

Development of wolf eel aquaculture in BC



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VanAqua Propagation Lab

Why wolf eels?

- Relatively easy to culture, grow fast, taste good

Sustainable aquaculture addresses conservation issues related to wild harvest of:

- (1) eels (European, Japanese)
- (2) white flesh fish (sablefish, halibut)



Wolf eel Aquaculture: Is it do-able?

Basic Research Questions:

1. What and how do we feed them?

Feeding Studies at CAER (diet & ration)

2. How do we grow them out – densities, tank design?

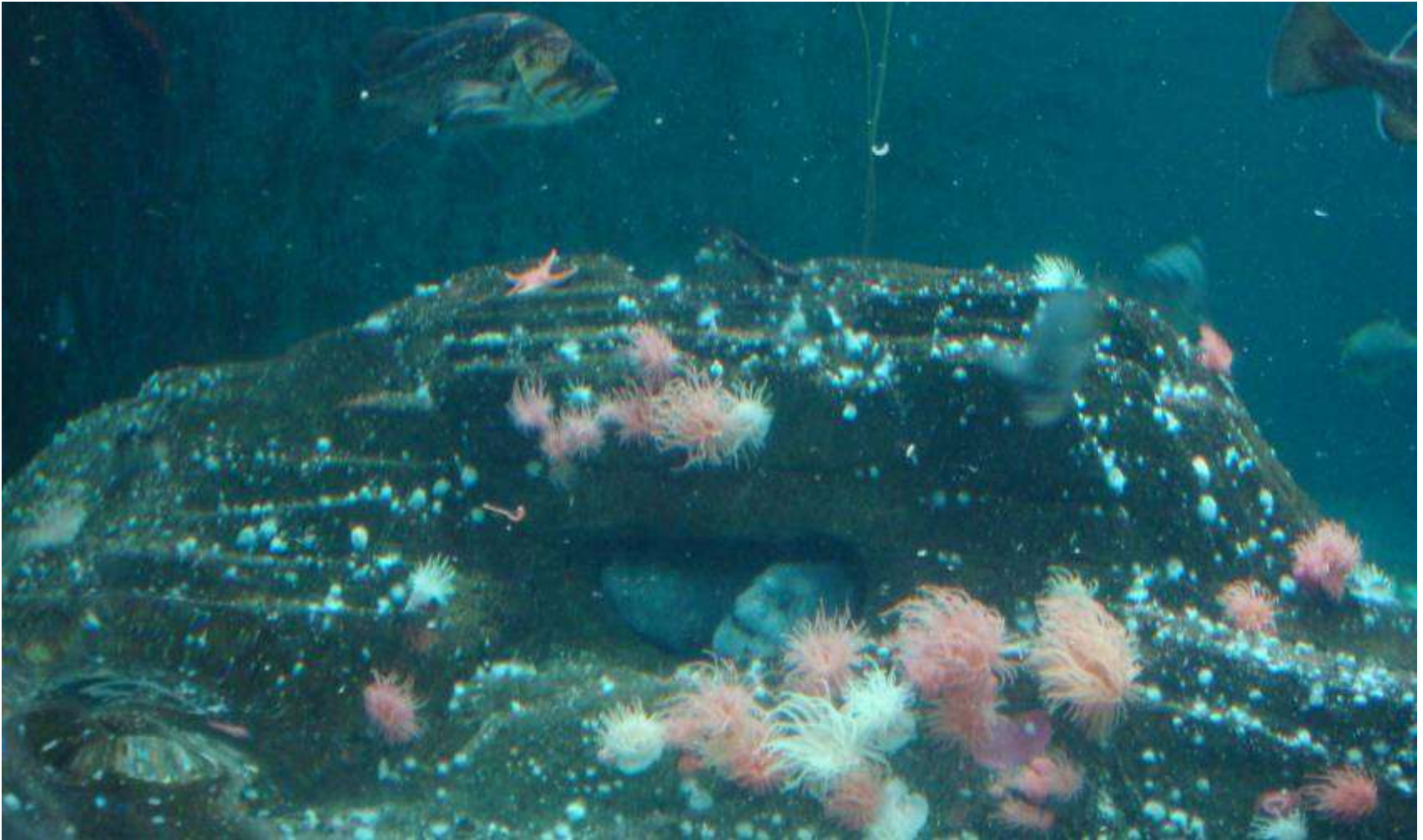
Growout Studies at ISL (density & tank design)

3. Where do we get wolf eels for these studies?

Broodstock Hatchery Studies at VA/CAER



Broodstock in display tank at Vancouver Aquarium





Vancouver Aquarium Broodstock at CAER





Reproductive Control: Ovaplant™

Synthetic analogue of salmon GnRH, cholesterol base
Single implant into dorsal ridge (180 ug)



