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FISH AND BOAT COMMISSION

Fish Health Updates

John Cingolani

Fisheries Technician

Overview

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- The Raceway
- Salting Fish
- Sick Fish
- Fish Kills
- Exchange Rates

The Raceway

Raceway Set Up

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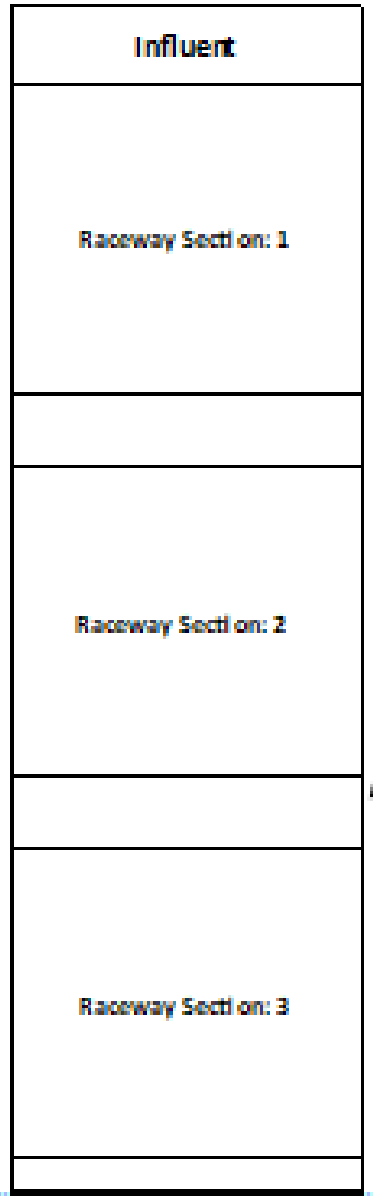

Water Flow

Quiescent Zone — A space in the raceway that fish are restricted from being in to allow organic material to settle. This feature allows an easier cleanup of the organic material in the raceway. These sections are created by a full bar rack in the upstream edge and separated by a board set with a bar rack on top.

Bottom Weir Board

Weir Board - Calculating Flow!

