

A photograph of several sunfish caught in a green mesh fishing net. The fish are silvery with blue and orange markings. A person's foot in a brown boot is visible in the upper right corner. The background is a muddy, grassy area.

Sunfish Culture Status Report

Sunfish Projects (Summary)

Inputs

Title	Number	Year	Amount (\$)	Project Number
Sunfish	1	6/1/90- 8/31/92	\$130,758	90-38500- 5008
	2	9/1/92- 8/31/94	\$149,799	92-38500- 6916
	3	9/1/94- 8/31/96	\$173,562	94-38500- 0048
	4	9/1/96- 9/31/98	\$199,921	96-38500- 2631
	5	9/1/99- 8/31/01	\$199,748	99-38500- 7376
	6	9/1/10 8/31/11	\$75,000	
Total			\$928,818	



Project 1

Activities

#1 - Culture of Bluegill and Crappie for Food Fish

Project Objectives:

1. To determine the mechanisms of sex control in sunfish and to produce and evaluate polyploid sunfish and hybrids.
2. To compare the optimum temperature-food conversion relationship of selected hybrids with those of the parentals, and to determine optimum stocking densities of hybrid sunfish.

Control of Sunfish Reproduction
Optimal Stocking Densities

Outputs

- Production of polyploid fish [Garling (MSU) and Sheehan (SIU-C)]
 - pressure shocks
 - triploid sunfishes
 - cold shocks
 - tetraploid bluegill



Taxa Selection Outputs

- Earlier NCRAC studies
 - Female green sunfish \times male bluegill F_1 hybrids appear to be best candidates for aquaculture.
 - Black crappie out perform both white crappie and hybrid crappie

Pond Culture Outputs

- Stocking Rate
 - 12,355-17,297 fish/ha (5,000-7,000 fish/acre)
- Selective Sorting (top 70%)
 - Similar production of age-0 fish
 - Females smaller than males in ponds
 - Hybrids had better growth than bluegills
 - More aggressive feeders
 - >2 years to reach market weight for either taxa

Project 2

Activities

Culture of Bluegill and Crappie for Food Fish

Project Objectives:

Determinations of optimum stocking densities and relationships between temperature and growth for sunfish, sunfish hybrids, and triploid sunfish.

Development of low cost, high performance sunfish diets.

Feed and Feeding Outputs

- >40% protein (recirculating systems)
- >32% protein (ponds)
- Compensatory growth
 - Hayward (Missouri)
 - fish using CG outgrew controls by ~2x

Outputs

Control of Sunfish Reproduction

The development of protocols for reducing reproduction in these fishes allows for the potential of increased growth of these fish in aquaculture systems as opposed to unrestrained reproduction. The two shock treatments which appeared to be most effective were: (1) 48,265 kPa for 4 min begun 2 min post-fertilization; and (2) 41,369 kPa for 2 min begun 3 min post-fertilization.

Pond Culture Outputs

- Stocking Rate
 - 12,355-17,297 fish/ha (5,000-7,000 fish/acre)
- Selective Sorting (top 70%)
 - Similar production of age-0 fish
 - Females smaller than males in ponds
 - Hybrids had better growth than bluegills
 - More aggressive feeders
 - >2 years to reach market weight for either taxa

Project 2 (cont'd)

Activities

PROJECT OBJECTIVES

- (1) Produce a production manual, accompanying videos and other information as necessary to demonstrate the technology for culturing centrarchids.
- (2) Determine the major nutritional requirements for centrarchids and to compare their growth and performance using available commercial feeds in laboratory and field settings.
- (3) Determine the best feeding management strategies for culturing centrarchids in laboratory and field settings.

Outputs

- Coupled with the NCRAC-sponsored development of improved intensive larval sunfish culture techniques at ISU under the direction of Morris, commercial fish farmers have the tools to establish stocks of polyploid sunfishes.
- NCRAC funding permitted SIUC to leverage funding from the American Fishing Tackle Manufacturing Association to evaluate benefits of triploid sunfish in recreational fishing ponds. The supply of triploids to recreational fisheries could provide a new market for regional producers.
- Developing diets specifically for targeted species results in maximum performance at the lowest possible cost. Purdue research directed at minimizing costs of feeds will help to maximize profit to the producer.