Ralgun



Ovaplant - male (not female) broodstock



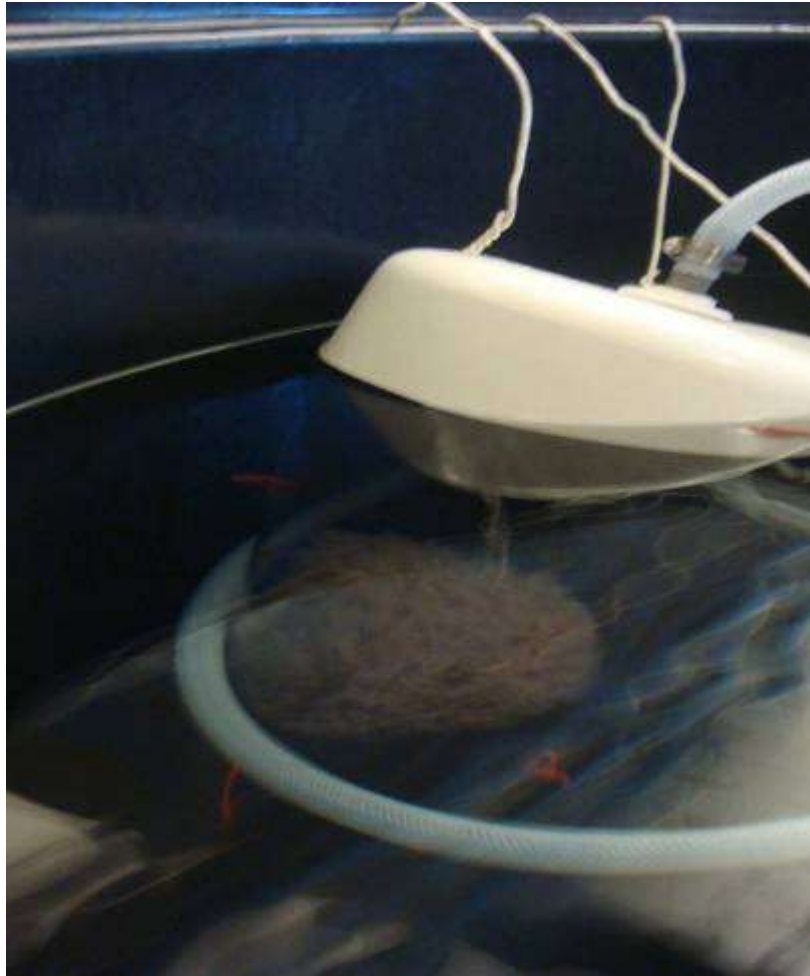


Egg mass at CAER – 6 d post-impant





Wolf eel egg mass incubation at VA





Wolf eel egg incubation at CAER





Wolf eel egg development

3 weeks



5 weeks



12 weeks





Hatching wolf eel egg mass: massage





Rapid onset hatching following stimulation





Post-hatch development





Wolf eel juveniles





Diet Study: What to we feed them?

Design:

- 4 commercial diets tested in triplicate
- 10 week study
- 25 fish (12g IBW)/ 250L tank
- hand-fed to satiation twice daily
- feed intake measured daily



Treatments:

- | | |
|---------|-------------------------|
| Diet 1: | 43% protein / 14% lipid |
| Diet 2: | 45% protein / 19% lipid |
| Diet 3: | 48% protein / 12% lipid |
| Diet 4: | 55% protein / 15% lipid |



Diet Study: CAER tanks





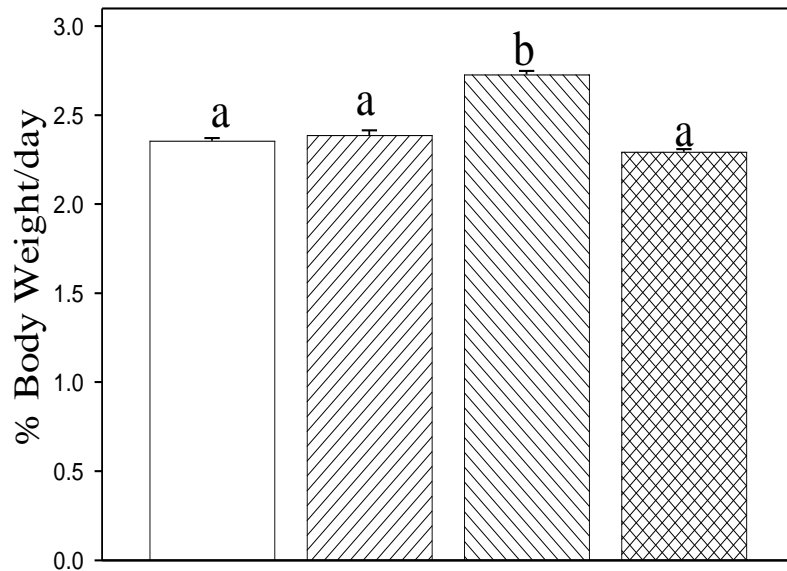
Diet Study: Performance Indicators

1. ***Growth*** - weight, length, SGR, FCR
2. ***Health*** - liver histology, necropsy, hematology
3. ***Proximate Composition*** - diet, whole body
4. ***Survival***

