Bivalve Hatchery: An Outline of Maintenance Senses and Vigilance

Seawater Source

- Ambient vs well
    - Algal use vs larval use
- Watershed- vigilance
- Intake location & maintenance (PVC is cheap compared to failed broods)
    - Redundant vs annual replacement

Filtration

- Primary
    - Sand
        - Annual maintenance
        - Regular disinfection-bleach
        - Tough to keep clean
    - Tank settlement/storage
        - Clean regularly
        - Dual for daily use is best
- Secondary
    - Cartridge
        - Expensive
        - Reuse
            - Freshwater soak
            - Watch bleach use
    - Polyester felt bag
        - Washing machine reuse
        - Watch wear & tear
- Tertiary
    - Activated carbon
        - Helps remove organics
        - Change media and keep clean
            - Foam fractionating helps first
    - Ozone-dry air is critical
    - Ultraviolet light
        - Maintenance
            - Quartz sheath cleaning
            - Bulb replacement-annual?
- Air
    - HEPA intake filters
    - Algal
        - Bacterial filters
            - Expensive but reusable (autoclavable)

Maintenance

- Cleaning
    - Organic cleansers
    - Bleach (10ml/ L freshwater)
    - Thorough rinsing
- Tanks-daily
- Screens & tools-daily
- Seawater hoses-weekly
    - Keep off floor
    - Overnight bleach soak & rinse
- Plumbing
    - Design for easy drainage
    - Overnight freshwater soak-weekly
    - Bleach treatment & flushing-weekly?
    - Watch for blue-green algae growth

Management

Observation is critical

- Algal growth
    - Color vs luster
    - Mucilage-older cultures
    - Contamination
        - Bacterial
- Larval growth
    - Wide size range
        - More food
        - Mid-brood screening
        - Runt riddance- plus & minus
    - No growth
        - Toxicity-blower story
        - Heavy rainfall or river discharge
            - High organics-foaming of raw water
                - High COD
                    - Humic and Tannic Acids-brown water
                        - Acidification
                            - Aragonite saturation
                                - pH
                                - alkalinity
                                - hardness
    - Bacterial contamination
            - Vibriosis
                - Bag culture systems
                - Tank bottoms of affected larvae
                - Broodstock in flow of contaminated water

        - Areas with high humidity in the hatchery
        - Wet areas that have high air flow - air coolers and condensation
        - Thio-sulfate concentrate that incubates for >1-2 days
    - Bacterial monitoring and management
    - Brood stock source, condition and management
    - Larval and juvenile handling and management
    - Micro-algal food culture management
        - Clean stock cultures
        - Uncontaminated water
        - Clean techniques
    - Water source(s), quality and management

Measured parameter	Approximate recommended range
Rearing water temperature	Depends on species reared.
pH	7.8 to 8.4 units
Salinity	Depends on species reared
Dissolved oxygen	> 5.0 mg/L, < 5% over saturation
Oxidation reduction potential (ORP)	150-250
Nitrogen cycle	*Ammonia:* Wildly variable; check PAN database for specific organism: 1% of LC50 for target species may be safe. 0.1ppm generally safe. *Nitrite:* Wildly variable; check PAN database for specific organism: 1% of the LC50 for target species should be relatively safe. .2 ppm should generally be safe. *Nitrate:* Wildly variable; check PAN database for specific organism: Canadian guidelines = 16ppm in SW
Copper	None detectible
Hypochlorite	None detectible
Alkalinity	110-140; few adverse consequences if higher than ca 200 ppmCaCO3. Also measured as dKh (norm 6-7; tolerable to 11) and meq/l (2.1-2.5 = norm)
Total dissolved gas saturation	< 5% greater than saturation

Source: Ralph Elston

Adding bicarbonate (HCO_3^-) increases [H^+] and decreases pH

Adding carbonate (CO_3^{2-}) consumes [H^+] and increases pH

Sodium carbonate (soda ash) may be added to increase alkalinity, and also raises pH

Sodium bi-carbonate (baking soda) may then be needed to reduce pH and further increases alkalinity