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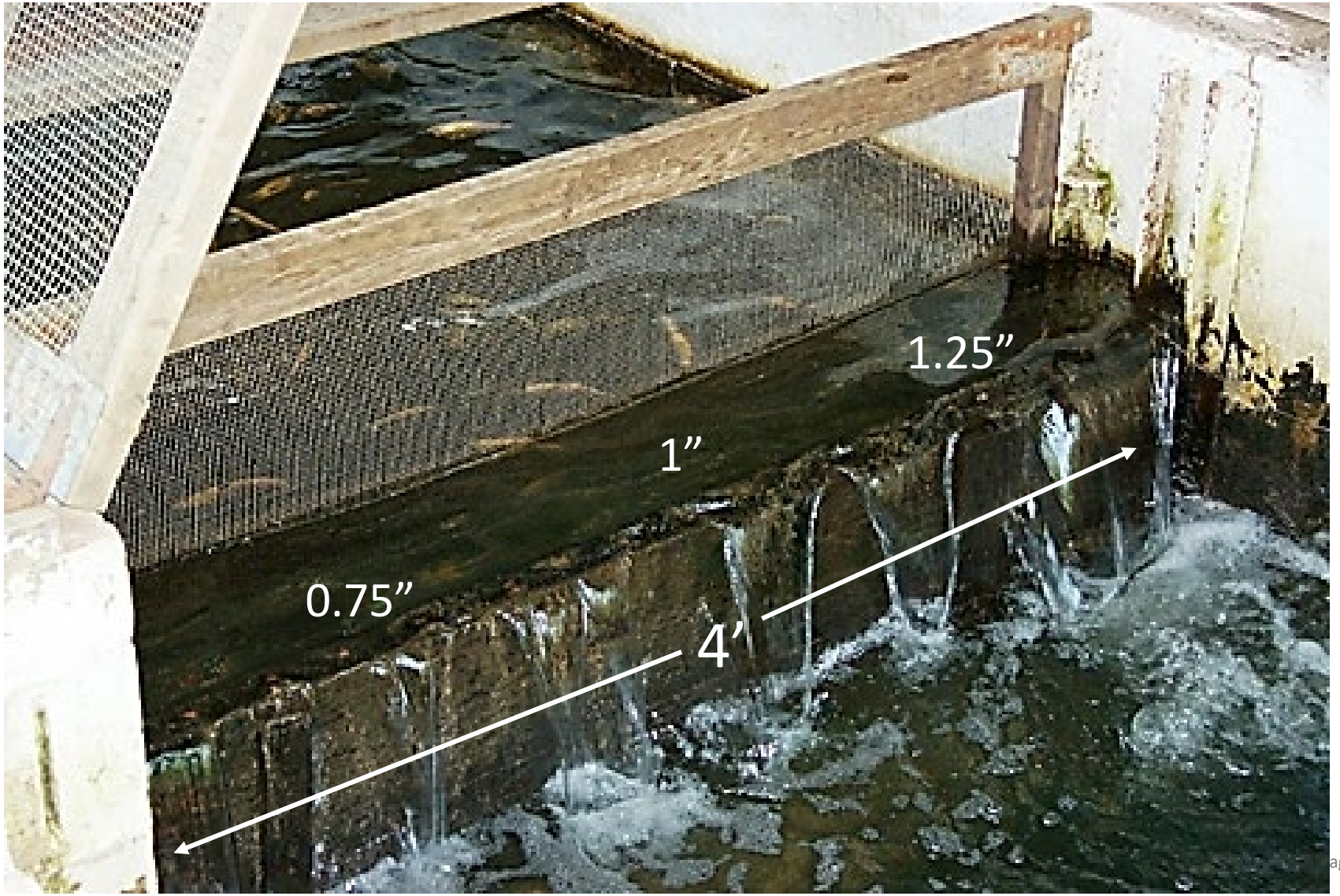

Flow Calculations

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H	Q	H	Q	H	Q
1/16	.562	1 1/4	50.3	3 1/2	236
1/8	1.59	1 3/8	58.0	3 3/4	261
3/16	2.91	1 1/2	66.1	4	288
1/4	4.49	1 5/8	74.5	4 1/4	315
5/16	6.28	1 3/4	83.3	4 1/2	343
3/8	8.26	1 7/8	92.4	4 3/4	372
7/16	10.4	2	104	5	402
1/2	12.75	2 1/8	111	5 1/4	433
9/16	15.2	2 1/4	121	5 1/2	464
5/8	17.8	2 3/8	132	5 3/4	496
11/16	20.5	2 1/2	142	6	529
3/4	23.3	2 5/8	153	6 1/2	596
13/16	26.3	2 3/4	164	7	666
7/8	29.5	2 7/8	175.5	8	814
1	36.0	3	187	9	971

Flow = Height (**Q** gallons per minute) x Weir **Length**

Ex: Height 1” , Length of Weir = 4’

36.0 x 4 = 144 gpm

Salt

Salting Fish

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- Why Salt?
  - Stress relief
    - NEW FISH - salt and hold feed for 3 days
  - Parasitic control
  - Fungal control
  - Muddy water relief
  - Low oxygen relief
  - Hauling stress relief during stocking

Salting Fish

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- How Much Salt?
  - Water flow (gpm)
  - Treatment concentration
    - New Fish: 0.5% - preventative treatment
    - Sick Fish: 1.0% - therapeutic treatment

Salting Calculations

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Salt Treatment Table

30 Minute Treatment Concentration

Flow (gpm)	0.5%	1%	2%	3%
1	1.25	2.5	5	7.5

Water flow x Treatment concentration =

Pounds of salt needed

New Fish (0.5%) example: 144 gpm x 1.25 = 180 lbs

Sick Fish (1.0%) example: 144 gpm x 2.5 = 360 lbs

Salt

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- Are you able to adjust the flow for less salt?
  - Less flow = money saved
- High granular salt
  - No additives
    - Farm supply stores

