ponding and noticed mortality in trays determine if treatment is required.

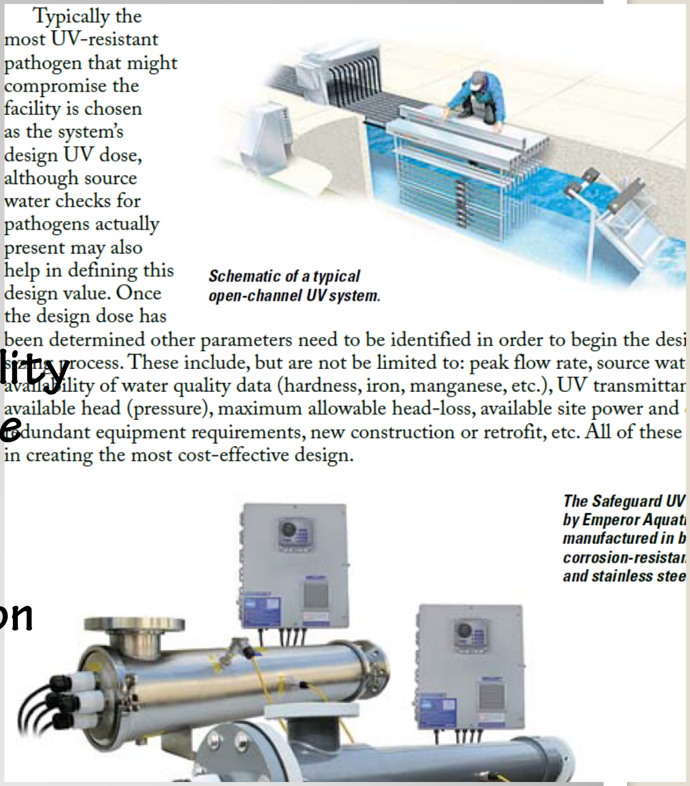
A- Nutritional deficiency

B- Normal Gill

C- Diseased Gill

# Treatment of Bacterial Gill Disease

- Hydrogen Peroxide
  - Treat @ 150,000ppm for 15min. After treatment visually check with microscope to determine effectiveness of treatment.
  - Unfortunately the treatment can cause mortality but if left unchecked BGD can result in explosive mortalities.
- Ultraviolet Light
  - Expensive to purchase and operate depending on amount of water requiring treatment but very effective.



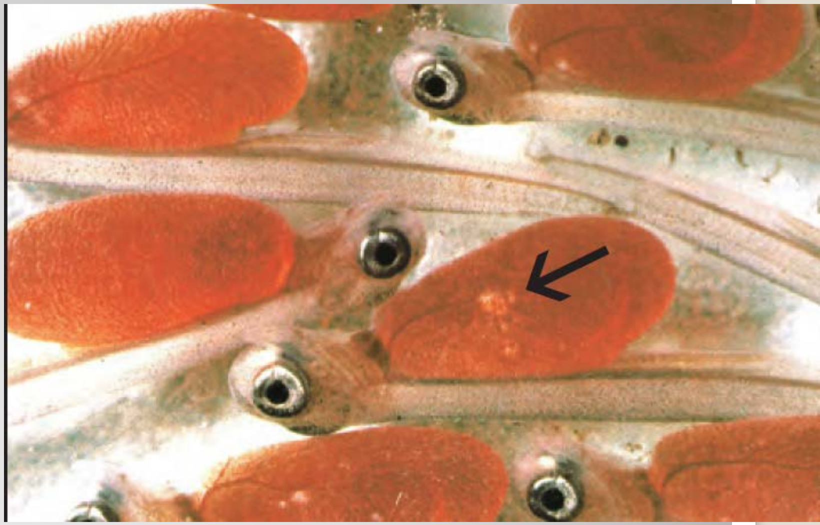
Typically the most UV-resistant pathogen that might compromise the facility is chosen as the system's design UV dose, although source water checks for pathogens actually present may also help in defining this design value. Once the design dose has been determined other parameters need to be identified in order to begin the desi
process. These include, but are not be limited to: peak flow rate, source wat
availability of water quality data (hardness, iron, manganese, etc.), UV transmittar
available head (pressure), maximum allowable head-loss, available site power and
redundant equipment requirements, new construction or retrofit, etc. All of these
in creating the most cost-effective design.

