

ATLANTIC COD LARVICULTURE

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Atlantic cod

- What is it?
- Where does it occur?
- Why grow it?



ATLANTIC COD/MORUE DE L'ATLANTIQUE

Gadus morhua

France

cabillaud

Germany/Allemagne

Kabeljau

Japan/Japon

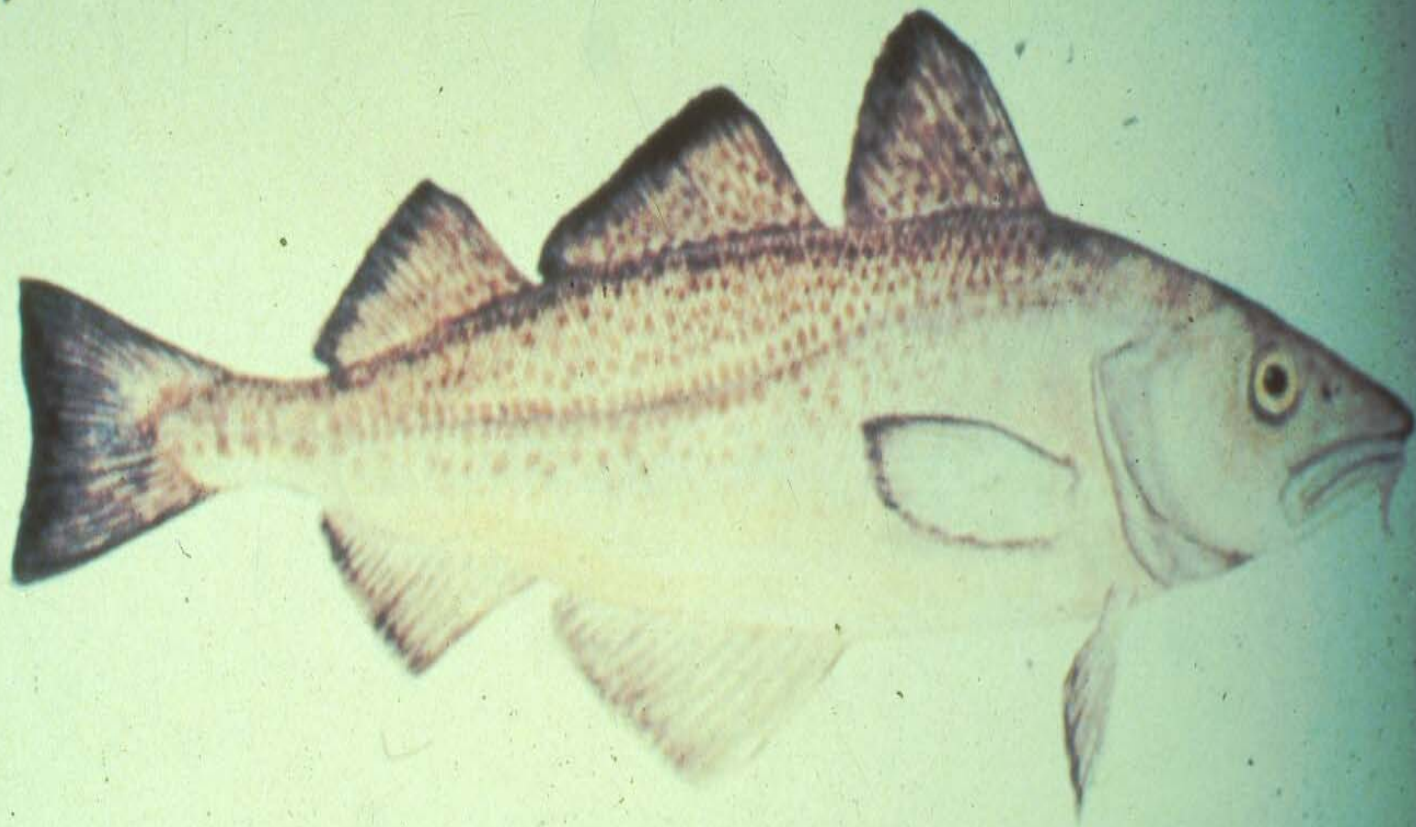
tara, madara

Portugal

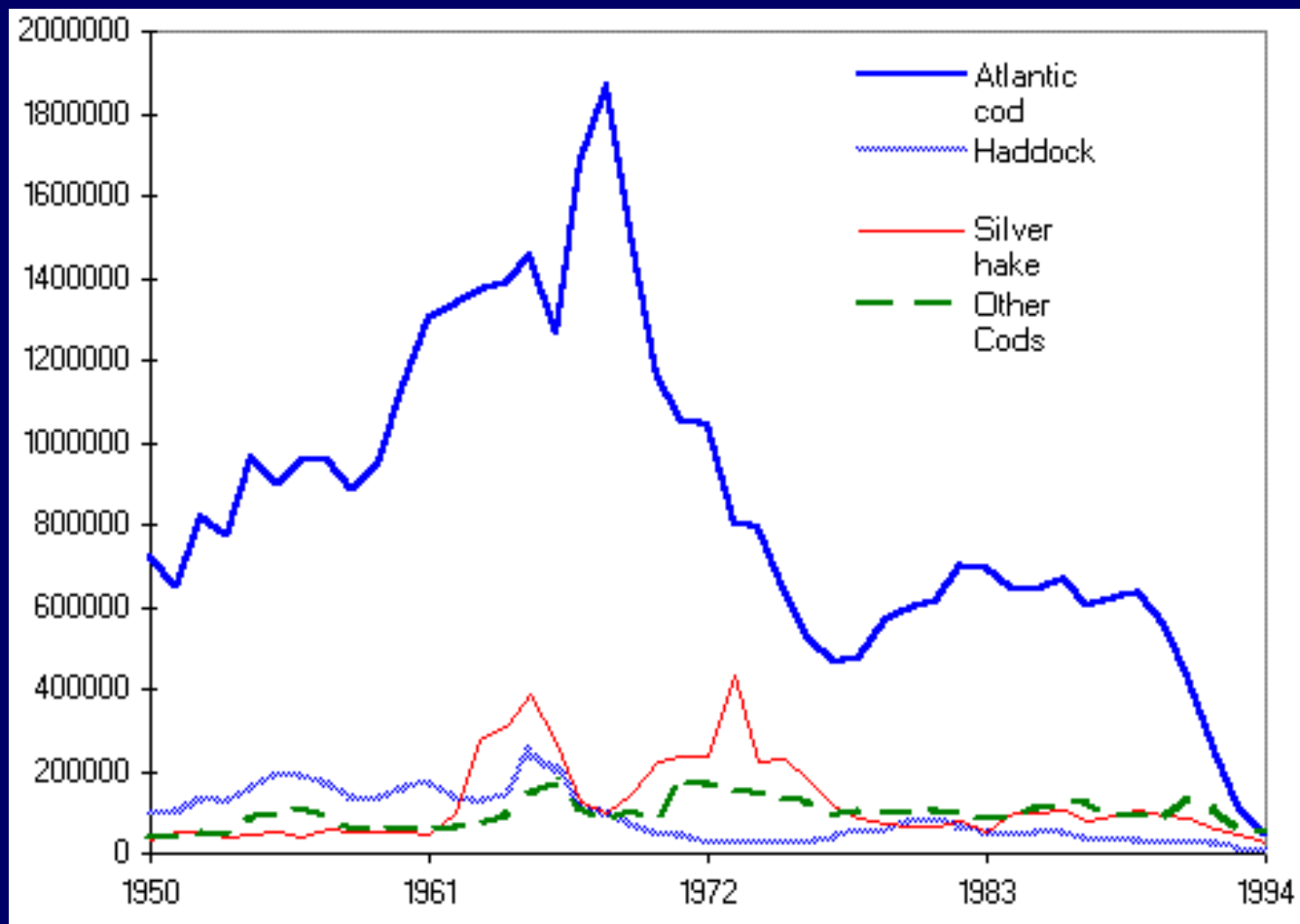
bacalhau

Spain/Espagne

bacalao



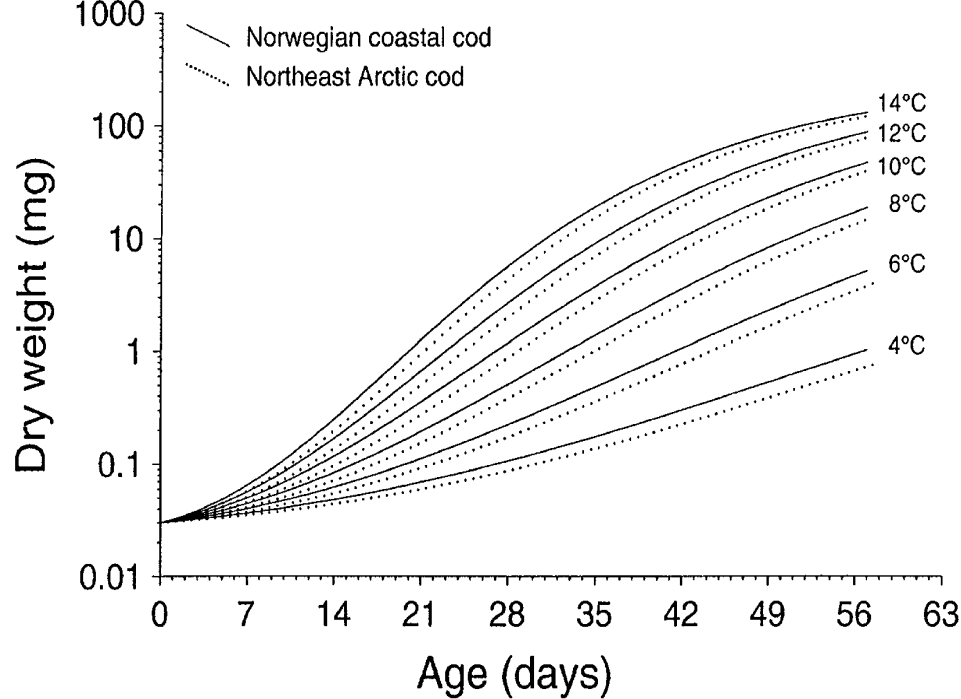




Decline of gadoid landings in Northwest Atlantic region (Source: FAO, 1997).

