University of Wisconsin- Stevens Point Northern Aquaculture Demonstration Facility

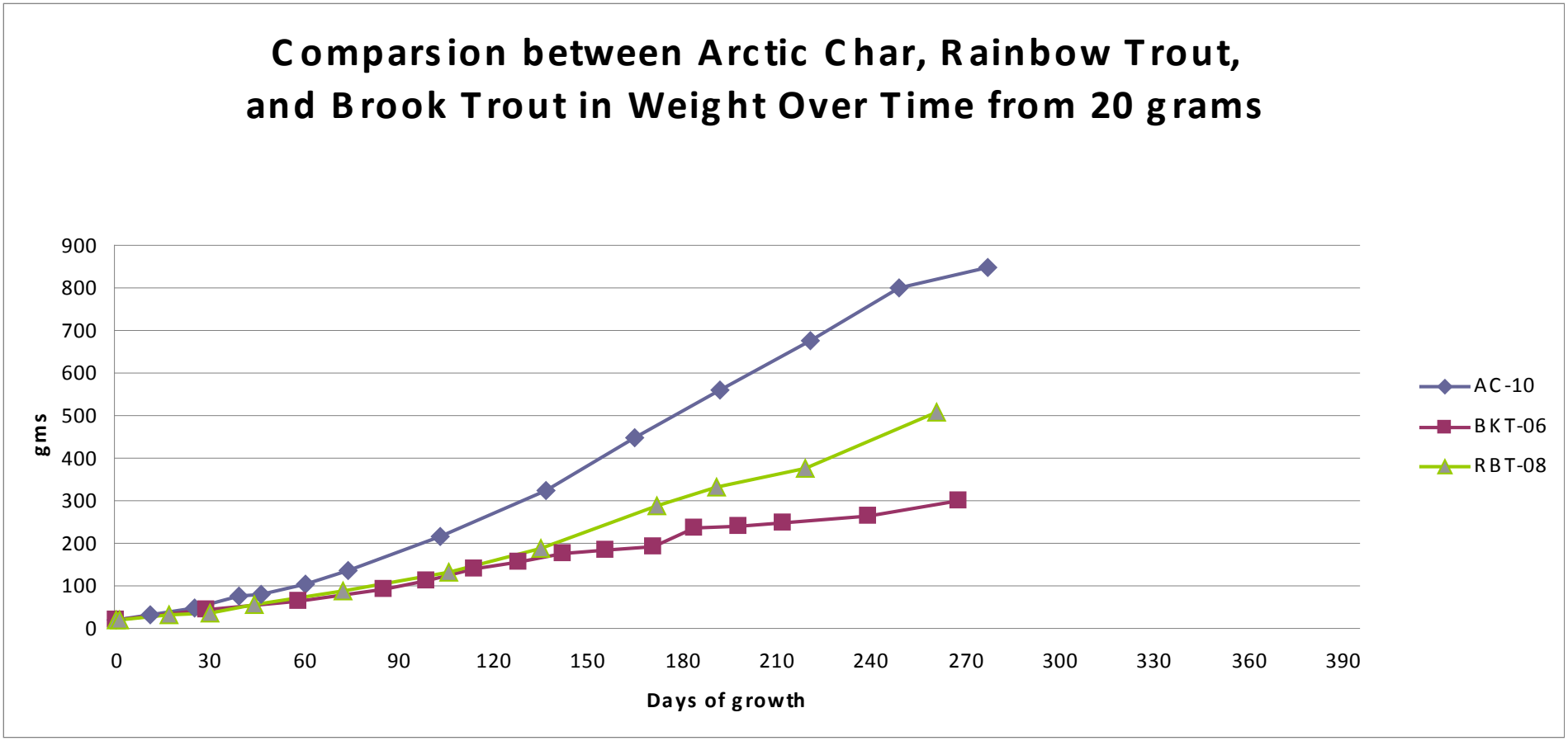
- Greg Fischer
- Facilities Operation Manager