*Schematic of a typical open-channel UV system.*

*The Safeguard UV by Emperor Aquati manufactured in b corrosion-resistan and stainless stee*

# White Spot/ Coagulated Yolk Disease

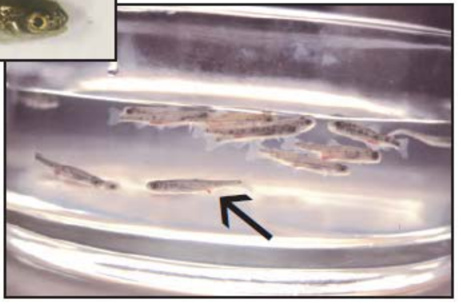
- Manifests as small spots of coagulated yolk in sac fry.
- Actual cause of the disease is unknown.
- Can be precipitated by high flow, exposure to light and absence of substrate.
- Basically anything that causes the fry stress can result in some of the yolk becoming coagulated.
- Severe shocking of eggs with a weak eye can result in the rupture of a small portion of the yolk which then coagulates.
- The fish depends on the yolk for energy and development. Loss of any portion can lead to death but some fry do survive.
- Can result in deformities in ponded fry



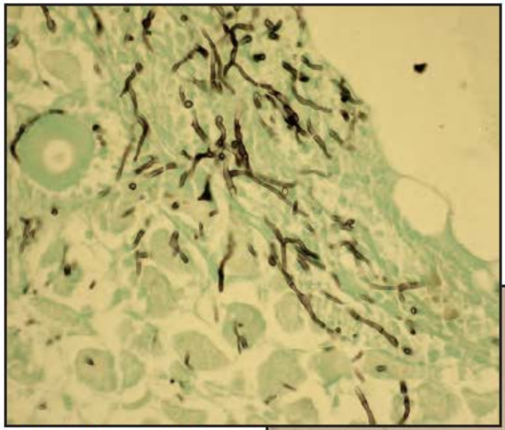
# Phoma Herbarum

- In simple terms, Phoma is a plant fungi that when the spores are ingested by a small fish the fungus begins growing in the air bladder and then spreads to other organs and tissue.
- It is generally thought that the fungus enters the fish at the time it fills its swim bladder with air.
- Fish often swim on their sides and will have extended abdomens.
- There is no known treatment and mortality will usually continue long term at chronic levels.

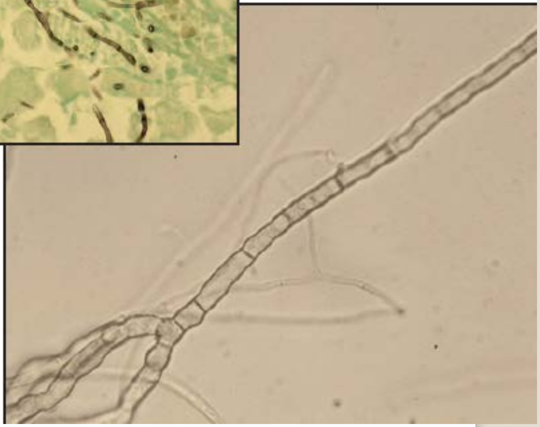
Perforated body wall near vent and "pinched abdomens" in fry with *Phoma* infection



Anal prolapse (arrow) and hemorrhage of sockeye salmon fry infected with *Phoma*



Hyphae of *Phoma* (black) invading fish muscle, stained with Grocotts fungus stain



# Ponding

- Volitional
  - Fry emergence is not controlled by hatchery staff.
  - Fry emerge to raceways, ponds, netpens
  - Can be controlled somewhat using lights
- Non – Volitional
  - Fry are forced from incubators to meet a production schedule.