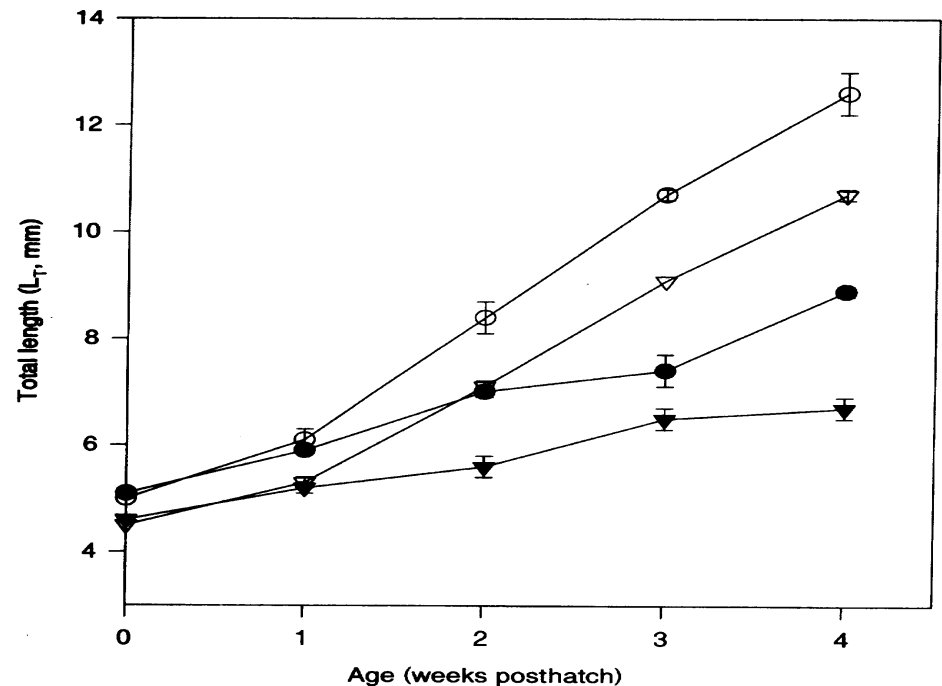
Rest of Talk

- Interpopulational differences
- Production protocol development in Nfld
 - research
 - current protocols
- Comparison and review of protocols



