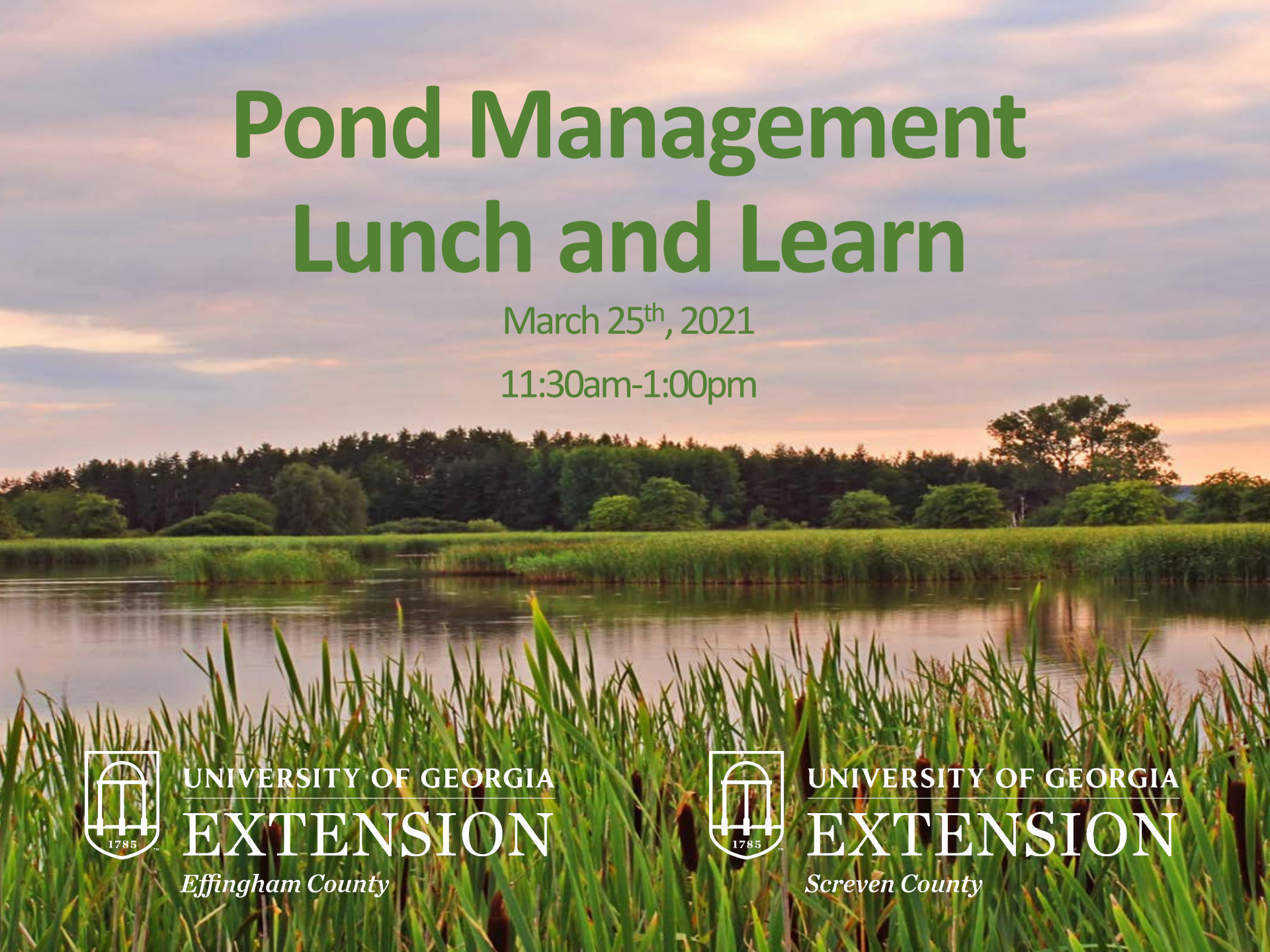


Pond Management Lunch and Learn

March 25th, 2021

11:30am-1:00pm

UNIVERSITY OF GEORGIA
EXTENSION
Effingham County

UNIVERSITY OF GEORGIA
EXTENSION
Screven County

Today's Speakers

Blake Carter
Agriculture & Natural Resources
University of Georgia Extension
Effingham County– Southeast District

Jason Mallard
Agriculture & Natural Resources
University of Georgia Extension
Screven County – Southeast District

Steven Patrick
Agriculture & Natural Resources
University of Georgia Extension
Habersham County – Northeast District

UNIVERSITY OF GEORGIA
EXTENSION

Ponds in Georgia

Few Natural Lakes

Most constructed to control sediment or to irrigate

Most in need of renovation

Initial Thoughts

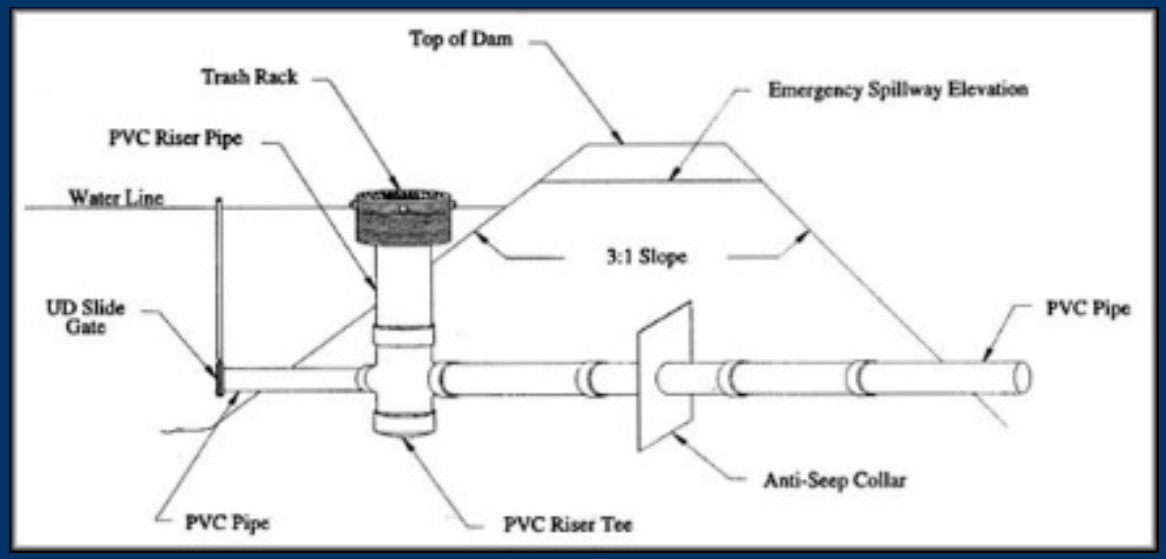
99% of ponds are “spring fed” from groundwater and watershed runoff. “Spring fed” isn’t what it seems.

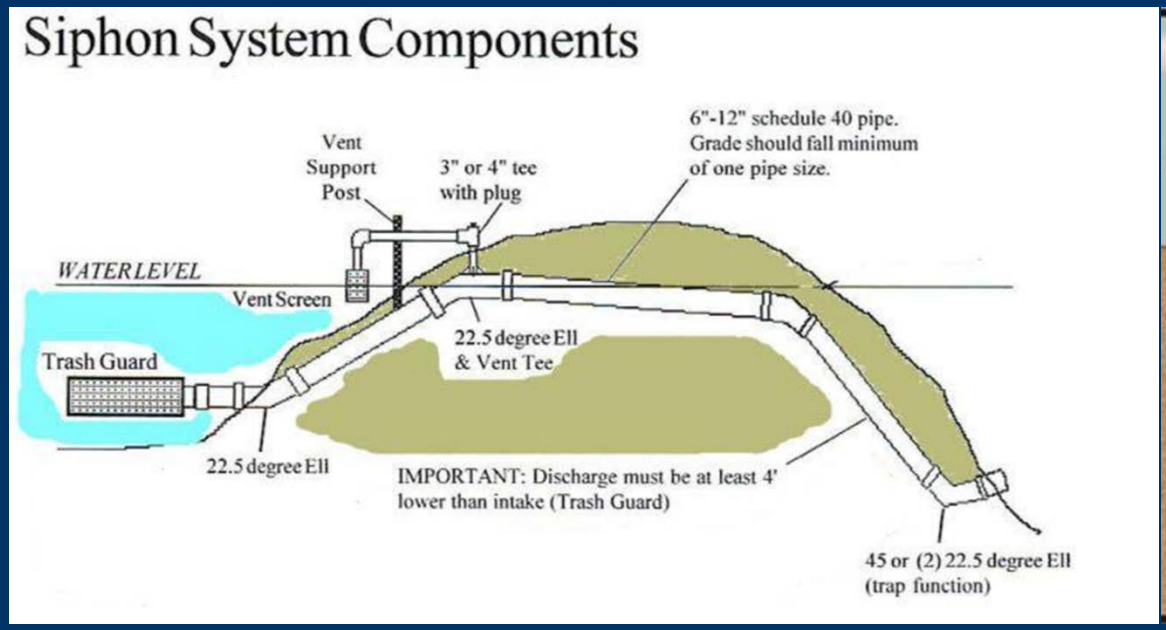
Fish production is based on surface acres, not by depth, structure or overall water volume.

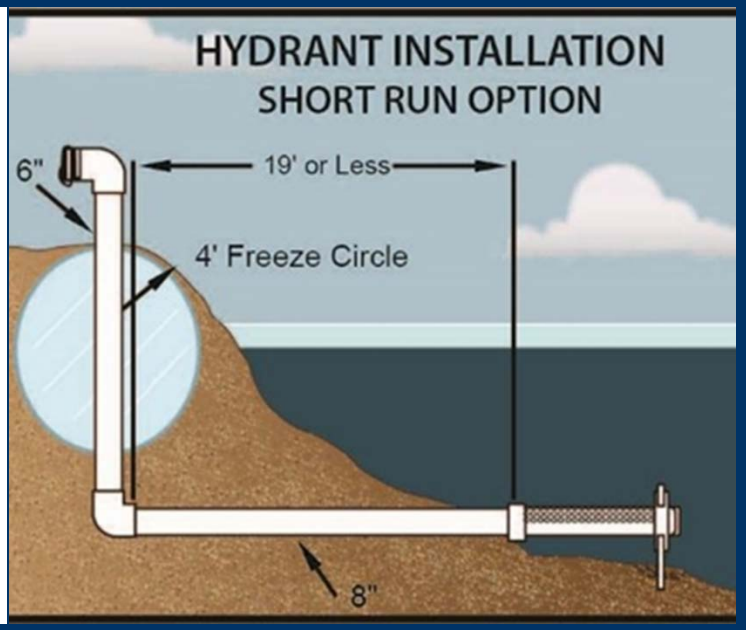
Every pond has a defined natural productivity and carrying capacity for fish production and water quality.

