Shellfish Hatchery Seed Supply: Alternate and Emerging Species

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December 6 2017

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July 2009 – Official opening of the ERB shellfish hatchery in Shippagan NB

2016-2017
Completion of the land-based nursery system

Capacity 360 - 18’’ upweller units
Pumps - 10,000 L/min

Present structure of our company

Martin Mallet: responsible for hatchery, nursery operations and seed sales. He has a PhD in evolutionary genetics and is currently involved in incorporating a genetic improvement program to govern the propagation of our hatchery broodstock.

Marc André Mallet: BSc in biology and responsible for field production, packing plant, and sales of market-sized oysters

André Mallet: President and PhD in quantitative genetics.

Alternate or emerging species

- Developing the production protocols/marketing strategy for a new species is a long and expensive process with no guarantee of success!
- However, if successful, the ROI will make the process worthwhile
- Two examples of emerging species in Atlantic Canada that became commercial species:

  Mussels – timeframe >10-12 years

  Oysters – timeframe > 40-50 years
  (only in the past 10 years have cultured oysters moved into the commercial realm)

General constraints for emerging species

Seed supply (wild or hatchery sources): seed for most shellfish species can be produced in hatcheries. However, often commercial hatcheries have little physical space available for small specialized orders.

Production strategy (technology, biology and husbandry): this is by far the most expensive and significant roadblock in bringing a species to commercial status. High recovery of seed at a marketable size is essential (survival), as are well-planned production scenarios with efficient technology (lower production costs and predictable outputs).

Market demand: Ultimately, if no significant sales, NOGO and the status of "Emerging species" is maintained (e.g. bay scallops).

Status of shellfish species in terms of commercialisation

Cultured Species	Seed Supply W=wild H=Hatchery	Production strategy	Market demand
Mussels	W	Yes	Yes
Oysters	W / H	Yes	Yes
European oysters	X	Yes	Yes
Bay scallops	H	Yes	X
Sea scallops	W / H	?	Niche
Soft-shell clams	W / H	?	Yes
Quahogs	H	?	Yes
Bar clams	H	?	?
Razor clams	X	X	X

Possible explanations for hatchery failures

Advent of a disease agent

- This was probably what led to the demise of the European Flat oyster in NS – high mortality in the cultured stock followed by hatchery production issues.

Water quality

- *Mountain Island* hatchery (NS) negatively affected by effluent from the local Canexel plant
- Changing conditions – e.g. ocean acidification on the West Coast
- Unstable incoming seawater - fluctuating salinity or high turbidity

Knowledge-based business (expertise)

- The devil is in the details…hatchery operations are complex
- Need to produce a significant seed inventory reliably in a timely fashion – this requires highly-dedicated competent staff, efficient system design and proper husbandry methods
- Compared to other regions of the world, our long winter period increases our cost of operation, augments the risk of loss, and reduces potential seed output

Substantial investment and no guarantee of success

Economics – balancing high expenses and uncertain revenues

Novostrea (***Crassostrea gigas)*** – large hatchery opened in Bretagne, France in 2012 but after 3 years of operation, a high natural oyster settlement in Arcachon led to a substantial drop in the price of seed and the business failed.

FRDL (Sea scallops) – well financed through National Sea Products and R&D grants from ACOA, IRAP and the Nova Scotia government. Successful hatchery protocols were developed after 5 years of R&D but the inability to grow a market-sized inventory at a reasonable cost led to a shut-down of the operation.

Mountain Island Hatchery (European oysters) - well financed by a Dutch business man who hired one of the most knowledgeable hatchery scientists of the time. Hatchery and field production issues eventually led to closure of the operation.

Reality check for operating a shellfish hatchery in Atlantic Canada

- Shellfish hatcheries are feasible, but the goal must be well-defined (research, commercial, restoration)
- If a commercial hatchery is integrated in a grow-out operation, then the long-term survival is more secure since $$$ can flow to support the initial phases of hatchery development
- Production problems will arise – important to have R&D-trained professional staff capable of addressing issues in a scientific manner
- Designing/operating a shellfish hatchery to support the development of an emerging species will require important financial support, either privately or long-term R&D grants
- The right intellectual partnership is crucial to develop the appropriate systems and implement the best production strategies

Conclusions

- Species diversification is a desirable objective for our shellfish industry. It is, however, a capital-intensive proposition!
- High-valued shellfish species, especially those without a significant public fishery, are preferred candidates. Niche markets can be developed, but it is difficult to develop an aquaculture species next to a public fishery.
- If possible, developing production gear, handling strategies and markets with wild-collected seed is a wise approach
- Commercial hatcheries will likely not have significant research space to develop protocols for emerging species
- Research hatcheries dedicated to emerging species will need to be well financed either from private equity or long-term research grants in order to sustain operations and support competent R&D staff
- Success is feasible, but the financial risks are very high!!!