

# What's wrong with living in filth?



# Maintaining a Clean Rearing Environment

- It is important to keep containers clean because:

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- It is important to keep containers clean because:
  - Reduce the amount of particulates in the water, minimizing gill irritants.
  - Remove fecal matter and uneaten feed.
  - Less organic material in a raceway will make chemical treatments more effective. Organic material may bind with some drugs being used for treatment and make it less effective.
  - Outlet screens remain clean longer.
  - Removal of dead or dying fish daily will reduce the spread of disease.



## Fish rearing container basics:

- containers should be cleaned as needed
- Mortalities should be removed daily (or as needed).
- Clean outlet screens – or else!
- Disinfect equipment between raceways. (what would you use for this?)
- Disinfect containers once fish are out of it. Steam or sun-drying is preferable



# Cleaning Methods

- There are two primary methods of manually keeping containers clean:
  - Vacuuming
  - Brushing
- Clean as needed!
- You can potentially do more harm than good. How is that so?

# Vacuuming

- Need to either create a siphon or pump
- Where is the “stuff” going to go?
- How do you keep from sucking up fish?





**Some raceways may have an area at the tail section to allow solids to settle out**

The problem is – where does that stuff go?

This is a state facility in the midwest – most lower 48 hatcheries discharge into river systems →



# Effluent Standards

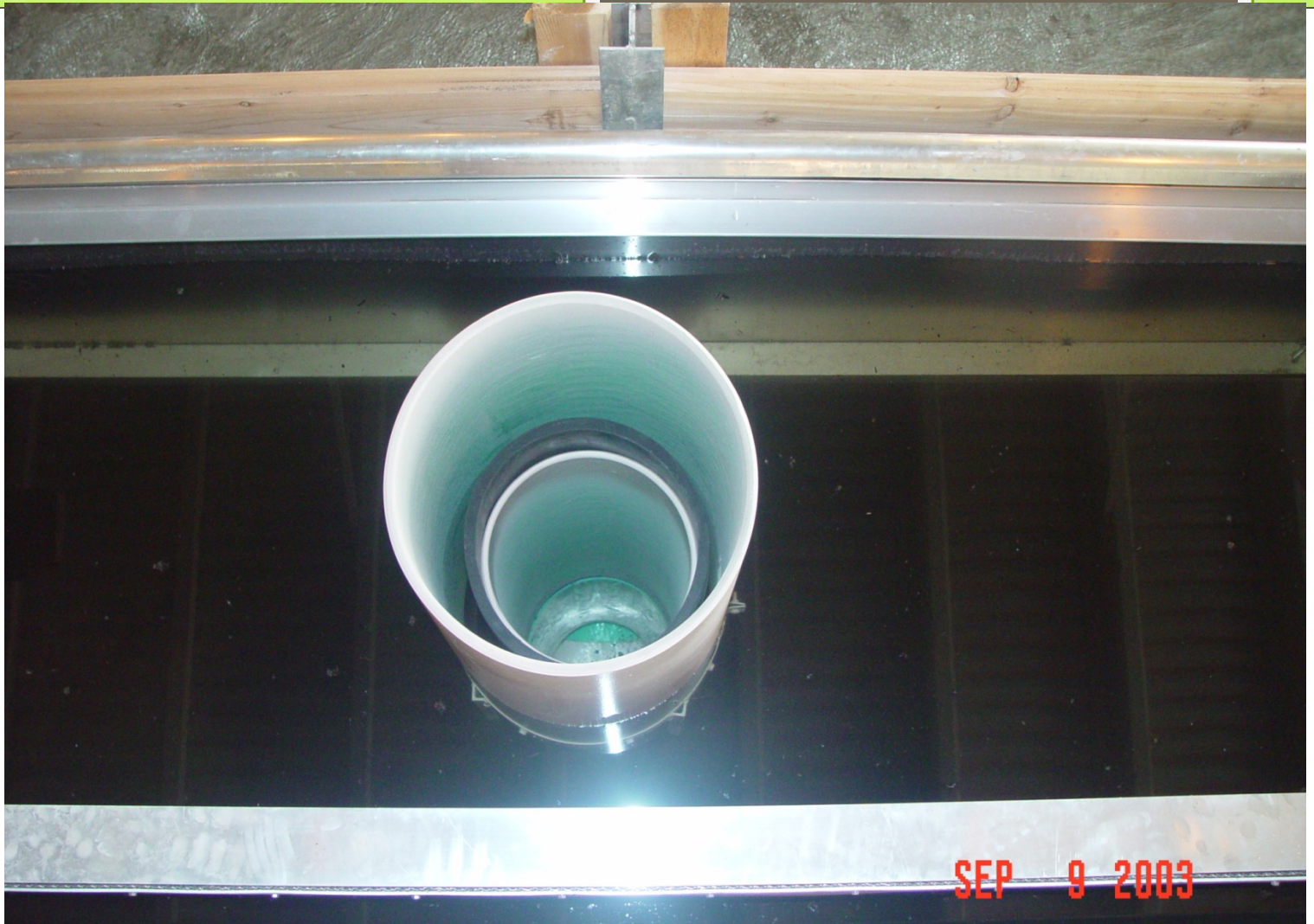
- Effluent Limitations for Discharge of Hatchery Waste from Raceways
  - Effluent sampling is conducted May – October during peak rearing months.
  - pH (range) 6.5 – 8.5
  - Settleable Solids
  - Total suspended solids
    - Monthly avg. not to exceed 5.0 mg/l
    - Daily max. not to exceed 15 mg/l
- Effluent monitoring is especially critical when discharged into a stream/river system