Ponds don’t require annual/periodic restocking.

Engineering for Ponds







U.S. DEPT. OF AGRICULTURE
SOIL CONSERVATION SERVICE CERTIFICATION

I certify that I have made, or caused to be made, a final inspection of this pond project and that all work related thereto has been completed in accordance with these plans and with all other applicable specifications except as listed below.

Signed _____ Title _____ Date _____

EXCEPTIONS

_____

_____

_____

_____

_____

_____

_____

GENERAL INFORMATION

Uses for Impounded Water _____

Area at Normal Pool = _____ acres Maximum Depth = _____ feet

Capacity = 0.40 X _____ acres X _____ feet = _____ acre feet

Source of Water _____

EARTH QUANTITIES

Embankment	_____	cu. yds.
Excavation of Cutoff Trench	_____	cu. yds.
Excavation of Stream Channel	_____	cu. yds.
Other Excavation	_____	cu. yds.
Total	_____	cu. yds.

BENCH MARK DESCRIPTION

_____

_____

_____

GA-ENG-027
8-83

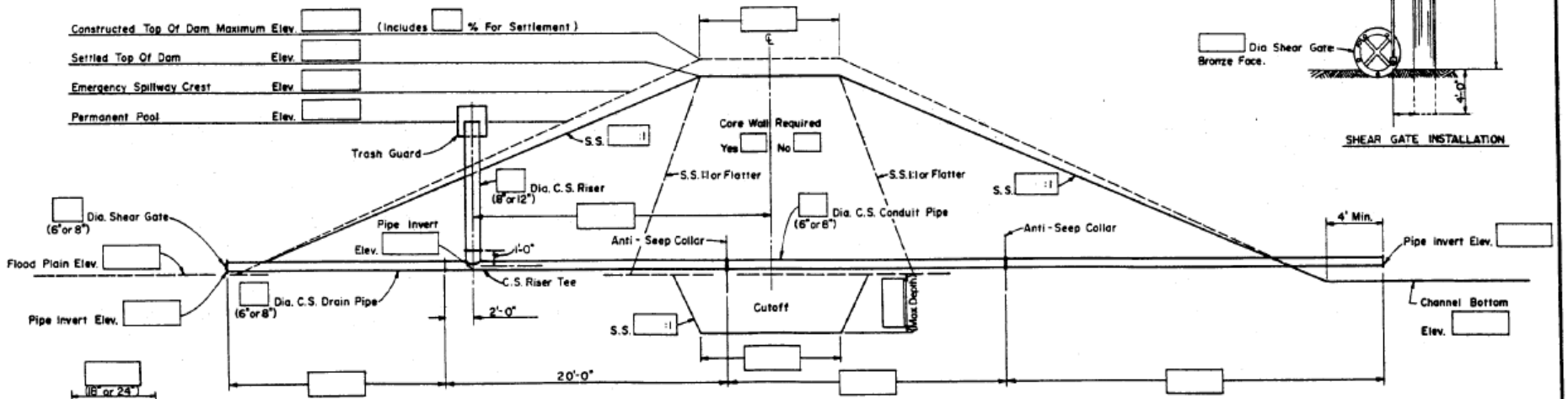
BILL OF MATERIALS

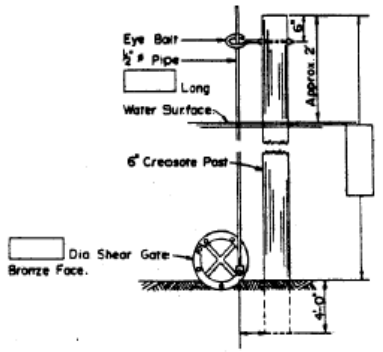
Riser Pipe _____ Dia. Corrugated Steel	_____	lin. ft.
Conduit Pipe _____ Dia. Corrugated Steel	_____	lin. ft.
Drain Pipe _____ Dia. Corrugated Steel	_____	lin. ft.
Riser Tee _____ x _____ x _____ Corrugated Steel	_____	each
Anti-Seep Collars, Sheet Steel	_____	each
Trash Guard _____ Dia. Corrugated Steel	_____	each
Shear Gate _____ Dia. with Post	_____	each

_____

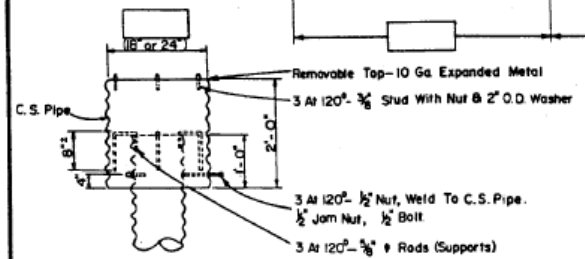
_____

_____



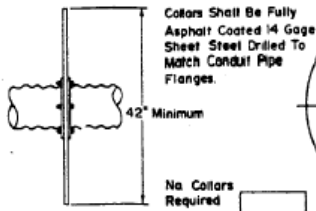


SHEAR GATE INSTALLATION

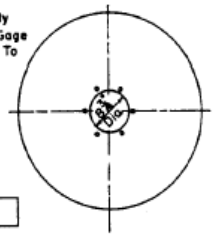


TRASH GUARD

Note: All Corrugated Steel Shall Be 16 Gage Galvanized And Asphalt Coated.



SIDE



ANTI-SEEP COLLAR

PLAN OF FARM POND
6" OR 8" PIPE

_____ Farm

_____ County, Georgia

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

Date
Designed
Drawn
Approved by
Title

U.S. DEPT. OF AGRICULTURE
SOIL CONSERVATION SERVICE

GA-ENG-055
12-92

CERTIFICATION

I certify that the cutoff trench, core wall and pipe were installed in accordance with these plans.

Contractor signature _____ Date _____

I certify that this pond has been completed in accordance with these plans and with all other applicable specifications, except as listed below.

Signed _____ Title _____ Date _____

EXCEPTIONS

_____

_____

_____

GENERAL INFORMATION

Uses for impounded water _____

Area at Normal Pool = _____ acres _____ Maximum Depth = _____ feet

Capacity = 0.40 X _____ acres X _____ feet = _____ acre feet

Source of water _____

EARTH QUANTITIES

Embankment (Including 5% settlement) _____ Cu. Yds.

Excavation of cutoff trench _____ Cu. Yds.

Excavation of stream channel _____ Cu. Yds.

Other excavation _____ Cu. Yds.

Total _____ Cu. Yds.

BENCH MARK DESCRIPTION

_____

_____

BILL OF MATERIALS

Siphon Pipe _____	Dia. Schedule 40 PVC	_____ Lin. Ft.
22 1/2°	Bends, Schedule 40 PVC	_____ Each
45°	Bends, Schedule 40 PVC	_____ Each
90°	Bends, Schedule 40 PVC	_____ Each
___" X ___" X ___"	Schedule 40 PVC Tee	_____ Each
90°	Elbow, 2" OR 4" Schedule 40 PVC	_____ Each
45°	Elbow, 2" OR 4" Schedule 40 PVC	_____ Each
2" OR 4" Schedule 40 PVC Pipe		_____ Lin. Ft.
4" X 4" Treated Wood Post 6' Long		_____ Each

_____

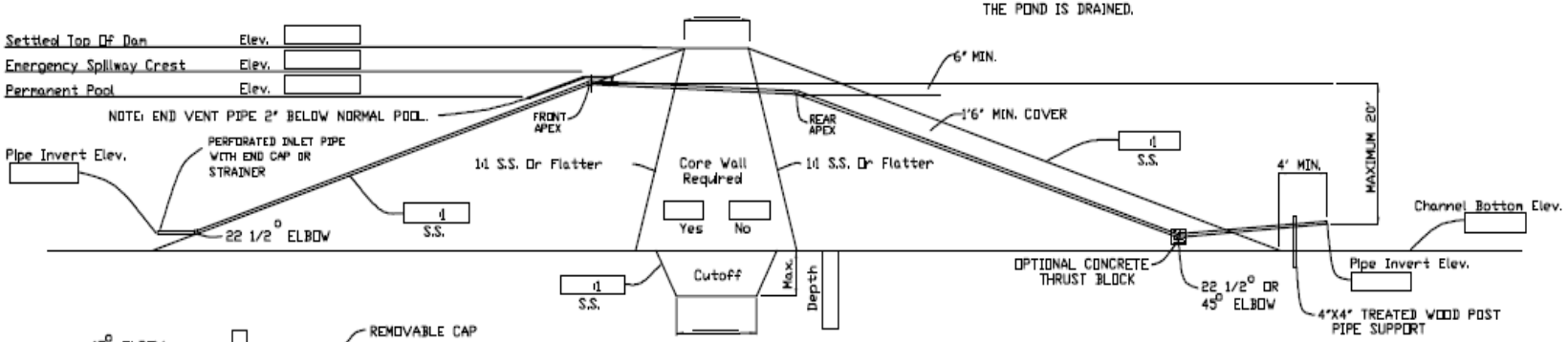
_____

_____

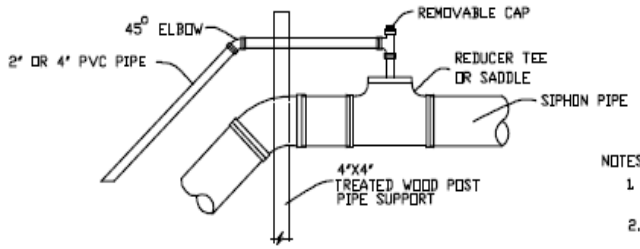
Date
Approved By _____
Title _____

Date 11/92
Designed JTSTEPHENSON
Drawn
Traced
Checked

NOTES:
1. ALL PIPE CONNECTIONS SHALL BE SOLVENT WELD JOINTS.
2. IN LIEU OF CONVENTIONAL 22 1/2°, 30°, 45° BENDS, TWO 90° ELBOWS MAY BE USED AT THE FRONT APEX AND THE REAR APEX OF THE SIPHON PIPE TO ALLOW THE PIPE TO CONFORM TO THE FRONT AND REAR SLOPES OF THE DAM.
3. SIPHON PIPE SHOULD BE BURIED IN FRONT OF DAM IF THE POND IS DRAINED.