Indoor Culture – ISU

Outputs

● ISU

- Difficult to raise BG or HSF within 2 years even after two grading intervals
- Density a factor of BG growth but not HSF
- BG had higher growth rates than HSF at low densities

Project 3

Activities

Project Objectives

1. Produce a production manual, accompanying videos and other information as necessary to demonstrate the technology for culturing centrarchids.
2. Determine the major nutritional requirements for centrarchids and to compare their growth and performance using available commercial feeds in laboratory and field settings.
3. Determine the best feeding management strategies for culturing centrarchids in laboratory and field settings.

Indoor Culture – UM-C Outputs

- BG have higher growth capacity than hybrid
 - BG growth reduced more by aggression
- Best growth was exhibited by BG at both UM-C and NDSU sites

Project 4

Activities

Project Objectives:

1. Compare feeding trials for grow out of locally available 5.1-10.2 cm (2-4") black crappie and bluegill male x green sunfish female hybrids:
 - a. in ponds at dissimilar latitudes in the region, and
 - b. in recirculating systems using compensatory feeding strategies
2. Establish baseline physiological measures for small 2.5-7.6 cm (1-3") black crappie subjected to handling stressors and to test the effect of salt and temperature on stress reduction.
3. Update the sunfish culture manual that had been developed for sunfish produced in the North Central Region.

Outputs

Michigan State University (MSU) and Iowa State University (ISU) personnel have completed the 100-page Sunfish Culture Guide; it is now being proofed and should be available for distribution from the NCRAC Publications Office spring 2000. ISU personnel have produced a video addressing various production areas of male bluegill \times female green sunfish (BG \times GS) hybrids.

Researchers at MSU have empirically determined the optimal energy level for growth and protein retention in 125 mm (4.9 in) BG \times GS hybrids utilizing a saturation kinetics model for curve fitting. Results demonstrate the semi-purified diet developed for these trials is well accepted by these fish; this results in a slightly lower but comparable growth to that obtained using a commercial control diet.

Outputs

It appears the dietary requirement of BG × GS hybrids for P is #0.5% of the dry diet. Both pure bluegill and BG × GS hybrids grow best when fed diets containing no less than 10% dietary lipid in the form of fish oil.

Increasing protein levels resulted in increasing growth rates of GS X BG Hybrids , with the optimum protein level of 40%. Dress-out analysis indicated a similar trend where increasing dietary protein levels resulted in increased percent gutted, headed, and fillet weight. Fillet composition also varied where increasing protein levels resulted in decreasing lipid content.

Outputs

UM researchers reran the treatments as in a 1997 study done by them to ensure that their previous results were reproducible. Results of their earlier study were duplicated with both compensatory growth treatments outgrowing controls. UM research also determined that a significant effect of social interaction occurred upon growth variables and size variation in juvenile hybrid sunfish.

Purdue researchers investigated three different diets and found that Hybrid bluegill can be fed diets containing 32% crude protein without sacrificing weight gain or feed conversion.

Growth of black crappie and BG × GS hybrids were compared using common pond aquaculture techniques at SIUC. Hybrid sunfish were successfully cultured while black crappie were not.

Project 5

Activities

Project Objectives:

1. Conduct field trials of bluegill and F1 hybrid sunfish (female green sunfish x male bluegill) in commercial size production facilities defined as ponds >0.04 ha and indoor recycle systems in the upper and lower portions of the North Central Region. A minimum of three replicates will be used in all pond and recycle system studies; commercial feeds to be used will be those identified in previous studies.
2. Evaluate grading strategies to enhance grow out in commercial systems to market size (³227 g), including the culture potential of discards.