Otterlei et al., 1999.
CJFAS 56:2099-2111

Purchase & Brown, 2000
CJFAS 57:2223-2229



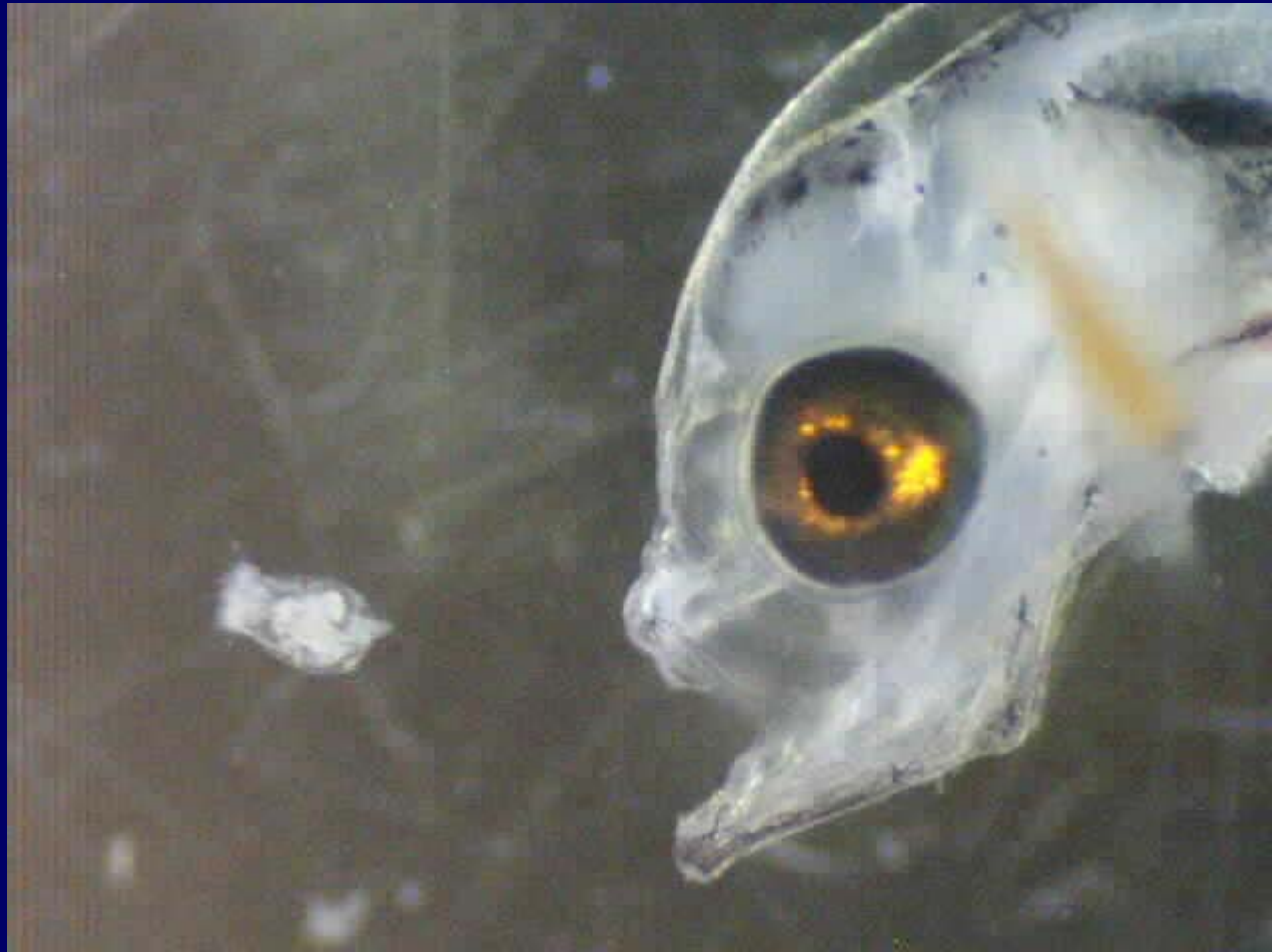