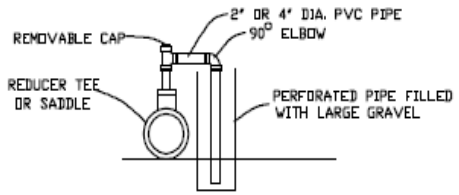


PROFILE OF DAM



VENT DETAIL

NOTES:
1. INLET PIPE PERFORATIONS SHALL HAVE AN AREA EQUAL TO FOUR TIMES PIPE CROSS-SECTIONAL AREA.
2. FOUR INCH VENT PIPES SHALL BE USED ON SIPHON PIPES WITH A DIAMETER OF 8 INCHES OR GREATER.



ALTERNATE VENT DETAIL

C:\DRAW\STANDARD\FARMPOND

PLAN OF SIPHON PIPE FOR FARM POND

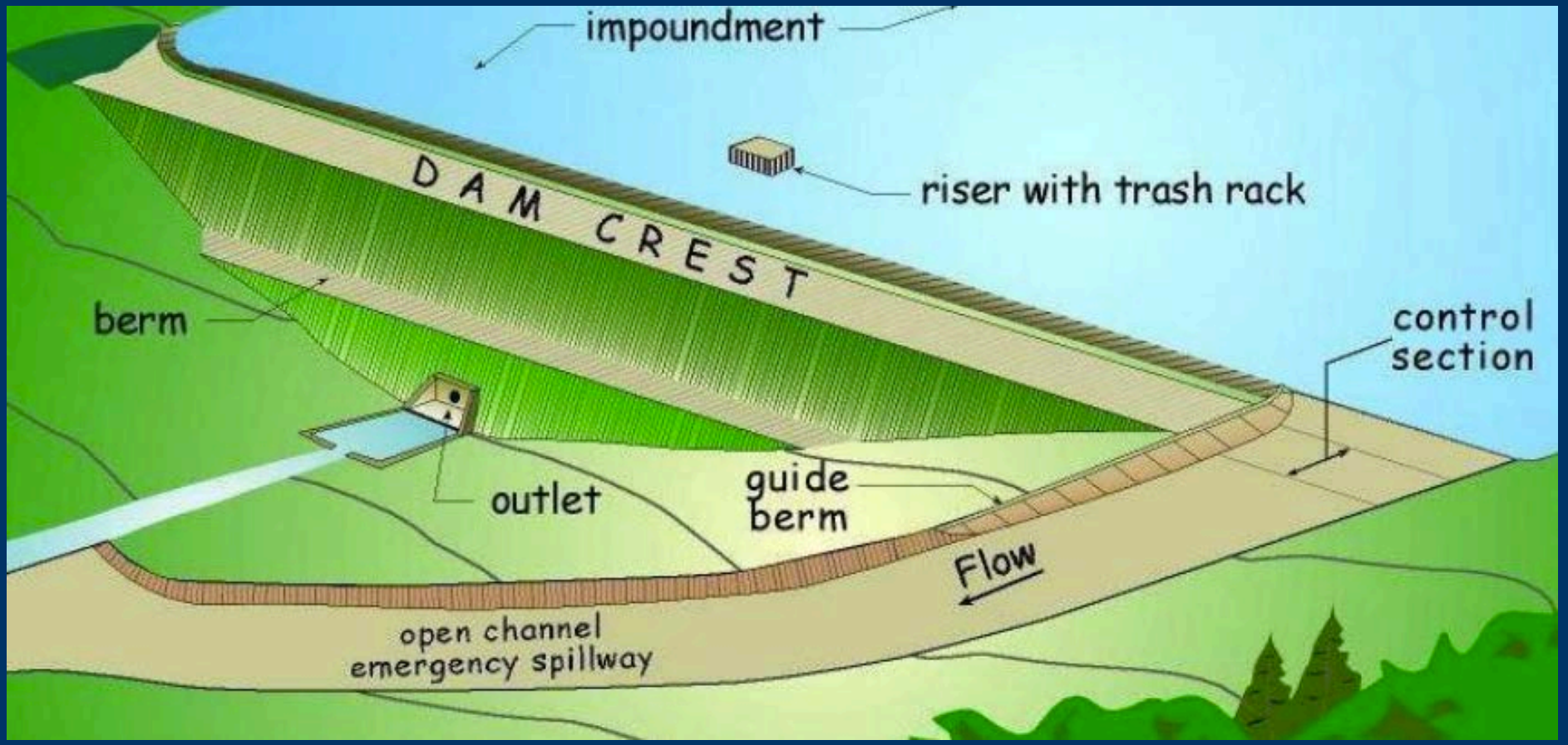
FARM _____ COUNTY, GA.

U.S. DEPARTMENT OF AGRICULTURE NATURAL RESOURCES CONSERVATION SERVICE

DRAWING NO.

SHEET NO. ___ OF ___

Emergency Spillway



The emergency spillway must be kept clear of all obstructions to protect your investment.

Dr. Claude Boyd
Auburn University – Water Quality

Developed methods for fertilizing and liming ponds in the 70's and 80's.

Water Quality & Liming Ponds

Total Hardness > 20 ppm

Bulk Agricultural Lime

Broadcast Applications Best

Cover the Entire Pond Surface

Professional Liming Barges on Large Ponds Ideal

Sunlight & Photosynthesis interactions

Water Hardness/Alkalinity = Thermostat

Note that DO problems come at night/sunrise

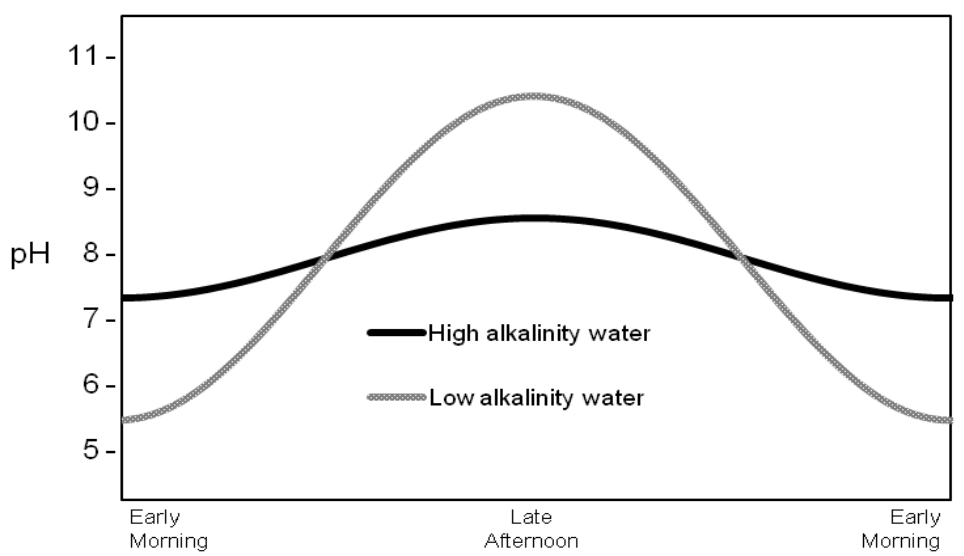
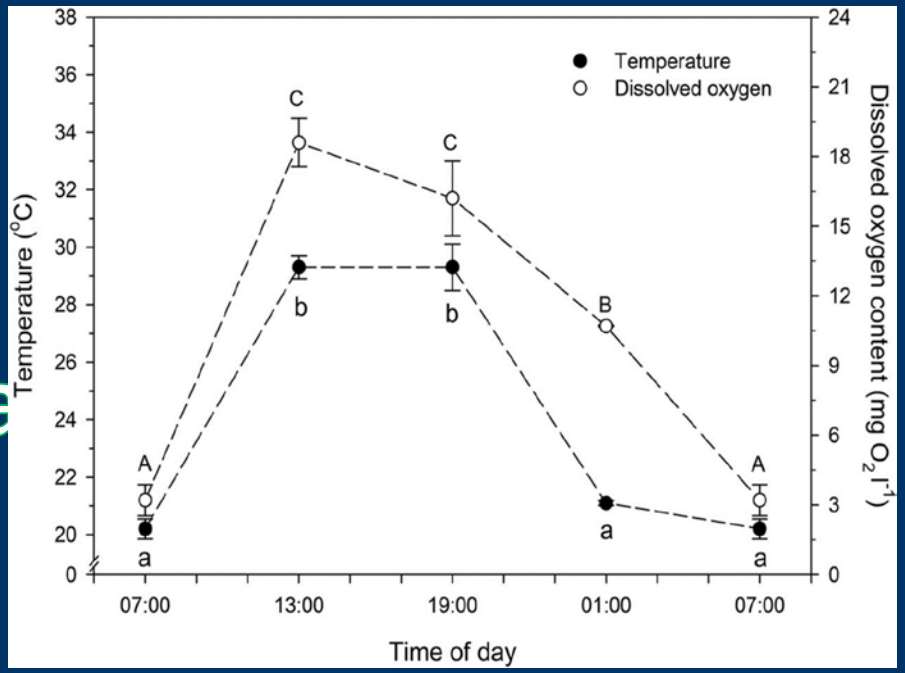


Fig. 1. Changes in pH during a 24-hour period in waters of high and low total alkalinities (Wurts and Durborow, 1992).



UNIVERSITY OF GEORGIA
EXTENSION
Ag & Environmental Services Labs

Soil, Plant, and Water Laboratory
2400 College Station Road
Athens, Georgia 30602-9105
Website: http://aesl.ces.uga.edu

Water Analysis Report

(CEC/CEA Signature)

Sample ID

Client Information

Springfield, GA
Sample: 1
Type: **Fish Pond**

County Information

Effingham County
501 N Richland Ave
Rincon, GA 31326
phone: 912-754-8040
e-mail: uge3103@uga.edu

Results

pH: 4.49 (Desired pH range 6.5 to 8.5)
Calculated Hardness: 4 ppm
(Water hardness is due to the presence of certain dissolved minerals, primarily calcium and magnesium.)