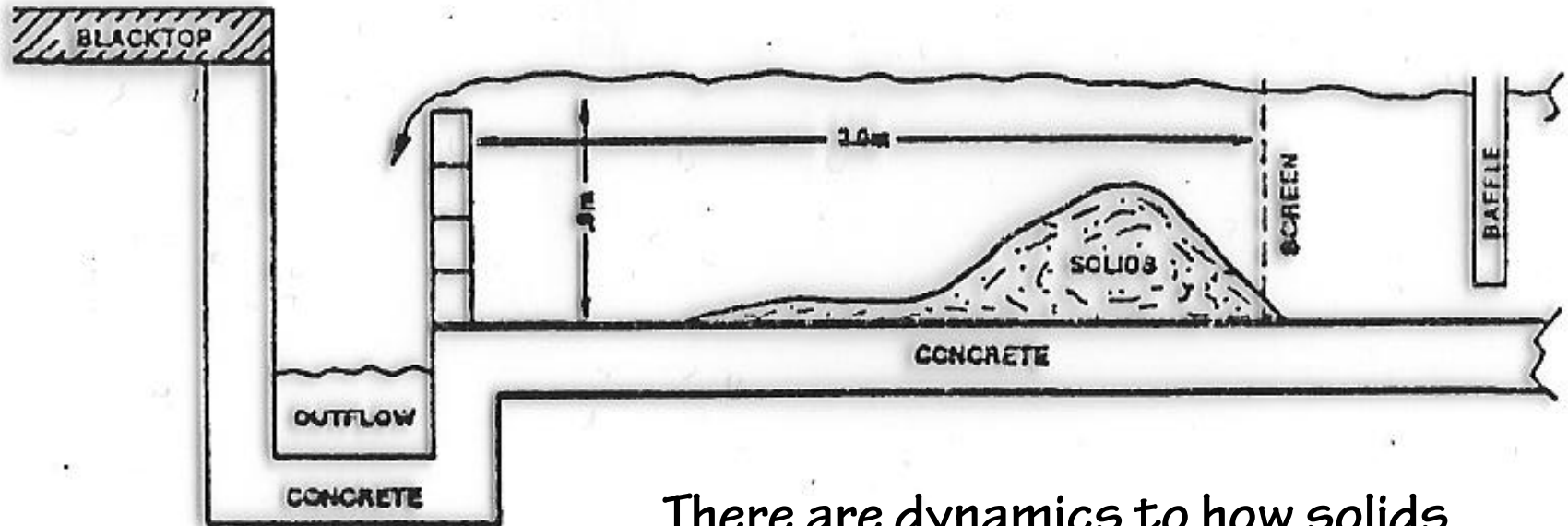
Here there is a pipe within a pipe. You are looking at the outer pipe. Better photo on next slide.

Standpipe cover, allows effluent to be pulled from the bottom



Looking straight down at the standpipe. The outer pipe allows effluent to be pulled from the bottom while the inner pipe leads to the drain.

## Solids Settling Characteristics in Raceways



There are dynamics to how solids settle out in a raceway – knowing how this works can greatly reduce labor and keep container much cleaner



- Advantages of vacuuming
  - Doesn't stir up debris
  - Is physically easier than brushing
- Disadvantages
  - Sucking up fish!
  - Time consuming
  - Breaking impellers
  - If using a gas engine the equipment is noisy
  - Difficult to disinfect equipment between tanks



# Brushing

- Starting at the head end, the bottom is brushed as you work a section at a time toward the tail end.
- During brushing it is necessary to intermittently draw down the water level to create a flushing/drain down action to force suspended debris to the tail end of the raceway and through the screens.
- Watch the tail screen!
- You want this to be pretty fast – don't want fish wallowing in poo for very long!