Grand Banks



Gulf of Maine

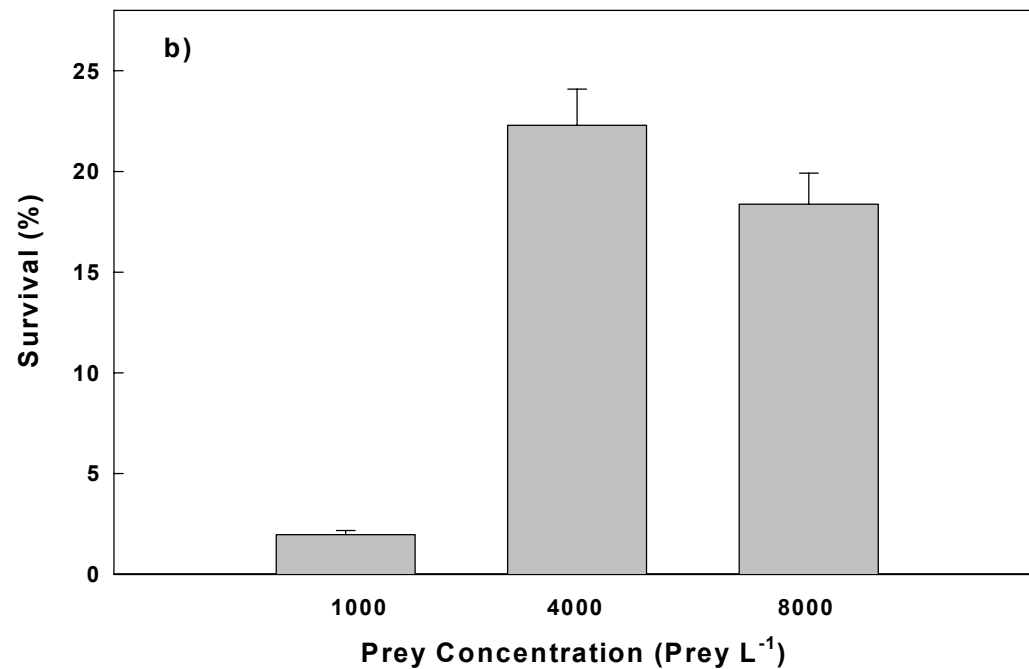
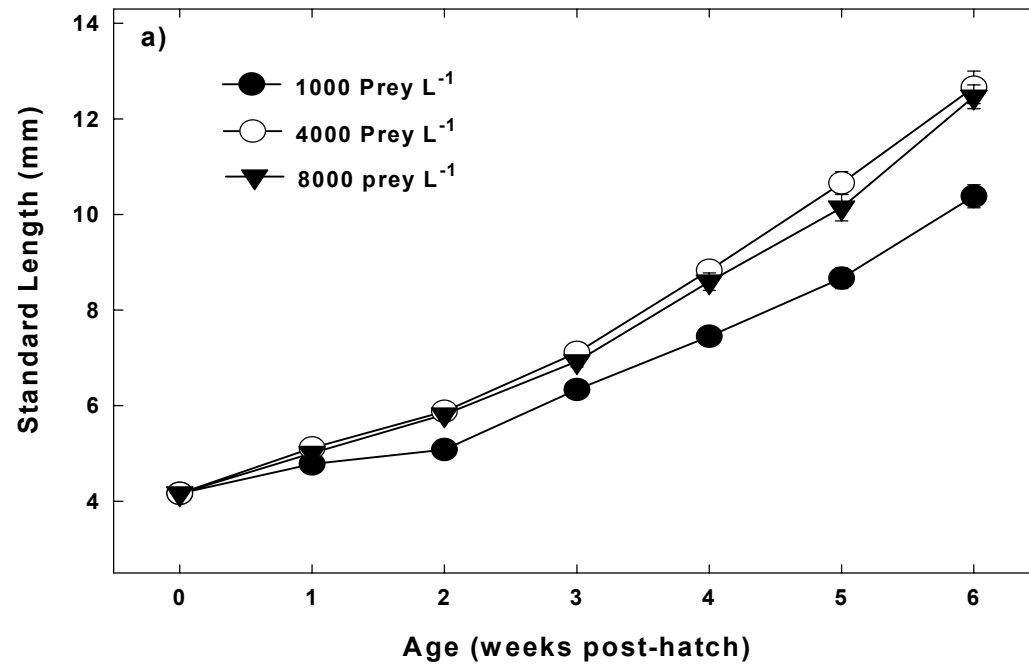