Parameter	Concentration in Sample
Alkalinity	negligible
Aluminum (Al)	0.59 ppm
Boron (B)	0.01 ppm
Calcium (Ca)	0.7 ppm
Carbon Dioxide (CO_2)	negligible
Chromium (Cr)	negligible
Copper (Cu)	negligible
Iron (Fe)	negligible
Magnesium (Mg)	0.5 ppm
Manganese (Mn)	negligible
Molybdenum (Mo)	negligible
Nickel (Ni)	negligible
Phosphorus (P)	negligible

Parameter	Concentration in Sample
Silica (SiO_2)	11.81 ppm
Sodium (Na)	4.6 ppm
Zinc (Zn)	negligible

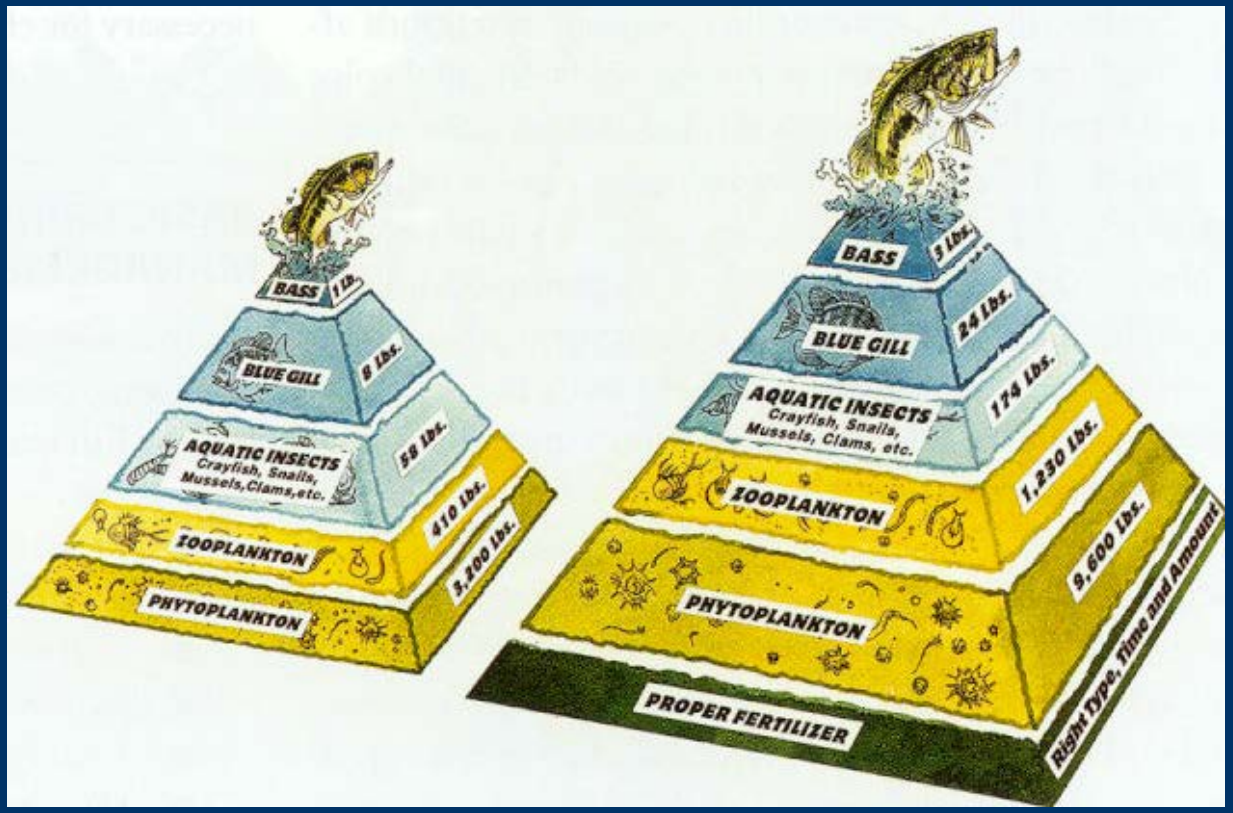
Fertilization Boosts the Food Chain

More Fish - Not Bigger Fish

Multiplies the Base of the Food Chain

Fertilizer, Plankton, Forage fish, bass

Increases Carrying Capacity 4X



Proper Fertilization

5-10 Applications per year using a secchi disk for 12-18” visibility

Dilute Liquid Fertilizer

Platform for Granulars

Improper Fertilization, # 1 Cause of Most Problems

Using the Secchi Disk

Professional Disk $25
Measures visibility
Measure frequently
Pie pan, 5 gal bucket lid w/ weight.

SECCHI DISK MEASUREMENT	RECOMMENDED MANAGEMENT
24 inches or greater	Fertilize.
18–24 inches	Good Bloom. No Action.
12–18 inches	Dense Bloom. Watch.
6–12 inches	Bloom Too Dense. Find Cause. Prepare to Aerate.
6 inches or less	Likely Oxygen Depletion. Aerate at Night.

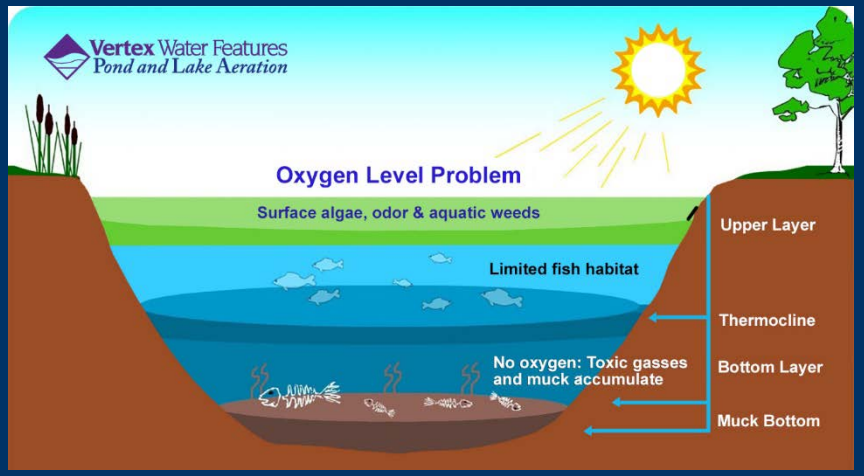
Is Aeration Necessary?

Commercial Production – Yes

Homeowners - No

Breaking the thermocline?

Best for emergencies only.



Pond Dyes / Aquashade

Turns Water Blue

Application Rates Based on Flow

Limits Productivity

Turnover Problems

Weed Management

Jason Mallard
Screven County
ANR Agent

First Things First

- What are plant needs?
  - Sunlight, Nutrients and of course Water!!!!
- We can't control the water and sunlight but we can influence the depth of the pond and shade within the water.

  1. Control weeds before adding nutrients (if needed).
  2. Once weeds are controlled then adding nutrients will help with an algal bloom. Again if the pond needs the nutrients.


Depth of the pond edges (slopes)

Control of Weeds

- Identify the plant pest
- Assess the acreage of infestation
- Know total pond acreage, average depth, flow rates
- Select labeled treatment

Timing of Applications is Critical!

Common Species to Georgia
Triploid Grass Carp

- Stocked for Vegetation Control
- Greatest Impact at 12-24" in Length
- Metabolism Slows with Age
- ~ 7 Years of Productivity

5 Per Acre Preventative 10-20 Per Acre Corrective

Feeding Preferences of Grass Carp on some Aquatic Plants

- High: American Elodea, Hydrilla, Musk-grass, Naiads
- Moderate: Bladderwort, Coontail, Duckweed, Fanwort, Filamentous Algae, Pondweeds, Water Pennywort, Water Primrose
- Low: Alligator weed, Cattail, Maidencane, Milfoil, Parrot feather, Reeds, Sedges, Splatterdock, Topedo grass, Water Hyacinth, Waterlily, Watermeal, Watershield.

Chemical Weed Control

- Aquatic Label
- **<u>WE MUST FOLLOW THE LABEL!!!!!!!!!</u>**
- **AQUATIC APPROVED PRODUCTS**
- Chemical requirements: ie. checking level of water hardness before applying copper.

Chemical Weed Control

- Aquatic Label
- Active Ingredient
- Immediate Impact
- # of Applications
- Potential Problems
- Other use..irrigation?

Herbicide Modes of Action

Systemic

Systemic herbicides are absorbed and move within the plant to the site of action. Systemic herbicides tend to act more slowly than contact herbicides.

- 2 4-D
- Bispyrbac
- Flouridone
- Florpyrauxifen-benzyl
- Glyphosate
- Imazapyr
- Imazamox
- Triclopyr

Herbicide Modes of Action

Contact

Contact herbicides act quickly and kill all plants cells that they contact.

- Copper
- Diquat.
- Endothall
- Flumioxazin
- Penoxsulam

Choosing a Pond Consultant

- Bonded & Insured
- Qualifications
- References
- Proper Equipment
- Local

http://www.caes.uga.edu/extension-outreach/commodities/aquaculture/list-of-ga-pond-consultants.html

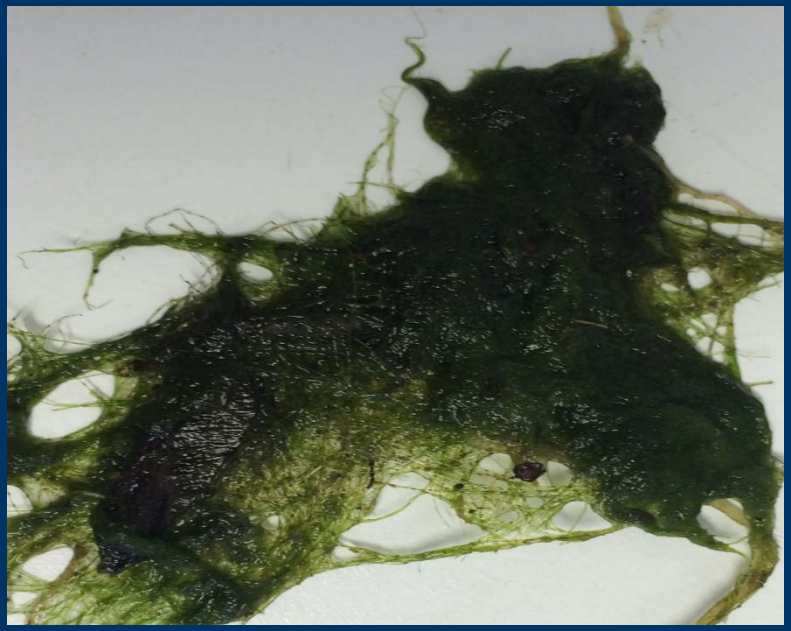
First Step in Long Term Control

Step # 1 Prevention

- **Check Water Hardness/Alkalinity**
- **Slow/Filter Runoff**
- **Fertilization Problems?**
- **Overstocking/Overfeeding?**

Algae – Planktonic & Filamentous

- Copper Based Compounds (Rated: Excellent)
  Cutrine Plus, K-Tea, Captain, Clearigate
- Diquat (Rated: Good)
  - Reward, Harvester, Tribune, Tsunami DQ, Diquat SPC2L, Weedtrine
- Alkylamine Salts of Endothall (Rated: Good)
  - Hydrothol 191
- Flumioxazin (Rated: Good)
  - Clipper
- Sodium Carbonate Peroxyhydrate (Rated: Good)
  - Green Clean, Pak27, Phycomycin



Treat 1/3 pond each 7-10 days until control is achieved.