The broom that flies underwater

It is the shape that makes the broom dive to the bottom for the cleaning pressure that is needed for an exceptional cleaning job.

The Warren Water Broom has been a mainstay in the hatchery business for over three decades. It is an extreme pond cleaning device that has stood the test of time and durability over the long haul. It is milled from UHMW plastic and has replacement bristles. Overall it is a broom made to be sanitized easily and used for many years.

24" Warren Water Broom **\$49.50**

36" Warren Water Broom **\$72.50**

24" Lightning Broom **\$52.50**





- Advantages of brushing:

- Fairly quick method
- Brushes are cheap and easily replaced.
- If done gently, works well with small fish.

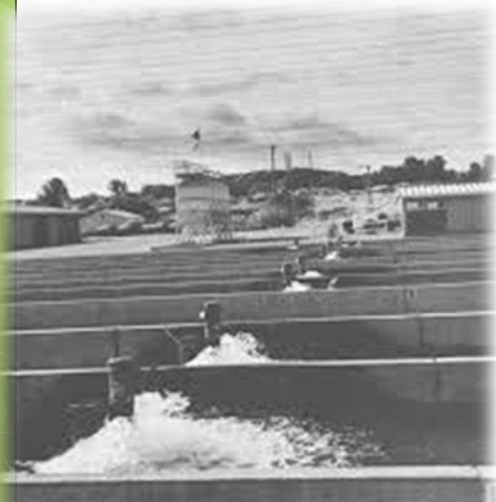
- Disadvantages

- Does not clean as effectively as vacuuming.
- Labor intensive, physically demanding.
- If you are not patient this methods stirs up a lot of feces and debris which can do a lot of damage to fish



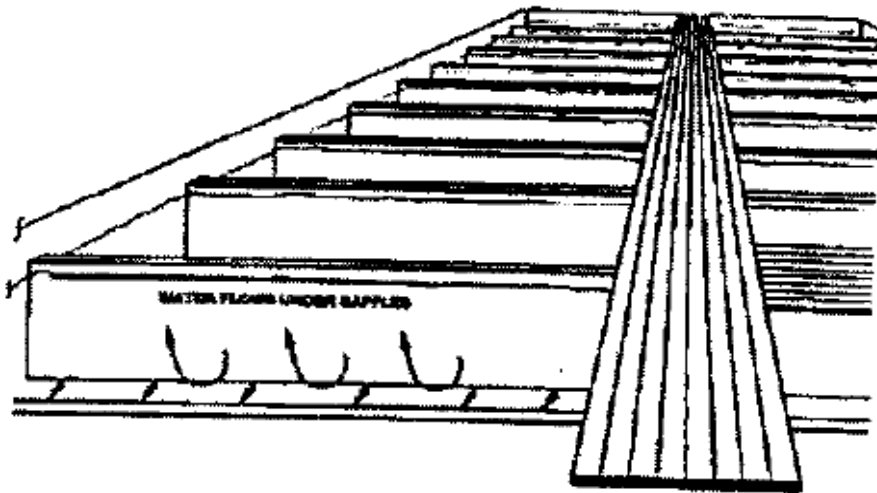
# Other methods of cleaning:

- Baffles: travelling and stationary
- Adjust densities and placement of fish
- Self-cleaning design
- Mechanically influence the flow
- Put a bunch of sturgeon in the container!



Fixed baffles in raceways create high flow at certain points and move material downstream 24/7.

Figure 6. Raceway equipped with baffles.



# Traveling Baffle



[http://www.vmgindustries.com/raceway\\_main.html](http://www.vmgindustries.com/raceway_main.html)



# Baffled Raceway





# Predators



**STUPID PEOPLE**

Sometimes they come labelled



# Predator Control



- Mort picking in saltwater pens
- River otters are a real problem here





Bird covers  
are  
essential



Indoor  
rearing

# Bears



- Going after broodstock
- Feed rooms
- Rearing ponds
- On-site housing

*Electric fences, tasers, rubber bullets, noise making devices*



# Alarms and Potential Problems

- Hi and Low water level alarms
- Intrusion alarms
- Flow Alarm
- Pressure Alarms – Mercury Switch
- Phone dialers



*A few site visits to show  
diversity of containers and  
layout*

# Bonneville Hatchery – rearing and adult holding











Bonneville Hatchery – near  
Portland

Captive broodstock  
program











Willamette and Leaburg hatcheries - Oregon









## Trail Lakes – indoor rearing







## Trail Lake – start tanks and outdoor rearing



## Gunnuck Creek – Kake







## New Sawmill Ck hatchery - Sitka