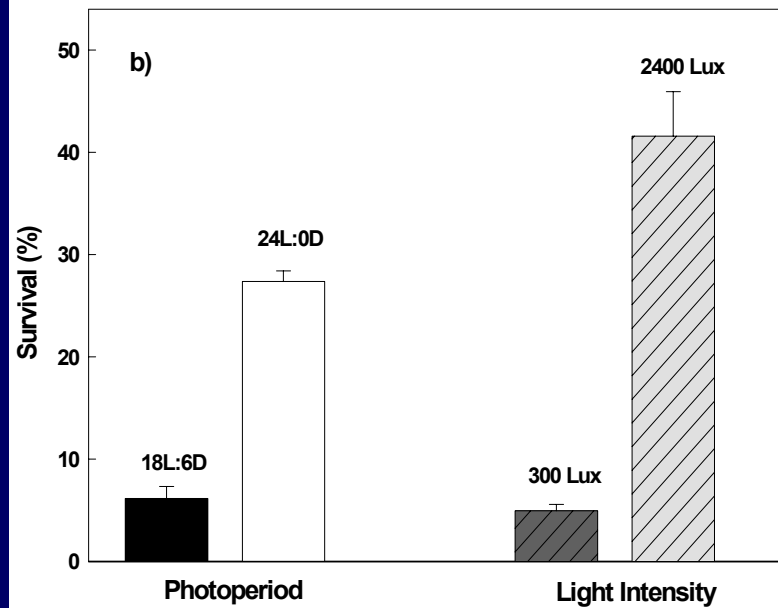
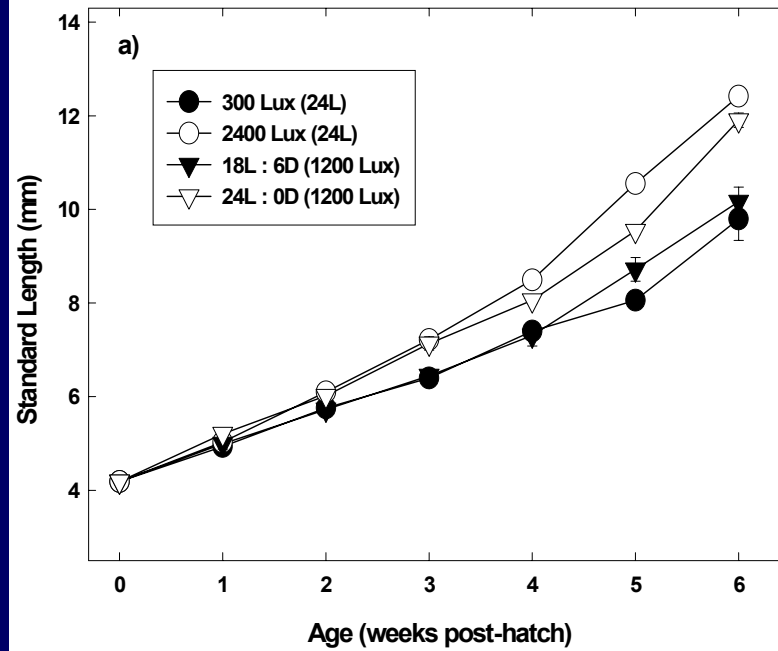
Juvenile cod ~ 1 year of age



