

Upwelling Incubator Modifications

Or

'Go Up Young Man, Go Up!'



Freshwater Fisheries Society of British Columbia

Kootenay Trout Hatchery

- ✦ Located in SE British Columbia
- ✦ Produces rainbow & westslope cutthroat trout, brook char
- ✦ Brood stocks for Gerrard rainbow and XX male brook char
- ✦ Conservation hatchery for Kootenay and Columbia River white sturgeon
- ✦ Eyeing station for kokanee salmon



Kokanee Salmon Program

- ✦ The first priority is for the provincial stocking program (which requires approximately 1,000,000 eggs)
- ✦ Requests from outside agencies for eyed eggs are filled on an as available basis
- ✦ Egg availability can be highly variable as we depend on natural runs
- ✦ 2003 requests for 5.7 million eyed eggs, including 4.6 million for US agencies; this seemed highly unlikely
- ✦ Two weeks before the Meadow Creek station opened the fish showed up and the goal suddenly looked possible



Isolation Incubation Facility



- ✦ Built as a stand alone unit
- ✦ Operated as a quarantine unit until pathological examinations are complete
- ✦ Capacity for 16 upwellers @ 120-150,000 eggs
- ✦ For kokanee, 16 X 137,500 eggs = 2,200,000
- ✦ Up to 6 vertical stack incubators can also be installed for hatch out
- ✦ Maximum flow available is 300 l/min; 78 US gal/min)

Incubation system

- ✦ Since 1994 we have utilized the Ennis-style upwelling incubator
- ✦ 22.7 liter (5.9 US gal) bucket, fitted with 2.5cm (1") piping
- ✦ Uses 15-18 liters (4-5 US gallons) per minute
- ✦ Main feature is the diffuser plate which has a limited number of holes (8-10% of open area compared to standard perforated screens. Helps to reduce uneven flow or dead areas)



The Plan



- ✦ 3.3 million eggs assigned to Kootenay Hatchery
- ✦ 2.75 million eggs assigned to Clearwater Hatchery
- ✦ Kootenay's capacity was 2.2 million eggs
- ✦ Plan was to build six 110 liter upwellers each with a capacity of 600,000+ eggs
- ✦ The containers were ordered and promised by Sept. 16, but didn't arrive until after all eggs on site
- ✦ Eggs were to begin arriving Sept. 18
- ✦ A new approach had to be formulated at the last minute.

What do we now?



EUREKA!!!!



It works, 115%!

- ✦ By adding the 2nd bucket on top of the first, we went from 17 liters of useable volume to 36.75 liters
- ✦ Over double the volume while utilizing basically the same flow.
- ✦ It appears that the flow required to run the upweller is dependant on the diameter of the unit with the height or depth making little difference
- ✦ The most noticeable effect is that getting the upwelling effect takes slightly longer, so patience is a key



Working on the eggs

- ✦ The eggs were loaded using a sieve
- ✦ Disinfecting the eggs required some modification to our upwelling disinfection system
- ✦ Shocking the eggs was done by the siphon method
- ✦ Eggs were sieved out for loading into the egg pickers
- ✦ Overall, they were easy units to work with slight modifications to the various methods



Costs

✦ Per unit cost of the original
Ennis – style upweller :
parts - \$35.50 CDN
labor - \$81.25 CDN*
total - \$116.75 CDN
 \$87.80 US
* 3.25 hrs @ \$25/hr

Per unit cost of
modification:
parts - \$ 5.00 CDN
labor - \$25.00 CDN*
total - \$30.50 CDN
 \$22.55 US
* 1 hr @ \$25/hr



The Next Generation



- ✦ "Burt" – 110 liter upweller
- ✦ Capacity of 750,000 kokanee eggs, (93 liters of useable volume)
- ✦ Flow rate 33-35 l/min
- ✦ Provides 5 times the egg capacity for twice the water useage of the original Ennis upweller
- ✦ Key feature again is the diffuser plate, which back pressures the water to provide even distribution, no dead spots

Parting comments



- ✦ “God gives us wonderful opportunities brilliantly disguised as impossible problems.” Swindoll
- ✦ Hang in there, the solution will come.
- ✦ Talk it over with some people with a different perspective, they may see it from a fresh angle
- ✦ Share your successes at next year’s NWFCC in Victoria!