Aquaculture in North Carolina: Species Selection and Production

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Aquatic Species Farmed in NC- 2012

- Black Sea Bass
- Catfish
- Clams
- Crawfish
- Freshwater Prawn
- *Flounder
- *Hybrid Striped Bass

- Large Mouth Bass
- Ornamentals (Koi)
- Oysters
- Soft Shell Crabs
- *Tilapia
- Trout
- Yellow Perch

*2011 Aquaculture Farm Gate, Processed Product, and Feed Value = $53,819,237

*Tank Reared
How to Determine Which Species to Produce

Facility requirements
- Infrastructure needs
- Capital costs
- Available resources
- Labor
- Variable (operating) costs

Management requirements
- Compatible culture practices
- Time to market...cash flow
- Availability of seed stock
- Access to markets
Production Methods: Recirculating Aquaculture Systems vs. Ponds

• **RAS**
  – Indoor, tank production
  – Efficient use space/resources...lbs/gal
  – Operator control
  – Less labor
  – Intensive electronic technology
  – Requires 24/7 mgmt.

• **Pond**
  – Outside, levee ponds
  – Large land area
  – Weather/seasonal condition effects
  – More labor
  – Daily/weekly mgmt.
Channel Catfish

- 5-10 acre pond
- Stock 6000/acre
- 6” fingerlings best
- 26%-32% protein feed
- 12 months to first harvest
Partial Harvest 2-4 times/year/pond
Channel Catfish

- Restock annually after harvest
- Seine mesh-size grades fish
- Carolina classics processor/ marketer
Hybrid Striped Bass

- **Stock in June-Aug**
  - Harvest 14-18 months

- **Single Phase**
  - Stock 3200-4500/acre
    (single stock/ phase II)

- **III Phase**
  - Stock 12,000-16,000/acre
  - “Split Pond Oct-Feb
  - Grade and re-stock
Hybrid Bass: Harvesting and Post-Harvest Handling—“on-ice”

- Harvest with Seine
- Chill-stun in ice slurry
- Box in ice, ready for shipment
Hybrid Striped Bass: “live-market”

- Fish carefully removed from pond
- Held for a few days to purge waste
- Fish hauled to metropolitan niche markets

Live markets are highly competitive!
Freshwater Prawn

- Pond design critical
- Stock 12,000/acre in May
- Keep pH below 9.5
- Feed acts as fertilizer
- Harvest Sept-October

*Harvest success based on stress management and accurate count!*
Freshwater Prawn: Drain Harvesting

- **harvest >62°F**, avoid “Scrapping out
- **Prawn collect in pond depressions, even footprints**

Notice how smooth the pond bottom is; excellent for prawn to walk to basin

Low oxygen and getting mud in the gills causes stress and can increase mortalities
Freshwater Prawn: Post harvest Handling/transportation

- Must organize workers:
  - 3 in harvest basin
  - 3 loading
  - 2 reading scales

- Need enough tools, equipment for efficient harvest
  - No time to share nets!

- About 80% of Prawn collected during last hour
  - No time to waste!!!!

Equipment has been greased, fueled, repaired days before harvest.
Freshwater Prawn: Purging

--Increases “shelf life”
-Improves flavor/texture
-Makes ready for processing or live hauling

-Need to use pure oxygen
-Available fresh water necessary
-Covered work area essential!
Freshwater Prawn: Purging/Short-term Holding

- Water re-use system for live haul
- Chill water to reduce stress
- Air and O2
- Pond water available for acclimation
Chill-Stun for Quality Control

- Best results were to chill to about 62°F (well temp)
  - Easy to handle

- Keep O2 at saturation, best

- Prawn were chill-stunned when processed

- Ice bath needs to be as cold as possible (<38°F)
  - Replenish ice frequently!
  - Insulate container best
  - Stir well to insure cold water reaches all prawn
  - Chill to “core”

- Need 1–1.5 lbs ice/per pound prawn
- Chill–stun 40 minutes max.
Freshwater Prawn: Post harvest Handling/transportation

- Plastic, insulated “totes”
- Oxygen critical
- Cages to keep separated

- Can use this system for “live-hauling”
RAS Production

• Highly “intensive” production
• Suitable for most species
• Efficient use of space
RAS: Particulate Filtration

- Primary filtration
- Removes waste particles
- Many types
RAS: Biological Filtration, Oxygenation

- Removes dissolved waste
- Media type and surface area critical

- Oxygen cone; highly efficient
- Necessary for fish and biofilter
Stocking

• Accurate counts are critical!
• Examine stockers to ensure health

• Acclimate for:
  - pH and temp.
Feeds

• Generally formulated to supply complete dietary needs.
  * Larvae = “Meal” type small, micro-particulate feeds.
  * Fingerlings = small crumble or pellet, high protein.
  * Growout = larger, lower protein.
    - Usually floating.

• Vary with season, size and life stage of fish.
  * Winter feeds = less protein.
Feed Storage

- Order enough to justify shipping
- Bulk generally cheaper
- Store bags dry
Feeding

- Feed 1-2 times daily to *near* satiation
- Blow feed across large area
- Reduce feeding as temperature decrease
- Feed = ½ cost of production!!!
- Note fish behavior
  - *Best management tool*
Pond Management = Water Quality

- Dissolved Oxygen
- $\text{NH}_3$ Waste byproduct
- $\text{pH}$ and $\text{CO}_2$
- Hardness/Alkalinity
- Temperature
- $\text{NO}_2$ and Salt

Fish do best under stable environmental conditions. Raising fish outside of preferred conditions results in stress, often leading to disease.
Water Quality: Testing Tools

- Chemical Test Kit
- Oxygen meter
- pH meter
Aquatic Weeds

- Many types: *submersed & immersed plants, and algae*
- Thrives in high nutrient loaded (feed waste) water

- **Filamentous** algae - interfere with feeding/harvesting
- **Planktonic** algae cause low D.O.’s, off-flavor, and fish toxins
- All weeds managed chemically and biologically