Fish Care

Fish Care

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- Observe the fish!
  - Riding high or Crowding the intake or aerators?
  - Evenly spaced out?
- Observe the temperature!
  - Water temps over 65°F?
    - Hold Feed!
  - Water temps below 38°F?
    - Drop back in pellet size
    - Feed slowly – less waste!
    - Alternate feeding days

Fish Care

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- Pick ALL the dead – not just floaters!
  - Dead fish are a “nursery” for diseases and parasites!
    - Separate nets and top-down method
    - Record the mortality trends
- Salt fish if necessary & hold feed!
  - Clean up fish waste
  - Clean up uneaten feed in the raceway

Sick Fish

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- When to call the CNU?
  - After salting and still losing fish
  - Open wounds or rotting caudal fins
  - **Call the office phones and ALWAYS leave a voice message!**
  - Call more than one person
  - Call the cell phone last

Sick Fish:
Parasites and Bacteria

Parasites

Common to most water sources:

Springs, surface and wells!

Sick Fish - Parasites

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- **Gyrodactylus** – monogean fluke
  - Hooked anchors and feeds by releasing a digestive solution with enzymes which dissolves the fish skin
  - Fish will produce excess mucus to shed parasites or scrape walls and bottoms of raceway – "**flashing**"

Sick Fish - Parasites

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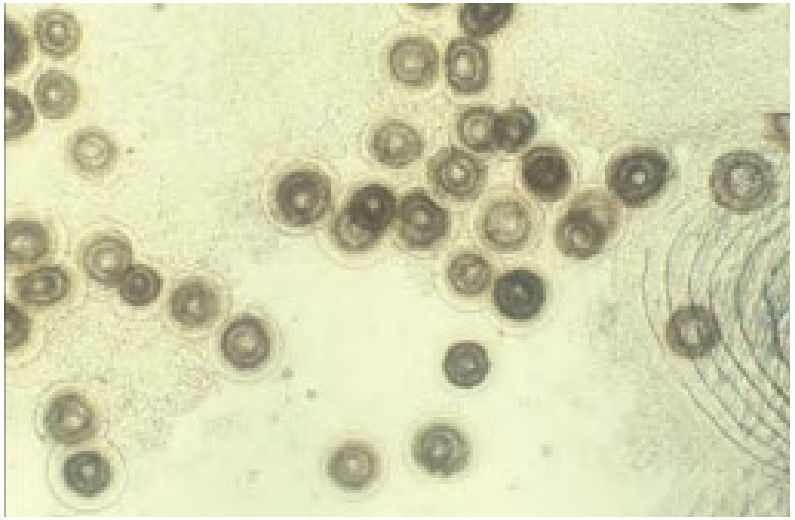
- **Trichodina** – ciliated protozoan with scraping teeth
  - Irritates the **skin** which can cause tissue damage and allow for infections
  - Irritates the **gills** which leads to gas exchange issues



Sick Fish - Parasites

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- **Epistylis**- ciliated protozoan
  - Not a true parasite – uses the fish as a sub straight that **causes tissue damage** from secreted enzymes
  - Found in slower water flows with **heavy organic wastes**