New Species for Wisconsin Aquaculture

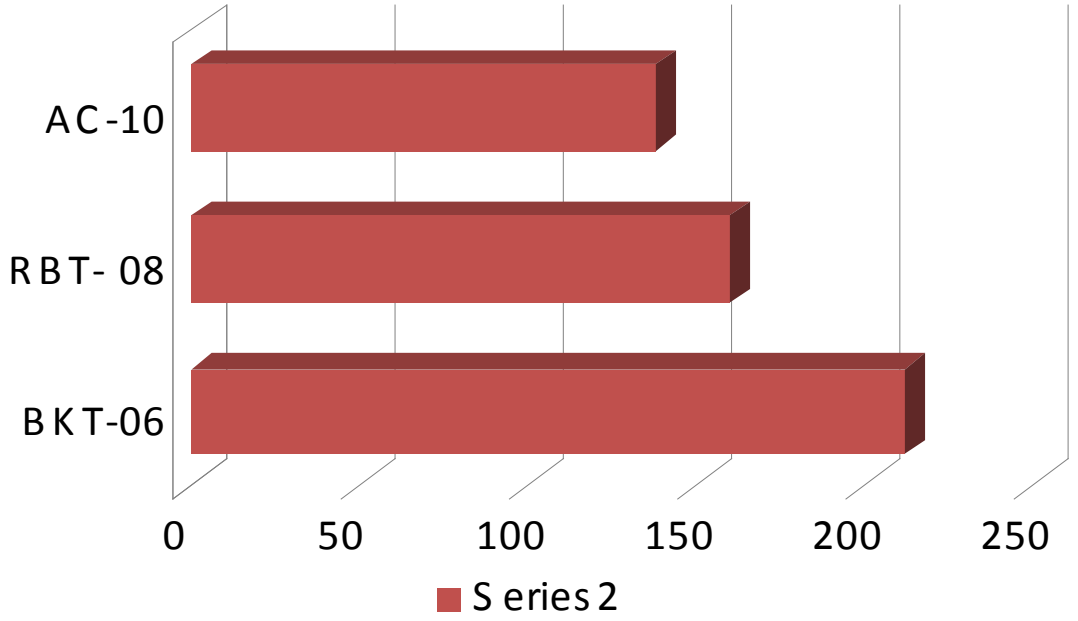
- Arctic Char??

WHY ARCTIC CHAR

- Coldwater Species
- Rapid growth – 1 kg(2.2 lbs) <17months
- High quality flesh
- Good market price with limited availability
- High culture densities-120kg/m^3(1.0lb/gal)
- High fillet yield 50% + @market size 1-3 kg (2.2-6.6lbs)


Comparsion between Arctic Char, Rainbow Trout, and Brook Trout in Weight Over Time from 20 grams
900
800
700
600
500
400
300
200
100
0
gms
0
30
60
90
120
150
180
210
240
270
300
330
360
390
Days of growth
AC-10
BKT-06
RBT-08

Days from 20 gms to 1.0 pd



Evaluation of photoperiod manipulation on Arctic Char growth, processing attributes, and sexual maturity in a coldwater recirculating system at UWSP-NADF

Materials and Methods

- The purpose of this study was to evaluate and compare arctic charr production attributes reared under two different photoperiods (24 hr and natural) in an RAS system.
- Troutlodge Inc. provided Nauyuk Lake (Canada) strain arctic charr eggs.
- Cultured 17 months from egg to market size (1.0 kg) (2.0 lbs)
- Reared 10 months in RAS system
- Project was conducted inside main aquatic barn at NADF.

Materials and Methods

Egg and Fry Culture

- Eyed eggs incubated in Heath Stack

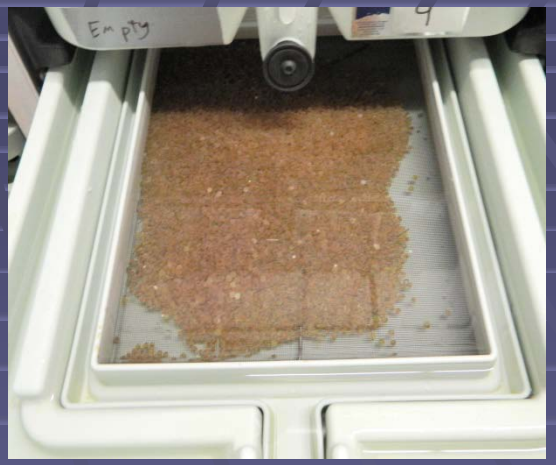
- Flow thru 8.0°C(48F) degassed & aerated ground water.

- Fry were transferred to shallow (406 mm x 1219 mm) flow-thru fiberglass tank inserts.

- Fry fed dry salmon starter at approximately 5% BW.

- Water temperature maintained at 8.0 °C (48F) at a flow of 20 L/min.

- Indirect 24 hour light.