Experimental protocols

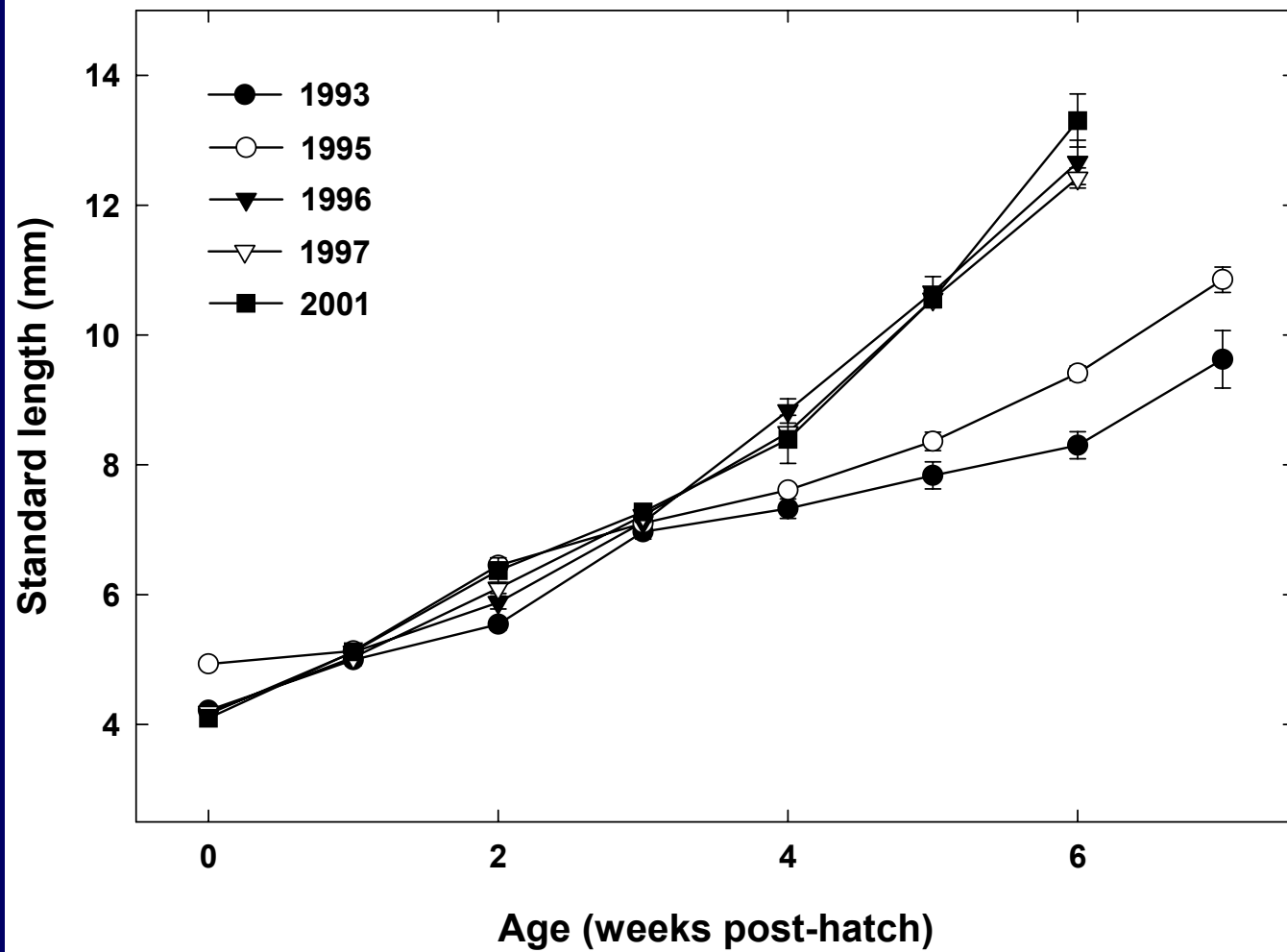
	Prey Density Experiment	Light Intensity Experiment	Photoperiod Experiment
Temperature	8°C	8°C	8°C
Water flow	6 L/hr	6 L/hr	6 L/hr
Tank Volume	30 L	30 L	30 L
Light Intensity	1200 lux	300, 600, 1200 & 2400 lux	1200 lux
Photoperiod	24:0	24:0	12:12, 18:6 & 24:0
Prey	Rotifer & Artemia	Rotifer & Artemia	Rotifer & Artemia
Prey Density	250, 500, 1000, 2000, 4000, 8000 & 16000	4000	4000