Sick Fish - Parasites

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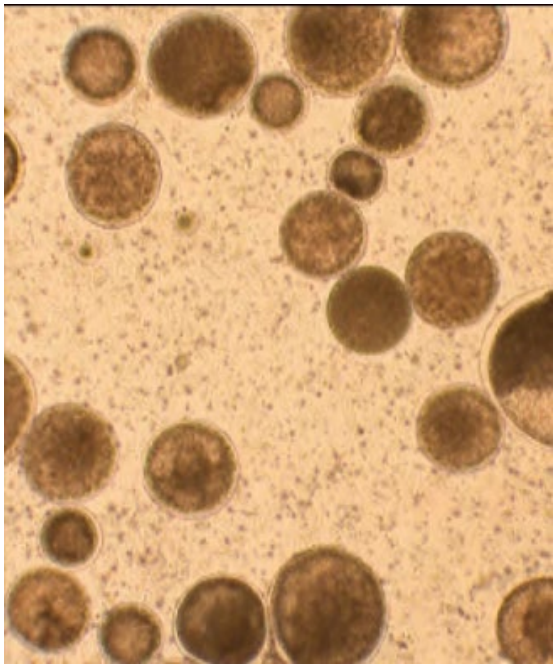
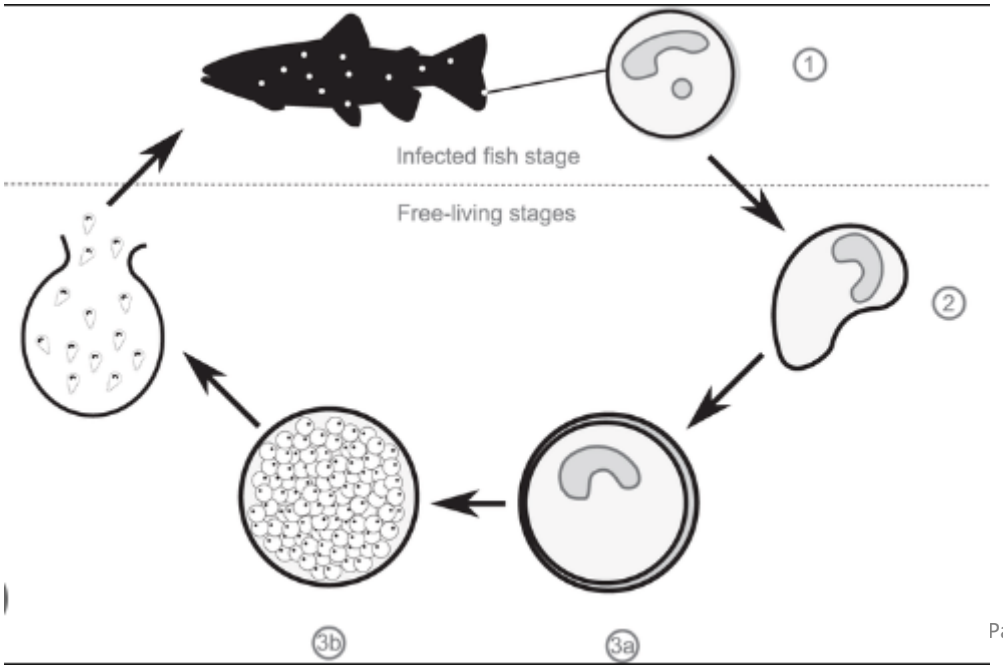
- **ICH** (white spot disease)- protozoan
  - Affects fish and amphibians worldwide
  - Life cycle is temperature dependent
    - 68-77°F common, happens at 33°F
    - Can complete the cycle in 8 hours!





Bacteria

Bacteria

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- **Bacterial infections are a common** problem in nursery operations
- **Internal** infections could occur shortly after fingerlings are received from the hatchery
  - Brought on by the handling, hauling and change of water quality on the fish
  - **Stress Related**