# When to Pond

- Using Yolk Absorption as a Guide
  - At ponding % yolk absorption should be between 3 – 6%
  - Samples should be taken beginning 30 – 45 days prior normal ponding TU’s
  - Collect a sample of fry randomly from each lot to be ponded and preserve in 10 - 50% formalin.
  - Yolk is excised and weighed to determine % of body weight.
  - Early or late ponding can result in pinheading, it is important to pond at the proper time for early development.

# Yolk sac pellet sampling – important for sw ponding

# Chinook yolk sac percentages


0%
151
163
157
156
1%
153
155
158
161
2%
49
111
150
148
3%
57
106
48
144
4%
50
53
54
93
5%
99
110
34
74

# Ponding

- Estimate survival to ponded fry from green egg, more accurate enumeration will be performed when the fish are large enough to be handled and weighed without mortality
- Weigh a random sample of fish to determine initial size at ponding. This weight will be used for loading number.
- Fry at ponding tend to pile up on the bottom of the raceway especially in corners. Be sure the rearing container has good flow characteristics or some of the fry may suffocate.
- After a day or so most will swim up off the bottom and begin feeding if not ponded too early or late.
- Fry must surface and take in air to initially fill the swim bladder for buoyancy control.

# Chum ponding

# Chum outmigration

# Chinook ponding and initial sample weights




# An introduction to ponding densities and early feeding

# Early Feeding

- Wait for “swim up” before feeding
- Feed frequently / small amounts
- Feed “slow sinking” feeds – most salmon won’t pick feed up off the bottom
- Feed rates vary according to: water temp, fish size, species
- Pay attention to fish behavior – be observant – **feed the fish, not the container!**

FHM pp 254-259

# Early feeding – one of the most important aspects of good fish culture

# Initial Feeding Guidelines

| Feed Rate Guidelines for Pacific Salmon and Trout | | | | | | |
|---|---|---|---|---|---|---|
| Water Temp. | Fish Size in Grams | | | | | |
| Degrees C | <.8 | .8 - 1.5 | 1.5 - 3.0 | 3.0 - 8 | 8 - 15 | 15 - 40 |
| | %body weight to feed | | | | | |
| 2 | 0.8 | 0.7 | 0.6 | 0.5 | 0.4 | 0.2 |
| 3 | 1.1 | 1.1 | 1.1 | 0.8 | 0.7 | 0.4 |
| 4 | 1.4 | 1.3 | 1.2 | 1.1 | 0.9 | 0.6 |
| 5 | 1.7 | 1.7 | 1.6 | 1.4 | 1.1 | 0.8 |
| 6 | 2.2 | 2 | 1.8 | 1.6 | 1.3 | 1.1 |
| 7 | 2.5 | 2.4 | 2.1 | 1.9 | 1.5 | 1.2 |
| 8 | 2.8 | 2.6 | 2.4 | 2.2 | 1.8 | 1.4 |
| 9 | 3 | 2.8 | 2.6 | 2.4 | 2 | 1.6 |
| 10 | 3.2 | 2.9 | 2.7 | 2.6 | 2.2 | 1.8 |
| 11 | 3.4 | 3.1 | 2.9 | 2.8 | 2.4 | 1.9 |
| 12 | 3.6 | 3.3 | 3.1 | 2.9 | 2.6 | 2.1 |
| 13 | 3.9 | 3.6 | 3.4 | 3.2 | 2.8 | 2.3 |
| 14 | 4.2 | 3.9 | 3.7 | 3.5 | 3.1 | 2.4 |
| 15 | 4.5 | 4.3 | 4 | 3.7 | 3.3 | 2.6 |
| 16 | 4.8 | 4.7 | 4.3 | 4 | 3.5 | 2.8 |
| 17 | 5.1 | 5.1 | 4.8 | 4.5 | 3.7 | 3 |