Age (d)	0	15 / 0	4	8	12	16	20	24	28	32	36	40	44	48	52	56	60			
Life History	<- egg -> <---Yolk-sac ---> <-----First feeding -----> <- Metamorphosis -> <---Juvenile --> <i>Begin</i> <i>End</i>																			
Larval size (mm) (standard length)		4.2		5		6.1		7.2		8.4		10.6		12.5		15.5		18.5		21
Temperature (°C)	<- 6 --> <----- 8 -----> <----- 10 -----> <----- 12 ----->																			
Prey density (L ⁻¹)			<- 2000 -> <----- 4000 -----> <----- 2000 ----->																	
Prey type/s			<----- rotifer ----->										<-----Artemia nauplii----->							
Light intensity	<-600-> <-200-300-> <----- 2400 Lux -----> <- 200-300 Lux ->																			
Photoperiod (hr)	<----- 24 L -----> <- 18L ->																			
Tank System	<250L> <----- 3000L Circular Tank -----> <- Deep Raceways -> Silo 																			
Water Exchange (L/min.)	<- 3 --> <-1.5--> <-3-> <-6-> <-8-> <-----10L----->																			
Greenwater (day ⁻¹)			<-----20L -----> <----- 10L ----->																	
Number of Feeding (Live food) (d ⁻¹)			<----- 3 -----> <-2--> <-1->																	
Weaning (Dry feed)													<-300-400 µm-> <400-600 µm>							

Atlantic cod early rearing protocol



COMPARISON OF LARVICULTURE PROTOCOLS

- Newfoundland

- 4000 prey/l
- 1200 - 2400 lux
- 7° - 13° C

- Norwegian

- 4000 prey/l or demand
- 0.4 - 1 lux
- 8° C or increasing



FINE TUNING

- Refinement of feeding protocols
- Balanced (EAA's & fatty acids) enrichment
- Scheduling of light, prey level, & temperature
- Cannibalism, weaning and grading