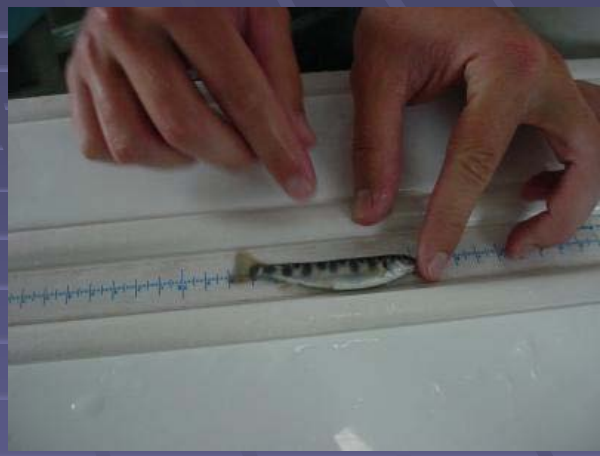
Materials and Methods
Fingerling Culture

- 1.25g fingerlings (51mm) were moved to 1,500 L (1.5 m^3) fiberglass rearing tanks on 24 hour light.
- Fish were fed commercial trout diet to satiation approx. 5% BW utilizing 24 hr belt feeders.
- Flow thru single pass 8.0ºC groundwater.

Materials and Methods
Growout

- 48,000 L Coldwater RAS @ 12ºC
- Six 5.3 m^3 (5,300 L) round fiberglass tanks with side & bottom drains.
- System components included microscreen drum filter, fluidized sand biofilter, LHO w/oxygen, CO_2 stripper, UV irradiation, and chiller.
- Average system water flow was 1,477 L/min
- 8.0ºC groundwater added @ 38 L/min or 2% of total flow to flush out high nitrite loads at final stages.

Materials and Methods (Growout)



- Arctic charr averaging 100.0 mm (9.0 g) (approx. 4 inch) were placed into the RAS 5.3m³ tanks for growout.

- Density was maintained above 70kg/m³(0.5lbs/gal).

- Commercial diet of 44% protein, 25% lipid, 1% fiber of appropriate size throughout the grow-out period.

- Constant feeding occurred over 24 hour daily time period with automatic feeders. Feed rates were adjusted bimonthly based upon trout growth and feed consumption.

Materials and Methods
Photoperiod Study

- 3 tanks were kept on 24 hour light cycle at >100lumens
- 3 tanks were placed on “natural light” cycle to follow winter photoperiod
- All tanks were part of the coldwater recycle system and shared similar water chemistry and water temperature
- All tanks went back onto 24hour light after winter period was done

Materials and Methods
Monitoring

- DO (mg/L), temperature (ºC), pH and total dissolved gases (%) were measured daily in each tank utilizing handheld monitors.

- Ammonia-nitrogen (NH_3-N), nitrite-nitrogen (NO_2-N), alkalinity, CO2, TSS, and Salinity were measured once weekly from water samples collected in the RAS distribution sump utilizing a Hach test kit.