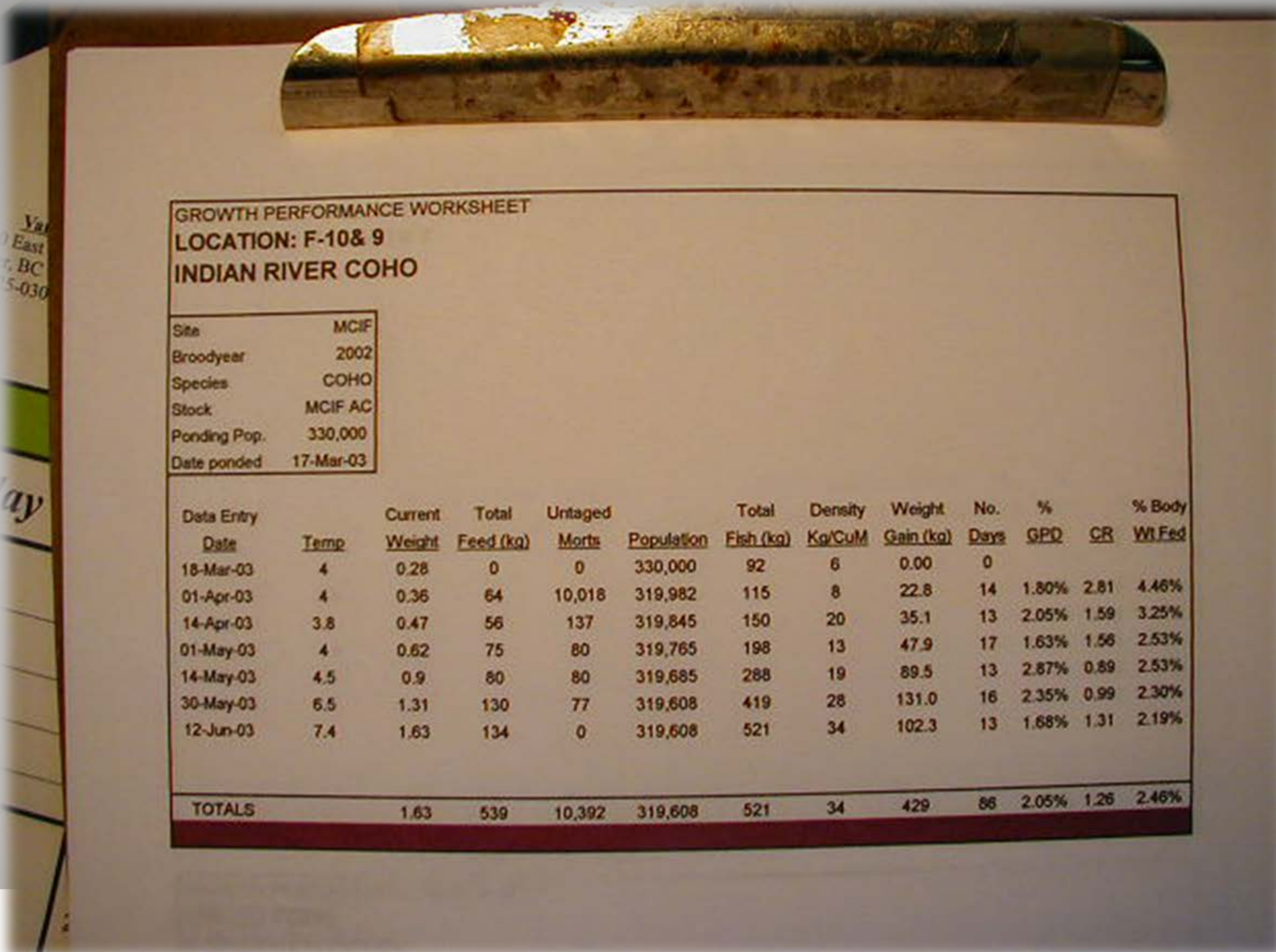
# Fish Size/Feed Size Guidelines

| | | | Fish Size |
|---|---|---|---|
| Feed Size | | Form | Grams |
| Mash | .25 - .4mm | Crumbles | <.15 |
| #0 | .3 -.6mm | Crumbles | .15 - .8 |
| #1 | .4 - 1.0mm | Crumbles | .8 - 1.5 |
| #2 | .8 - 1.4mm | Crumbles | 1.5 - 3 |
| #3 | 1.1 - 2.3mm | Crumbles | 3 - 5 |
| 1.2 | (mm) | Pellet | 3 - 5 |
| 1.5 | (mm) | Pellet | 5 - 8 |
| 2 | (mm) | Pellet | 8 - 20 |
| 2.5 | (mm) | Pellet | 20 - 75 |
| 4 | (mm) | Pellet | 75 - 400 |

# Initial Raceway Stocking

- Rearing density is measured in Kg/m3
- Initial rearing density is determined by:
  - Species, body size and age of fish
  - Biomass
  - Water Flow
  - Available Oxygen
  - Water Temperature
  - Production Plan, are we pushing this group to meet a size / time release window?
  - Past Experience
  - Need to anticipate growth projections

# Importance of good initial ponding information



GROWTH PERFORMANCE WORKSHEET

**LOCATION: F-10& 9**

**INDIAN RIVER COHO**

| | |
|---|---|
| Site | MCIF |
| Broodyear | 2002 |
| Species | COHO |
| Stock | MCIF AC |
| Ponding Pop. | 330,000 |
| Date ponded | 17-Mar-03 |