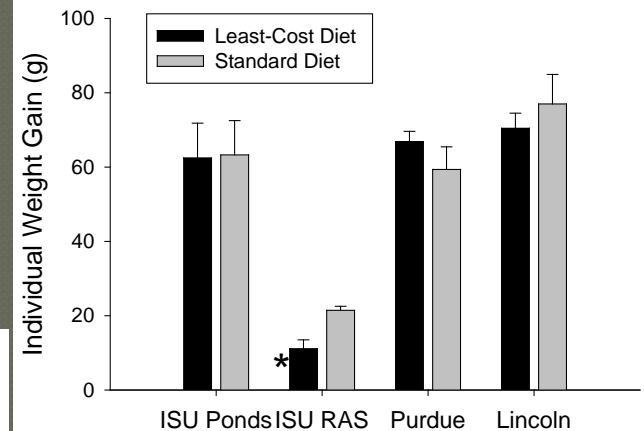
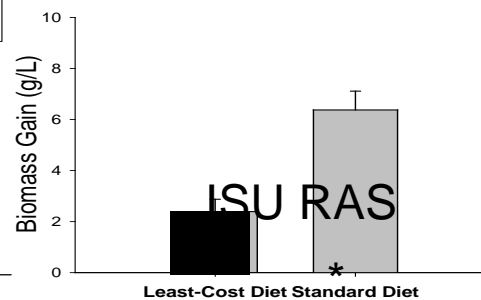
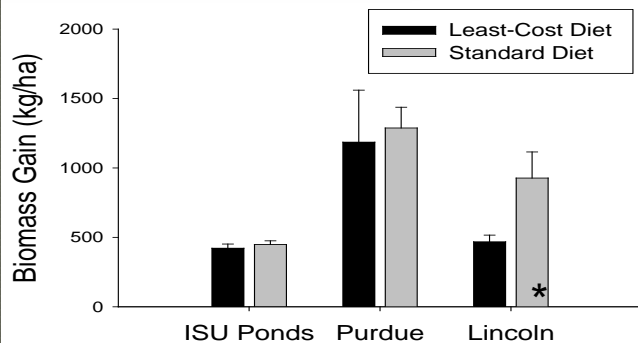
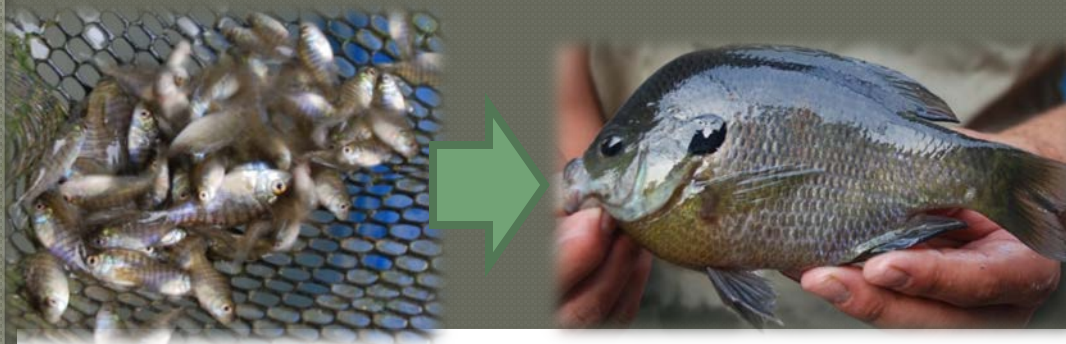
Project 6

Activities

Project Objectives:

1. Using as consistent protocols as possible across locations, evaluate/determine performance of recently-developed NCRAC least-cost juvenile (3" minimum total length) bluegill diet versus an "industry standard" diet at two distinct latitude locations at standard pond stocking densities for one growing season. Stocking densities to be determined by the investigator(s) and producer(s).

Outcomes Weight Gain



*WAS Presentation: Allen D. Pattillo, Charles E. Hicks
Paul B. Brown, Robert A. Rode, and Joseph E. Morris*