Sick Fish - Bacteria

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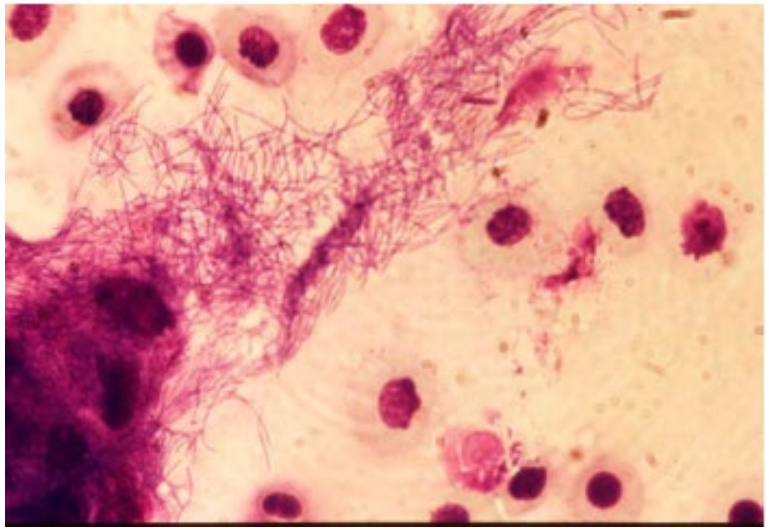
- **Bacterial Gill Disease** (*Flavobacterium spp*)
  - External
  - Result of overcrowding, excessive ammonia and low Dissolved Oxygen, and suspended organic matter
  - Treated with Chloramine - T



The Journal of Fish Disease | Wiley Online Library

Sick Fish - Bacteria

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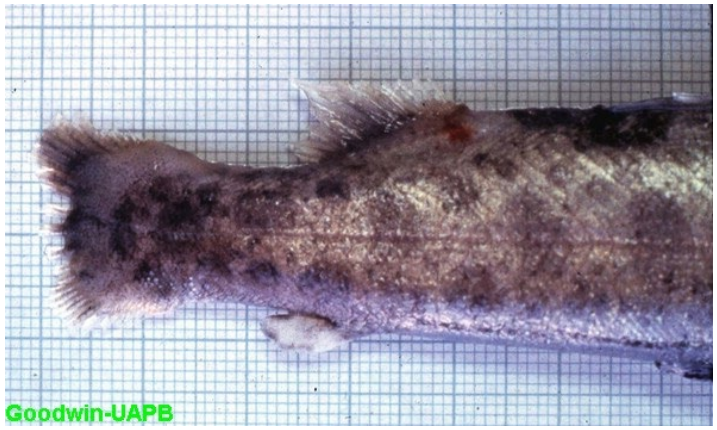
- **Bacterial Coldwater Disease**
  (*Flavobacterium psychrophilum*)
  - Internal
  - Found worldwide
  - Mostly affects Rainbow Trout
  - Requires VFD for treatment



Sick Fish - Bacteria

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- **Furunculosis** (*Aeromonas Salmoncidia*)
  - Internal
  - Found worldwide in fresh and marine water
  - Increases in warmer water temps
  - Mostly affects Brook Trout
  - Requires VFD for treatment

VFD

Veterinary Feed Directives

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- A **Veterinary Feed Directive (VFD)** is, under the law of the United States, a written authorization allowing animal keepers to use animal feed containing specified antibiotics in accordance with Food and Drug Administration (FDA) approved directions for use.

Veterinary Feed Directives

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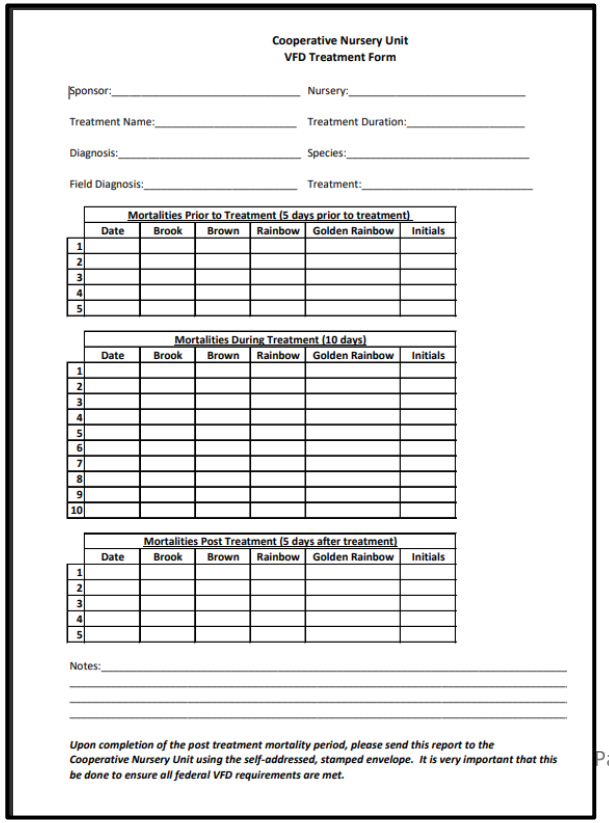
- Medicate for the whole duration
- Pick all the dead fish
- Fill out the Treatment form completely and send back to the CNU!
  - It's required by the VFD
  - We could lose the ability to use VFDs when audited!