Materials and Methods
Monitoring

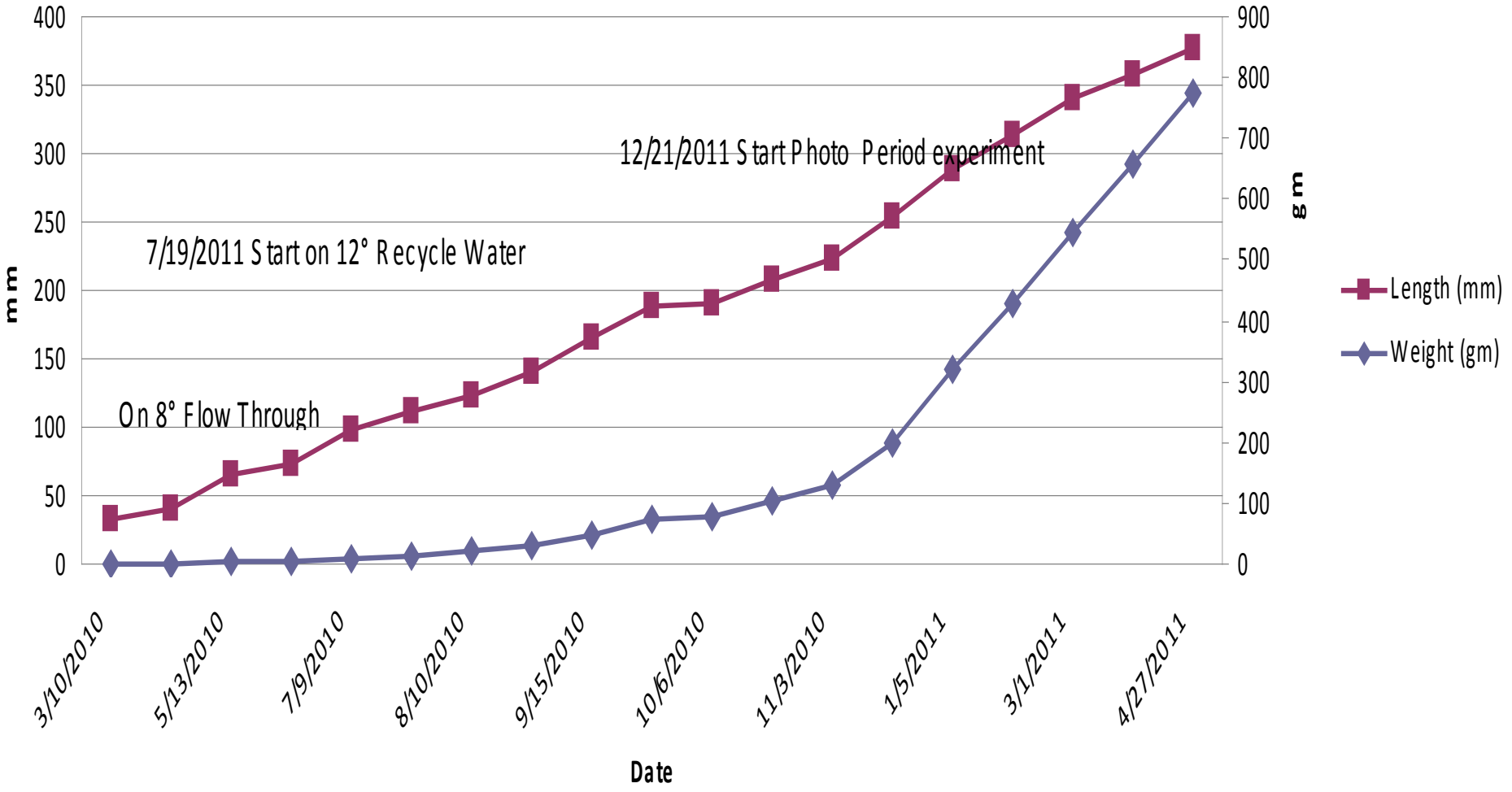
- Length and weights were measured monthly by obtaining 50 randomly sampled fish from each tank.

Results

2.2 lb (1.0kg) Arctic Charr finished in 12ºC Recycle system for 10 months at UWSP-NADF

Arctic Char

Overall Monthly Weight/Length



Artic Char Photoperiod Study
Length & Weight Comparision

Gonadal Development

- Minimal w/24 hour light group
- 24 light group experienced better fillet yields
- Recommend 24 hour light for rearing and growout

Results

Production

- Successfully raised 2,700 kg (6,000 lbs) in 10 months from fingerling (9 g) to fillet market size (1.0kg) (2.2 pds).
- Average feed conversions of 1.2 (feeding to satiation).
- Average fillet yields of 55% noted by commercial processors.
- Good market price of $8-10/Kg in the round.

Results

RAS Water Quality

PARAMETER	AVERAGE
AMMONIA	0.92 mg/L
NITRITE	0.24 mg/L
UNIONIZED NH3 (calc)	0.003 mg/L
CO2	23 mg/L
ALKALINITY	153 mg/L
SALINITY	0.52 PPT
TEMP	12.0 °C
Ph	7.2
TSS	2.8 mg/L
NITRATE	15.9 mg/L

Conclusion

- Our study demonstrated that market size arctic charr can be raised successfully in a recycle system operated at 12ºC utilizing photoperiod and temperature control.

Conclusion

- And that arctic charr show tremendous growth rates, high rearing densities, excellent feed conversions, good fillet characteristics and market prices making them a great candidate for the food fish market!!!!!

Acknowledgements

We would like to thank Steve Summerfelt, Bill Wolters and Troutlodge for their involvement and support for this project. We would also like to acknowledge the efforts of technicians Lance Bresette, Nate Martin and summer interns, Rebecca Phillips, Megan Cornwall, Ryan Holem, Ryan Goetz, and John Tix for fish rearing and data collection.

This project was supported by NADF base funding and partner funding.
Mention of trade name, proprietary product, or specific equipment does not constitute a guarantee or warranty and does not imply approval to the exclusion of other products that may be suitable.

Visit our webpage: aquaculture.uwsp.edu

QUESTIONS?