Project 6

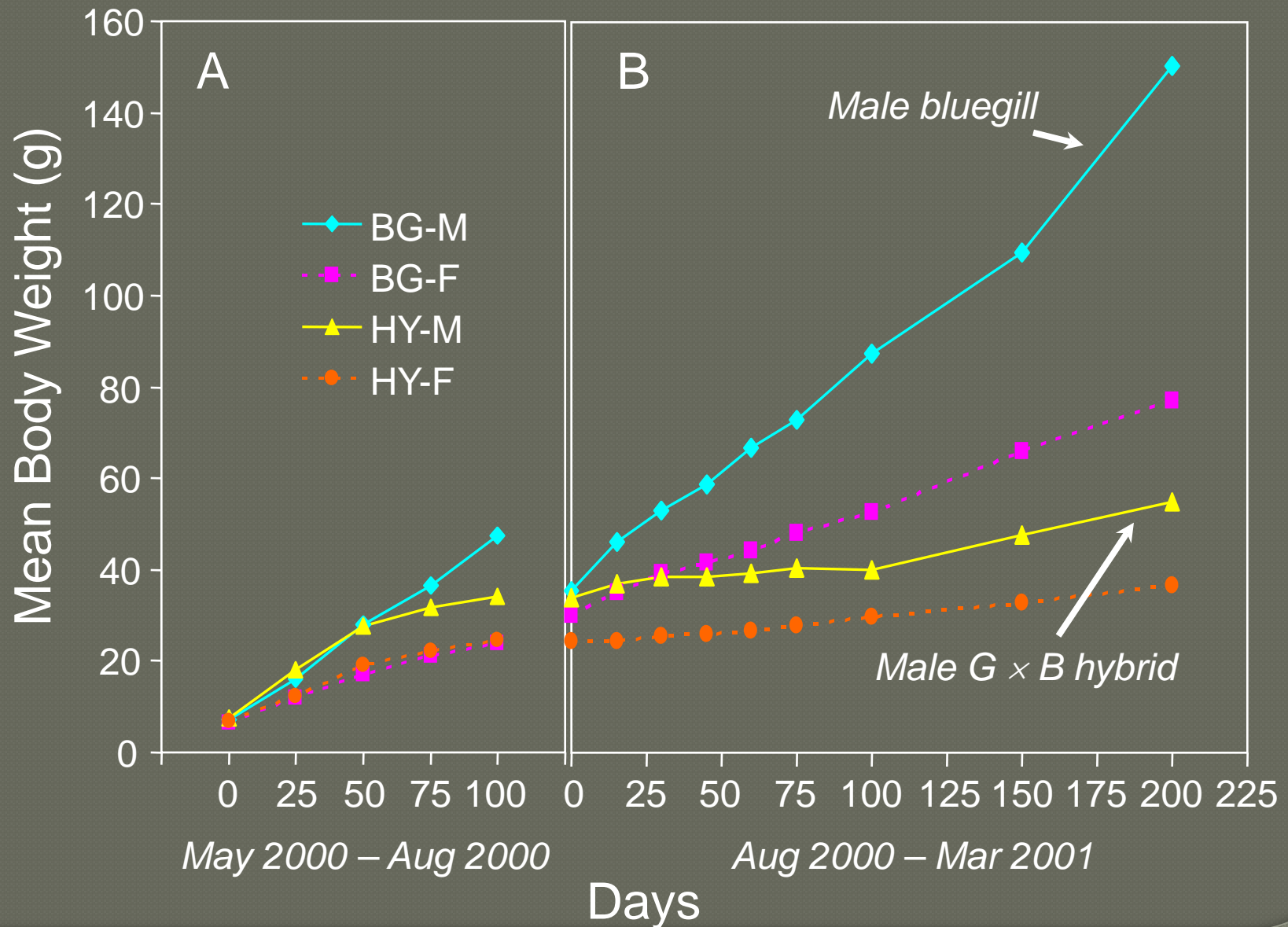
Activities

Evaluate grading strategies to enhance grow out of F1 hybrid sunfish (female green sunfish X male bluegill) in commercial systems to market size (227 g; 0.5 lb), including the culture potential of discards.

Outputs

Overall, study results indicate that the capacity to rear sunfish to food-market sizes within two years of grow out is much greater when predominantly male bluegill are grown in indoor tanks, relative to pond rearing hybrid bluegill in ponds in the middle latitudes of the Midwest region.

Growth Capacity of Age-1, Age-2 Male and Female Bluegills and G × B Hybrids – Individually Held



Outcomes

1. Refereed Papers
2. Fact Sheets
3. Sunfish Guide
4. Presentations at Meetings, Conferences, Workshops, Training Sessions
5. Extension videos

Impacts