Spike Rush

Grass Carp – Moderate/Poor

Big problem when hardness/alkalinity are low

GOOD CONTROL

- Reward, Harvester, Tribune, Tsunami DQ, Diquat SPC2L, Weedtrine = diquat.
- Sonar, Avast = fluridone

Smartweed

Excellent Control

- 2-4D
- Glyphosate
- Imazamox
- Imazapyr
- Triclopyr

Good Control

- Bispyibac
- Penoxsulam

Southern Naiad, Coontail & Hornwort

Grass Carp - Moderate Preference

EXCELLENT CONTROL

- Diquat + Copper
- Endothall
- Fluridone

GOOD CONTROL

- 2-4D
- Copper
- Flumioxazin
- Florpyrauxifen-benzyl

Duckweed

Complete eradication critical. One patch can lead to reinfestation.

Good

Diquat- 3/4 gallon plus 8 ounces of surfactant per 50 gallon tank mix.

Reward, Harvester Tribune, Tsunami DQ, Diquat SPC2L, Weedtrine

Excellent

Stingray, Carfentrazone

Sonar/Avast, Fluridone

Clipper, Flumioxazin

Galleon, Penoxsulam

Watermeal

Complete irradication critical. One patch can lead to reinfestation.

Good

Galleon = penoxsulam

Sonar or Avast = fluridone

Excellent

Clipper = flumioxazin - Contact option at ~ $160 acre

White Water Lily

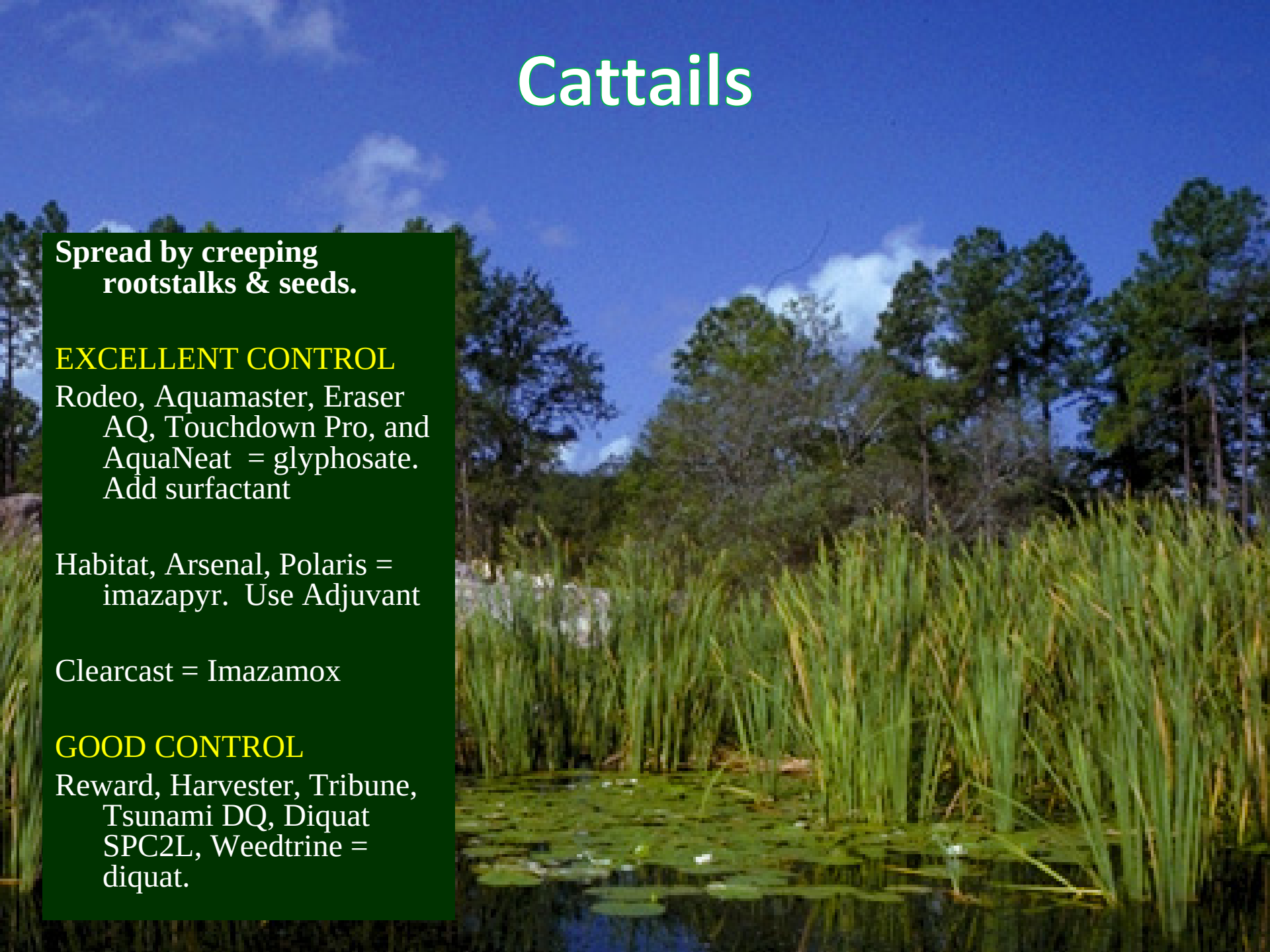
EXCELLENT CONTROL

- **2 4-D**
- **Triclopyr**
- **Fluridone**

GOOD CONTROL

- **Endothall**
- **Glyphosate**
- **Imazamox**
- **Penoxsulum**

Cattails



Spread by creeping rootstalks & seeds.

EXCELLENT CONTROL

Rodeo, Aquamaster, Eraser AQ, Touchdown Pro, and AquaNeat = glyphosate. Add surfactant

Habitat, Arsenal, Polaris = imazapyr. Use Adjuvant

Clearcast = Imazamox

GOOD CONTROL

Reward, Harvester, Tribune, Tsunami DQ, Diquat SPC2L, Weedtrine = diquat.

AQUAPLANT

- Plant Identification
- Weed Management Techniques
- Herbicide Recommendations
- Ornamental Propogation Techniques

http://aquaplant.tamu.edu

Fish Stocking and Management

Steven Patrick
Habersham County
ANR Agent

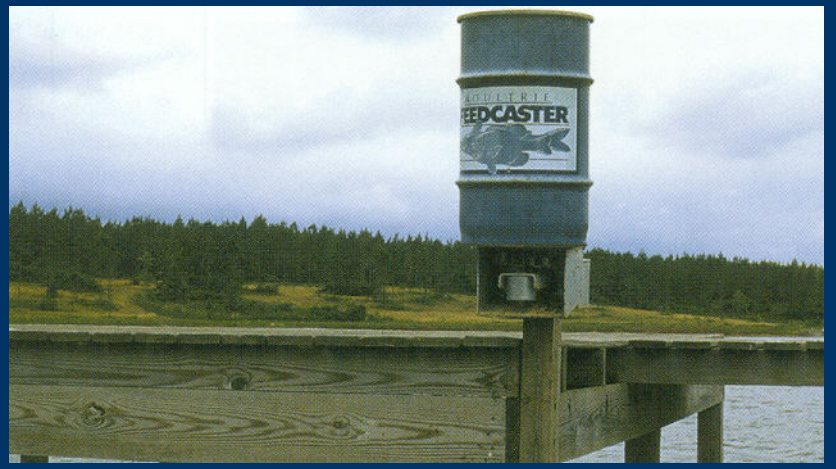
Feeding Fishes in Ponds

Typically feed what the fish normally consume in 15 minutes.

Floating feed easier to monitor.

Feeding during late fall/winter/early spring critical when water temp > 50 F.

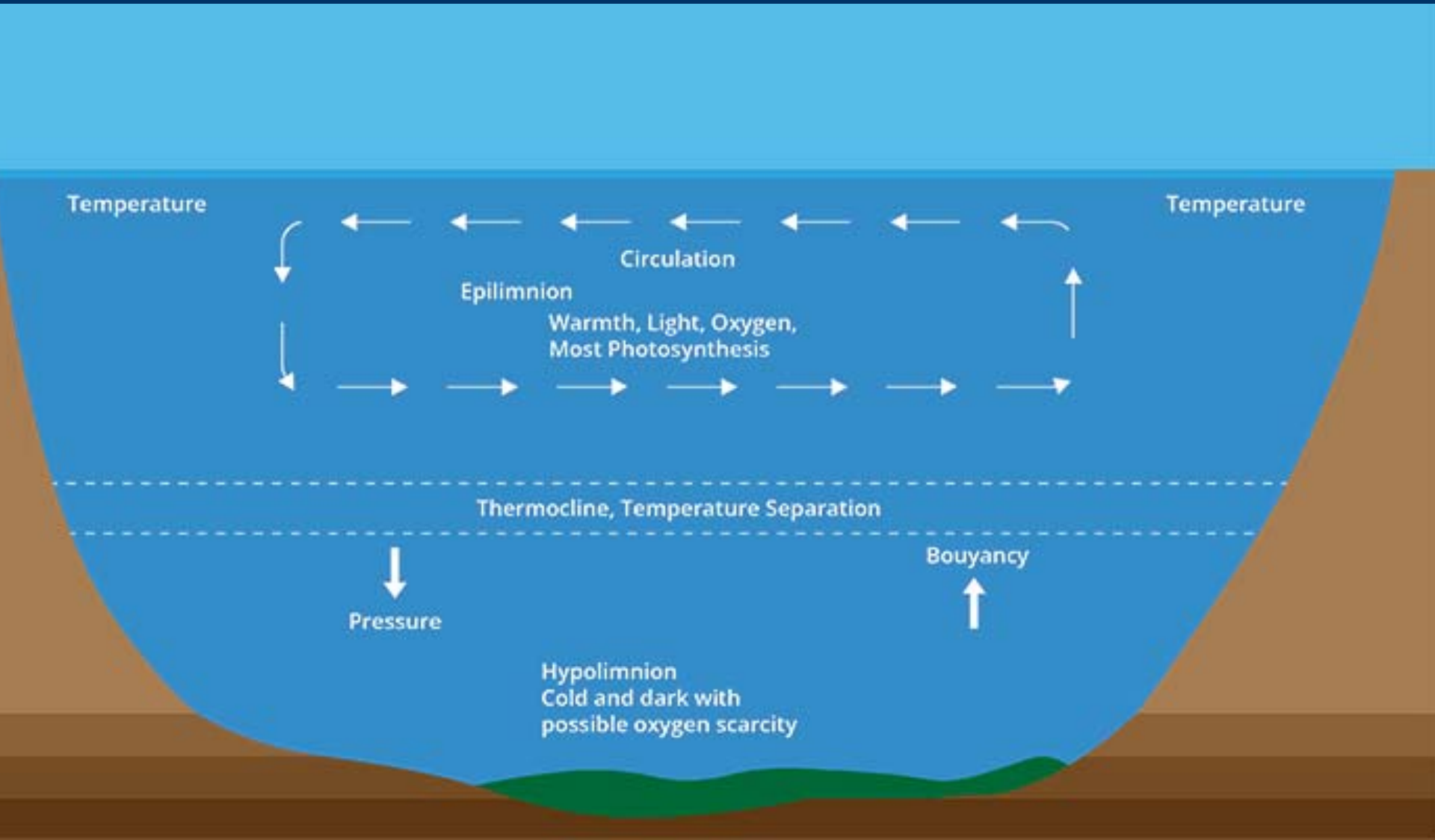
Protein content of the feed?