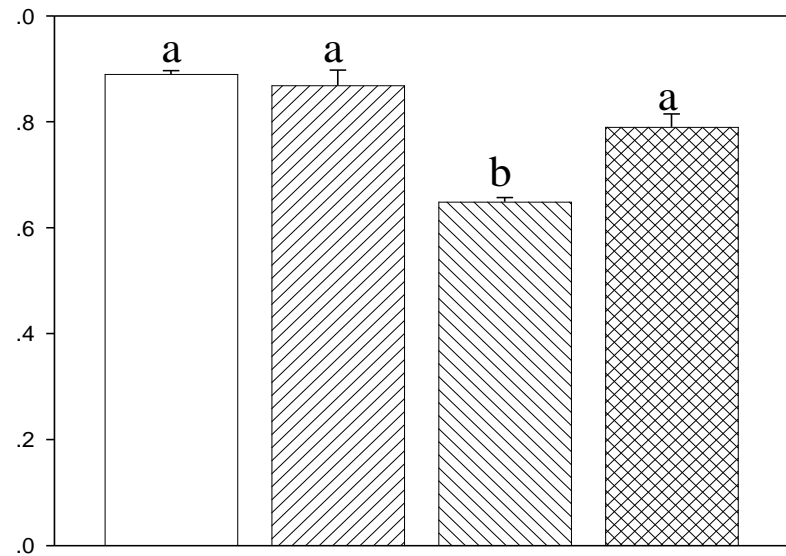


Results: Growth Performance

Specific Growth Rate (% body wt/day)



Feed Conversion Ratio (feed intake/weight gain)



IBW 12.5g, FBW 60-80g in 10 weeks



Diet Study: Results to date

1. ***Growth*** – Diet 3 fed fish; better SGR, FCR
2. ***Health*** – Diet 3 fed fish; lowest HSI, lowest hepatocellular lipid
3. ***Proximate Composition*** – Diet 3 fed fish lowest dietary and whole body lipid
4. ***Survival*** – 100% survival in all groups



Diet Study: How do we feed them?

Design:

- 4 rations of one diet tested in triplicate
- 10 week study, 25 fish (18g IBW)/ 250L tank
- feed intake measured daily

Treatments:

- Ration 1: 3% bw / day
- Ration 2: 3% bw / 2 days
- Ration 3: 1.5% bw / day
- Ration 4: 1.5% bw / 2 days



Diet Study: How do we feed them?

Ration 1: 3% bw / day

Ration 2: 3% bw / 2 days

Ration 3: 1.5% bw / day

Ration 4: 1.5% bw / 2 days

Preliminary results:

SGR: $1 > 2 > 3 > 4$





Density Study:

Design:

- 3 densities tested in triplicate cages (0.15 m^3)
- cages within a single tank
- hand-fed fixed ration daily (% biomass)
- 128g IBW, 160g FBW

Treatments:

Low Density: $11 - 13 \text{ kg/m}^3$

Medium Density: $21 - 27 \text{ kg/m}^3$

High Density: $41 - 52 \text{ kg/m}^3$



Density Study – Experimental Setup at ISL





Density Study: Performance Indicators

1. **Growth** - weight, length, SGR, FCR
2. **Health** - necropsy, hematology
3. **Survival**





Density Study: Performance Indicators

1. ***Growth*** – no differences
2. ***Health*** – necropsies showed no differences or signs of aggression, hematology (in-progress)
3. ***Survival*** – 100%!





Density Study: Grow out tank design

Troughs vs Tanks

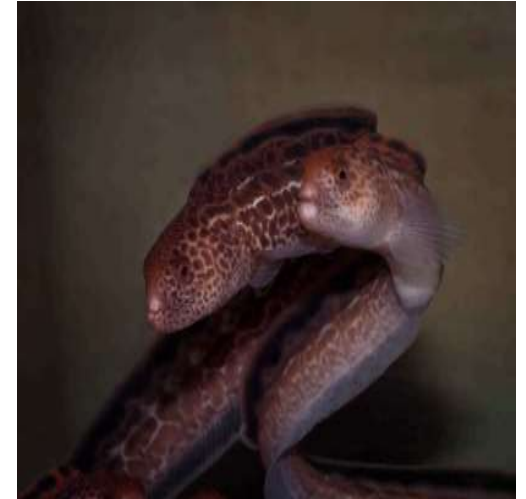
kg/m² vs kg/m³





Wolf eel Aquaculture: Pros

- Broodstock able to be manipulated
- Readily accept artificial diets
- No wild fishery for wolf eels
- Excellent growth & survival
- Grow-out is possible in high density





Wolf eel Aquaculture: Cons/Unknowns

- Produce LOTS of feces – problem with RAS
- Cannibalism/aggression – grading important
- Bottom dwelling - tank design challenges
- Broodstock reproduction – reliability issues
- Disease issues – parasites, etc.

**Is there are
market for
Wolf eels???**





Acknowledgements

DFO - ACRDP Funding, J. Oakes

Vancouver Aquarium – J. Wong, D. Carlson, C. Heaven

Island Scallops – R. Saunders, Yingy

UBC – W. Wong, J. Radloff, L. Garcia

BC Innovation Council – AEI Award Funding



Fisheries and Oceans Canada
Pêches et Océans Canada

Questions?