| Data Entry Date | Temp | Current Weight | Total Feed (kg) | Untaged Morts | Population | Total Fish (kg) | Density Kg/CuM | Weight Gain (kg) | No. Days | % GPD | CR | % Body Wt Fed |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 18-Mar-03 | 4 | 0.28 | 0 | 0 | 330,000 | 92 | 6 | 0.00 | 0 | | | |
| 01-Apr-03 | 4 | 0.36 | 64 | 10,018 | 319,982 | 115 | 8 | 22.8 | 14 | 1.80% | 2.81 | 4.46% |
| 14-Apr-03 | 3.8 | 0.47 | 56 | 137 | 319,845 | 150 | 20 | 35.1 | 13 | 2.05% | 1.59 | 3.25% |
| 01-May-03 | 4 | 0.62 | 75 | 80 | 319,765 | 198 | 13 | 47.9 | 17 | 1.63% | 1.56 | 2.53% |
| 14-May-03 | 4.5 | 0.9 | 80 | 80 | 319,685 | 288 | 19 | 89.5 | 13 | 2.87% | 0.89 | 2.53% |
| 30-May-03 | 6.5 | 1.31 | 130 | 77 | 319,608 | 419 | 28 | 131.0 | 16 | 2.35% | 0.99 | 2.30% |
| 12-Jun-03 | 7.4 | 1.63 | 134 | 0 | 319,608 | 521 | 34 | 102.3 | 13 | 1.68% | 1.31 | 2.19% |
| TOTALS | | 1.63 | 539 | 10,392 | 319,608 | 521 | 34 | 429 | 86 | 2.05% | 1.26 | 2.46% |

# Raceway/net pens - Density

- Raceways are stocked at *low densities* in the early stages of fry rearing. Example 3kg/m3
- Raceway volume is calculated in cubic meters of water depth.
- Small raceway example:
  - Width = 8’
  - Length = 20’
  - Water depth = 3’
  - Volume = 20x8x3 =480cu’ = 13.6m3
  - Initial safe density = 3kg x 13.6kg/m3 = 41kg of fish biomass