Oxygen Depletion/Turnover

Cloudy Days/ Heavy Rain, Extremely Windy Days

- **Overfertilization / Overstocking/Overfeeding**



Why the Bass & Bluegill Combo?

Dr. Homer Swingle

Auburn University

1930's – 1970's

Homer Swingle's Goals

 # 1

Mosquito Control

 # 2

Food for Farm Families

Swingle's Balanced Pond Approach

Satisfactory Fishing

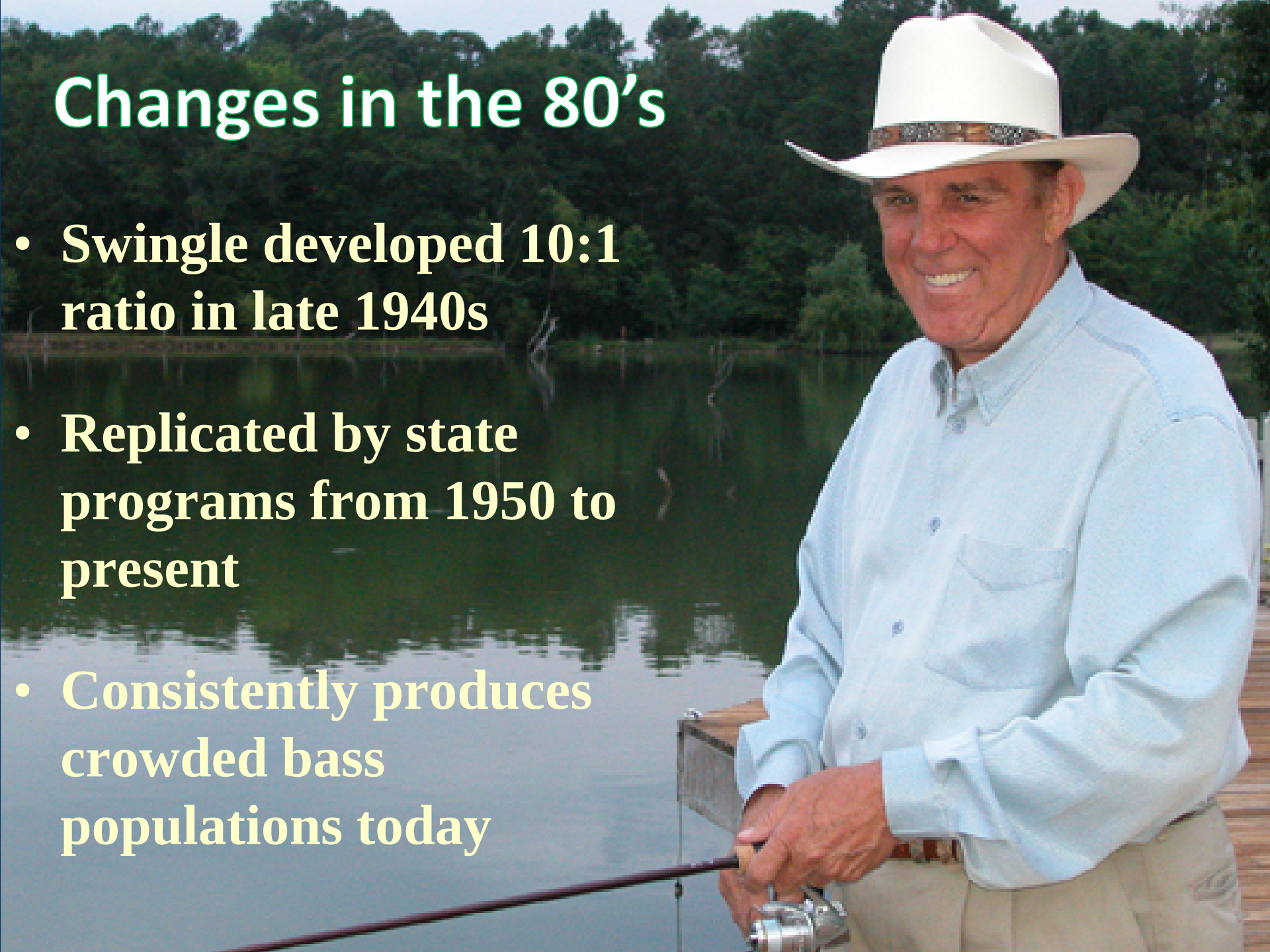
Variety of Species

Variety of Sizes

Over a Period of Time

Changes in the 80's

- Swingle developed 10:1 ratio in late 1940s
- Replicated by state programs from 1950 to present
- Consistently produces crowded bass populations today



Pond Owner Profiles Have Changed

- Expectations are higher
- Fishing is for sport and not harvest
- Demand quality bass and bluegill

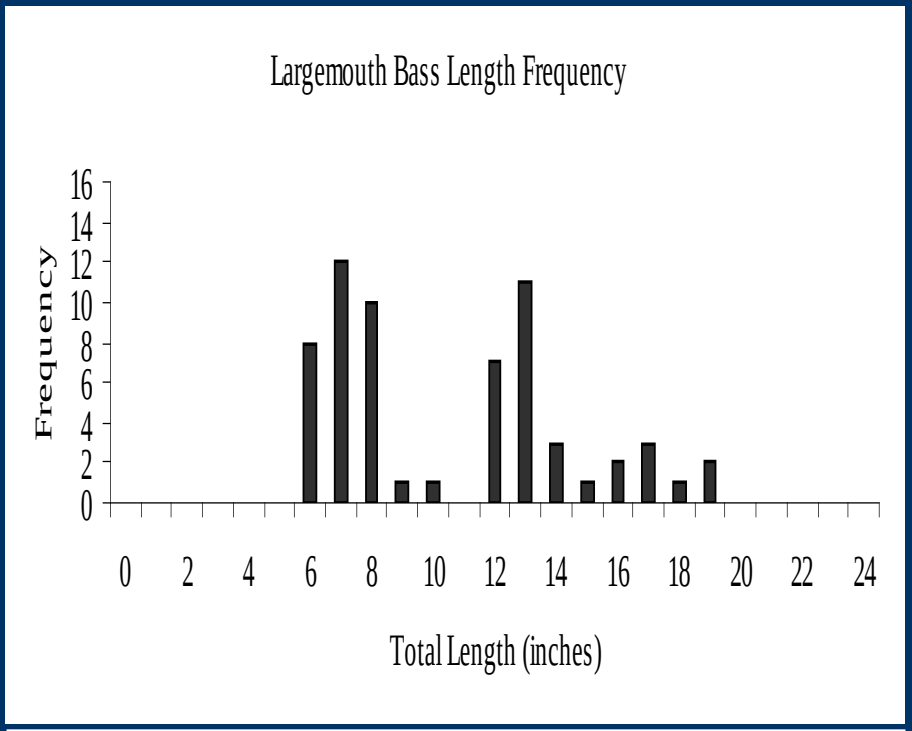
No Forage = No Quality Bass

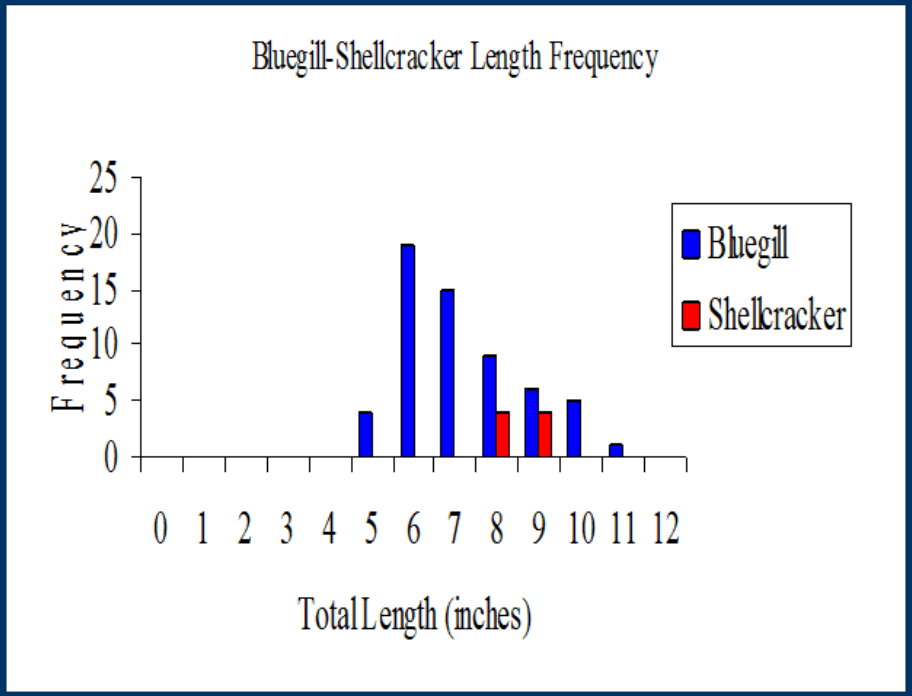
- Harvest Manipulation is Key!

- Quality bass need adequate forage in the 3-5 and 4-6” size class.

Crowded Bass

- 85% of lakes electrofished are bass crowded
- Attributed to low harvest
- Where are the 3-5” gills?





Stocking Your Pond

What Type of Fishing Do You Desire?

Who Will Be Fishing?

How Many Anglers?