Cooperative Nursery Unit
VFD Treatment Form

Sponsor:_____ Nursery:_____

Treatment Name:_____ Treatment Duration:_____

Diagnosis:_____ Species:_____

Field Diagnosis:_____ Treatment:_____

Mortalities Prior to Treatment (5 days prior to treatment)

	Date	Brook	Brown	Rainbow	Golden Rainbow	Initials
1						
2						
3						
4						
5						

Mortalities During Treatment (10 days)

	Date	Brook	Brown	Rainbow	Golden Rainbow	Initials
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						

Mortalities Post Treatment (5 days after treatment)

	Date	Brook	Brown	Rainbow	Golden Rainbow	Initials
1						
2						
3						
4						
5						

Notes:_____

Upon completion of the post treatment mortality period, please send this report to the Cooperative Nursery Unit using the self-addressed, stamped envelope. It is very important that this be done to ensure all federal VFD requirements are met.

Post Treatments

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- Continue to monitor mortalities
- Contact the CNU if mortalities continue
- Slowly bring fish back on regular feed cycles
- Save the containers and give them back to us

Fish Kills Happen

Loss Preventions

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- Fish Kill Preventions
  - Watch the weather for storms
    - Low Pressure = Lower Dissolved Oxygen
  - Hold feed
    - Low D.O. + Feeding = Fish sickness
  - Intake area clean up
    - Keep leaves and brush clear
  - Aeration and screens - be proactive
    - Keep clean of build up

Fish Kills

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- Fish Kill Actions
  - DO
    - Dispose of all fish properly
      - Farms or Dead pits?
      - Compost?
    - Notify CNU
  - DO NOT
    - Discard out in the open for anyone to see
  - What would you want to see done?

Exchange Rate

Exchange Rate

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- The number of times the water exchanges in the raceway –
  - The ‘new’ water flowing in and over the fish
  - Three exchanges per hour is ideal – more is better!
- Having deep water isn’t always the best for the fish
  - Deeper water is not colder water

Exchange Rate Calculations

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- Depth of raceway (average)
- Width of raceway
- Length of raceway
- Water flow in gallons per minute (gpm)

Exchange Rate – Example 1

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- Two-foot-deep raceway, 144 gpm:
  - **2’** (depth) x **4’** (width) x **25’** (length) = <u>200 cfw</u>
  - 200 cfw x 7.48 (gal/cfw) = 1,496-gal water
  - 144 gpm x 60 min/hr = 8640 gph
  - 8640 gph / 1,496-gal water = **5.77 exchanges per hour**

Exchange Rate – Example 2

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- 1 ½ -foot-deep raceway, 144 gpm:
  - **1.5'** (depth) x **4'** (width) x **25'** (length) = 150 cfw
  - 150 cfw x 7.48 (gal/cfw) = 1,122-gal water
  - 144 gpm x 60 min/hr = 8640 gph
  - 8640 gph / 1,122-gal water = **7.70 exchanges per hour!**

Lower Water Depths

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- Lowering your water depth in Summer and Fall may help:
  - Flush out solids out of the water column
  - Flush out high Ammonia concentrations
  - Rejuvenate the water with cooler temps and higher Dissolved Oxygen
  - Make your fish happier