How Many Fish do You Eat?

Largemouth Bass

Swingle Standard

Excellent Fishing Value

Easily Managed Using Harvest Manipulation

50 Per Acre

Biggest GA Bass Since 1987, Keith Watkins
17 lb Coweta County Lunker. #4 All Time GA Bass

Bluegill & Coppernose Bluegill

Swingle Standard

Excellent Forage

Multiple spawns

Excellent Fishing

Excellent Mosquito Control

500 Per Acre as only forage fish.

400 Per Acre if stocked with Redear

Threadfin Shad

Stocked at 200 – 500 per acre

Provide abundance of 2-3” forage

Creates a situation where 3-5” bluegill thrive

Gizzard Shad or Golden Shiners in select situations

Other states use Tilapia as well 25-50 ½ pound fish per acre in late May – Illegal in GA

Hybrid Striped Bass

- Usually stocked as advanced fingerlings
- High protein feed vs shad

Winter Trout = Forage Boost

- Usually 6-8 lb
- Stocked in Sept/Oct
- Excellent to enhance trophy bass
- Winter interest

Additional Forage Options

- **Summer Tilapia Illegal in GA**
- **Golden Shiners**
- **Gizzard Shad**
- **Crawfish**

Fathead Minnows

Initial Pond Stocking Only!

3-5 lbs per acre

Eliminated quickly

Get Bass off to Quick Start, Protects the Bluegill

Triploid Grass Carp

Stocked for Vegetation Control

Greatest Impact at 12-24" in Length

Metabolism Slows with Age

~ 7 Years of Productivity

5 Per Acre Preventative
10-20 Per Acre Corrective

Redear - Shellcracker

Swingle Standard

Stocked for Variety

Excellent Fishing

Poor Reproduction for forage

100 per acre in balanced pond

Along with 400 Bluegill

Channel or Blue Catfish

Excellent Food Fish

Easy to Stock & Feed

50 per acre in balanced pond

Must be ~ 12” when stocked with bass present

Can become a problem when not harvested?

Do not exceed 250 lb / acre to avoid competition.

Undesirable Fishes – Redbreast Sunfish

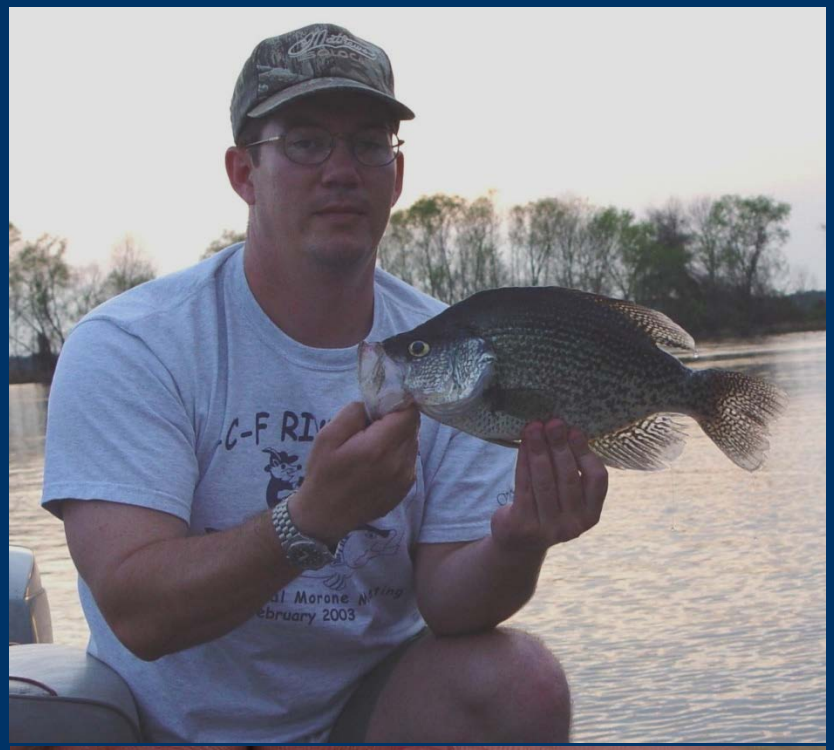
- Stream influence?
- Poor Reproduction
- Competitive Species

Undesirable Fishes - Crappie

Typically Overpopulate in Ponds

Need Large Bodies of Water, Clear Water, Structure & Vegetation

Bass Heavy Ponds?



Undesirable Fishes - Hybrid Bluegill/GA Giants

Bluegill x Green Sunfish

Poor Forage Species

Most of Reproduction Green Sunfish

OK in Special Situations

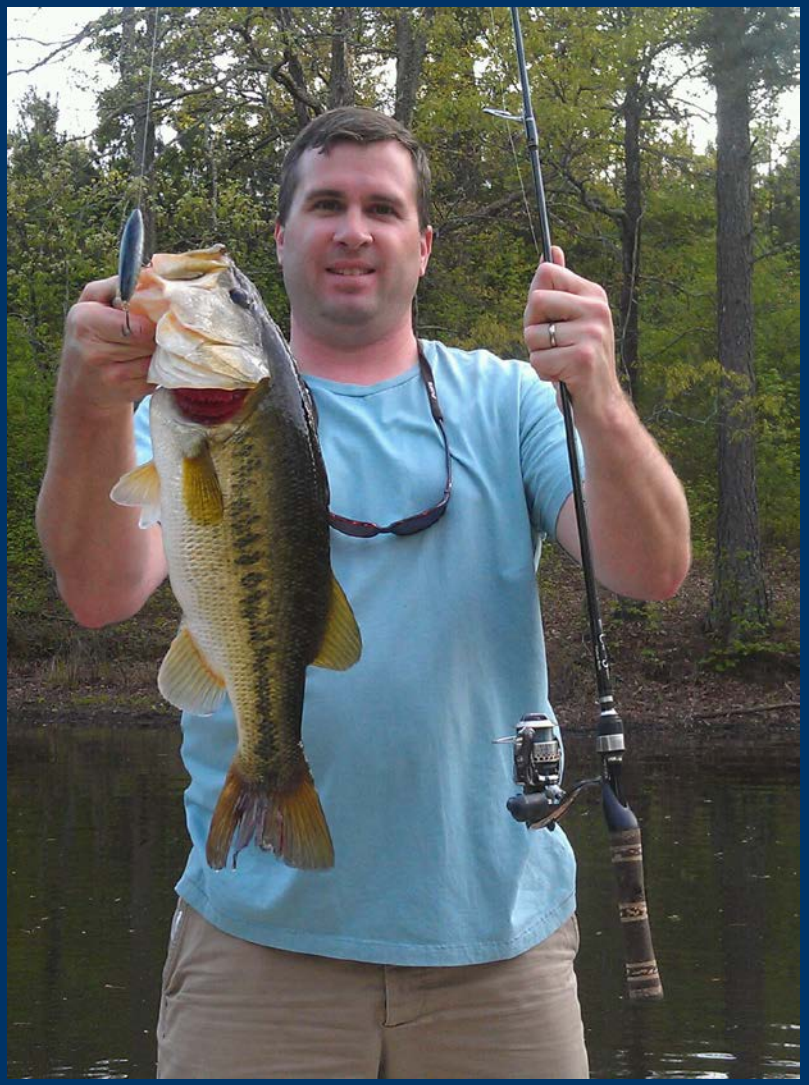
Balanced Populations

A Variety of Fishes of a Variety of Sizes

Stock: 50 LMB
400 BG
100 RE
50 CC

Harvest Catfish as they reach 1 lb in size.

Harvest 10-15 lbs of 8-10” Bass in year 3



Managing For Trophy Bluegill

Management Goal for Hand-Sized Bluegills

Stock: **400 BG**

100 RE

50 - 100 LMB

Restrict all LMB Harvest

Excellent Lake for #’s & BG or RE

Managing For Trophy Bass

Stock: 25-50 LMB
2-3 lbs Fatheads
500 Blugill
500 Threadfin

Liming

Fertilization

Intensive Bass Harvest

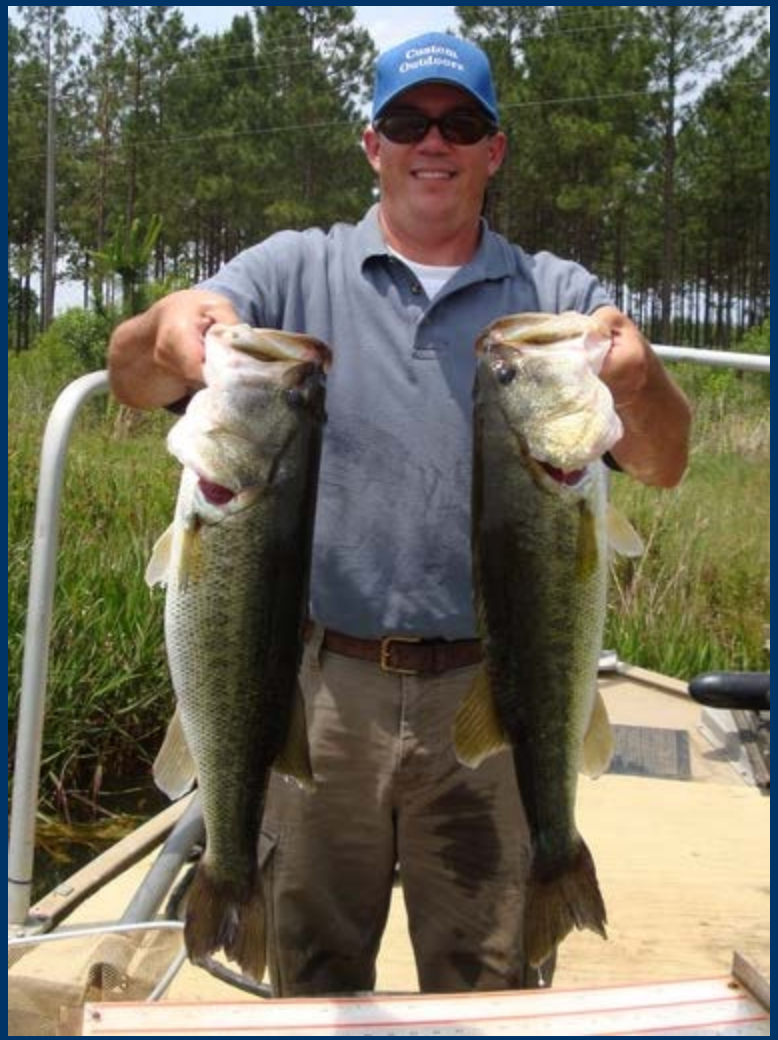
Florida Strain Largemouth

Less Aggressive

FL Strain Doesn’t Replace Harvest Manipulation

Current Research in F1 Hybrid = Tiger Bass

Research suggests stocking 20-30 FL Strain every 3 years for genetic improvement & F1's



1956 Swingle Seine Haul Analysis

Box 20.2 Swingle's (1956) Method of Pond Analysis Based on Seining.