Best Advice -

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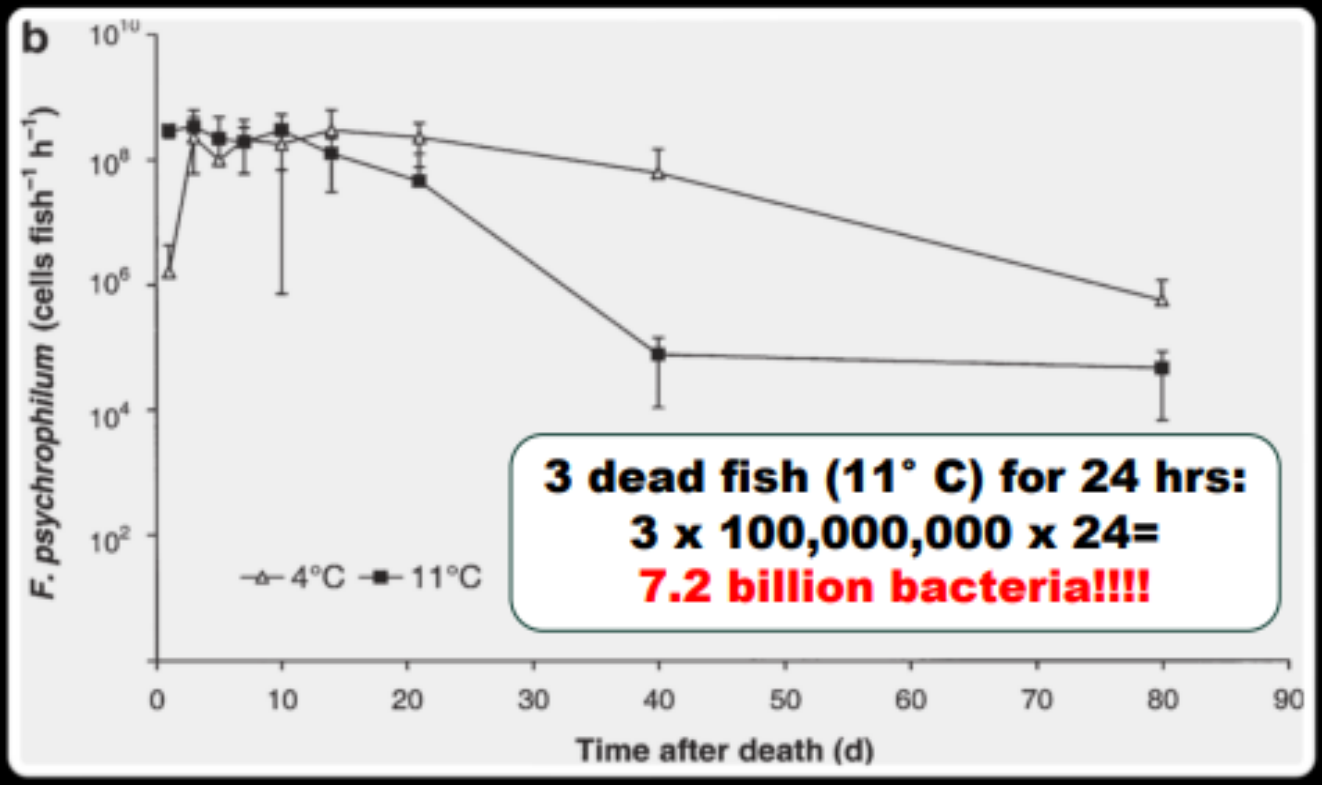
- Pick **ALL** the Dead Fish!

Dead Fish Even More Important?



Madetoja, J., Nyman, P., Wiklund, T., 2000. *Flavobacterium psychrophilum*, invasion into and shedding by rainbow trout *Oncorhynchus mykiss*. Dis. Aquat. Org. 43, 27-38.

Thank you!

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- Question?