1. No young largemouth bass present:
   - A. Many recently hatched bluegills; no or very few intermediate bluegills. (Temporary balance with bass overcrowded.)
   - B. No recent hatch of bluegills; many intermediate bluegills. (Unbalanced population with overcrowded bluegills and insufficient bass.)
   - C. No recent hatch bluegills; many intermediate bluegills; many tadpoles and/or minnows and/or crayfish. (Unbalanced population with overcrowded bluegills and very few bass.)
   - D. No recent hatch of bluegills; few intermediate bluegills. (Unbalanced population, crowding due to species competitive with bluegills.)
   - E. No recent hatch of bluegills; few intermediate bluegills; many intermediate fish of a species competitive with bluegills. (Unbalanced population due to crowding by competitive species.)
   - F. No recent hatch of bluegills; no intermediate bluegills. (Unbalanced population; possible no fish present or water unsuitable for bass-bluegill reproduction.)
2. Young largemouth bass present:
   - A. Many hatched bluegills; few intermediate bluegills. (Balanced population.)
   - B. Many recently hatched bluegills; very few or no intermediate bluegills. (Balanced population with slightly crowded bass.)
   - C. No recent hatch of bluegills; no intermediate bluegills. (Unbalanced population; bluegills prevented from spawning by low water temperature or salinity, etc.)
   - D. No recent hatch of bluegills; few intermediate bluegills. (Temporary balance with possibility of imbalance developing due to a reduction of the food available to the bluegill or overcrowding by a species growing to a competitive size.)
   - E. No recent hatch of bluegill; many intermediate bluegills. (Unbalanced population similar to 1.B., but less severely overcrowded.)

Swingle Seine Haul Analysis

Inexpensive to conduct

Monitors YOY

Best applied June – Sept

Looking for presence of species, size distribution, and relative abundance

Electrofishing

Method to Assess Adult Fish Population for Balance & Structure.

Wedge & Anderson's Relative Weight Equation

A length/weight relationship.

How fat/skinny a fish is when compared to a standard fish of a given length.

https://appliedecology.cals.ncsu.edu/wp-content/uploads/ANR-1193.pdf

RELATIVE WEIGHT (RW) TABLE

• Largemouth Bass		• Bluegill	
Length	Std. Wt.	Length	Std. Wt.
10	0.5	6	0.2
10.5	0.6	6.5	0.2
11	0.7	7	0.2
11.5	0.8	7.5	0.3
12	0.9	8	0.4
12.5	1.0	8.5	0.4
13	1.1	9	0.6
13.5	1.3	9.5	0.7
14	1.5	10	0.9
14.5	1.6	10.5	1.0
15	1.8	11	1.2
15.5	2.0	11.5	1.4
16	2.2	12	1.6
16.5	2.5	12.5	1.8
17	2.7	13	2.1
17.5	3.0	13.5	2.4
18	3.2	14	2.7
18.5	3.5	14.5	3.0
19	3.9	15	3.4
19.5	4.2		
20	4.5		
20.5	4.9		
21	5.3		
21.5	5.7		
22	6.2		
22.5	6.6		
23	7.1		
23.5	7.6		
24	8.1		
24.5	8.7		
25	9.3		
25.5	9.9		

Aquatic Environmental Services, Inc.

Largemouth Bass Relative Weight Index

		Weight of Bass Sampled (Pounds)						
Length (in.)		110%	Standard Weight 100%	95%	90%	85%	80%	75%
10		0.55	0.50	0.47	0.45	0.43	0.40	0.37
10.5		0.67	0.61	0.58	0.55	0.52	0.49	0.46
11		0.75	0.68	0.65	0.61	0.58	0.54	0.51
11.5		0.86	0.78	0.74	0.70	0.66	0.62	0.58
12		0.99	0.90	0.85	0.81	0.76	0.72	0.67
12.5		1.12	1.02	0.97	0.92	0.87	0.81	0.76
13		1.28	1.16	1.10	1.04	0.98	0.93	0.87
13.5		1.44	1.31	1.24	1.18	1.11	1.05	0.98
14		1.62	1.47	1.39	1.32	1.25	1.17	1.10
14.5		1.80	1.64	1.56	1.48	1.39	1.31	1.23
15		2.01	1.83	1.74	1.65	1.56	1.46	1.37
15.5		2.23	2.03	1.93	1.83	1.72	1.62	1.52
16		2.47	2.25	2.14	2.02	1.91	1.80	1.69
16.5		2.73	2.48	2.35	2.23	2.11	1.98	1.86
17		3.00	2.73	2.59	2.45	2.32	2.18	2.05
17.5		3.30	3.00	2.85	2.70	2.55	2.40	2.25
18		3.61	3.28	3.11	2.95	2.79	2.62	2.46
18.5		3.93	3.58	3.40	3.22	3.04	2.86	2.68
19		4.28	3.89	3.69	3.50	3.30	3.11	2.91
19.5		4.65	4.22	4.00	3.79	359	3..38	3.17
20		5.04	4.59	4.36	4.13	3.90	3.67	3.44
20.5		5.45	4.96	4.71	4.46	4.21	3.96	3.72
21		5.89	5.35	5.09	4.82	4.55	4.28	4.02
21.5		6.35	5.78	5.49	5.20	4.91	4.62	4.33
22		6.83	6.21	5.90	5.59	5.28	4.97	4.66
22.5		7.34	6.67	6.34	6.01	5.67	5.34	5.01
23		7.88	7.16	6.81	6.45	6.09	5.73	5.37
23.5		8.43	7.66	7.28	6.90	6.51	6.13	5.75
24		9.02	8.20	7.79	7.38	6.97	6.56	6.15
24.5		9.64	8.76	8.32	7.89	7.45	7.01	6.57

Measure fish from tip of nose with mouth closed to the end of the tail **(make sure to "pinch" the tail).** To estimate weight of a specific bass, weigh in tenths of pounds and measure in inches to nearest ½ inch and then using the table above look up the relative weight of the bass length. For example: a bass was caught measuring **16" and weighed** 2 lbs. Looking at the chart this particular bass has a relative weight of approximately 90%. To get the exact relative weight of a bass, use the standard weight column from the table above to find the standard weight of the bass caught. Divide the actual weight of the bass caught by the standard weight and multiply by 100. This will give you the relative weight of the bass caught. Example: a 20.5" **bass was caught** weighing 4.2 pounds. Looking at the table above, the standard weight for a 20.5" **is** 4.96 pounds. 4.2/4.96 = 0.846 * 100 = 85%.

1 pound = 454 grams
1 ounce = 28.35 grams
1 ounce = .0625 lbs

www.lakework.com

https://www.aquaticbiologist.com
Decals are $20 each.

You Make the Call?

Glen just bought a pond & he'd like it to produce Trophy Bass.

While fishing he immediately catches a few 12" Bass that weigh 0.75 lbs.

RELATIVE WEIGHT (RW) TABLE

• Largemouth Bass		• Bluegill	
Length	Std. Wt.	Length	Std. Wt.
10	0.5	6	0.2
10.5	0.6	6.5	0.2
11	0.7	7	0.2
11.5	0.8	7.5	0.3
12	0.9	8	0.4

Calculating Glen's RW

Looking at the table we find the fish's "standard weight at 12" is 0.9 lbs.

Divide the actual weight by the standard weight and multiply by 100.

0.75 / 0.9 * 100% = 83%

Try to average 20-30 fish of each species for better accuracy.

Management Recommendations

Pond is balanced, but may be tending towards bass heavy.

Reduce #’s of bass by 10 lbs per acre in 10-12" class.

Preferably in early spring.

Consider fertilization & forage enhancement.

Structure Enhancement

- **Strategically placed**
- **Above thermocline**
- **Ambush points**
- **Forage cover**

Spawning Area Enhancement

Great option for older ponds

Gravel piles

Sand flats

Inexpensive & Effective

Pond Renovation

Treat Puddles Not Ponds

- **Chlorine – 38.8 pounds of the 70% calcium or sodium hypochlorite formulation per acre/ft of water.**
- **Rotenone - rule of thumb 1/2 Gal. 5% Rotenone / Acre Foot**
- **Rotenone requires a GA Pesticide Applicators License**

Disease Problems & Fish Kills

Step # 1 - Assess the Situation, Numbers, % Infected

Step # 2 - Is it a Water Quality Problem?

Step # 3 - Is it a Carrying Capacity Problem?

Step # 4 - Will Fishes Accept Pelleted Feed?

Muddy Ponds

Undesirable Species

Poor Watershed

Water Source

Prevention is Key!

Bryozoans

Colonial Bacteria

Common in Ponds

Sign of Good Water Quality

Turtles & Wading Birds

No evidence of impact on fish populations

Turtles are easily trapped and removed

Southeastern Youth Kayak Fishing

- **Free Entry**
- **Monthly Online Tournaments**
- **End of Year Championship**
- **Great Prizes**
- **Preteen, Teen, Collegiate**

https://www.facebook.com/SEYKF/

Questions & Answers

Please type your questions in the Q and A box.

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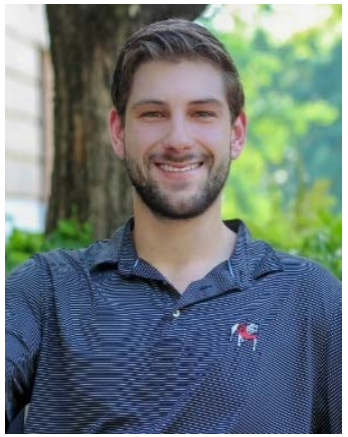

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Thank Y'all!!

UNIVERSITY OF GEORGIA
EXTENSION

Bladderwort

Notice the small air bladders on this rootless plant. Generally submersed with finely dissected leaves.

GOOD CONTROL

Navigate or Weedar 64= 2 4-D

Reward, Harvester, Tribune, Tsunami DQ, Diquat SPC2L, Weedtrine = diquat.

Clipper = Flumioxazin

Galleon = Penoxsulam

Sonar or Avast = fluridone

Egeria

Anachris in the tropical fish trade.
Whorled oval leaves in 4's.

Grass Carp - High Preference

EXCELLENT CONTROL

- Diquat + Copper
- Endothall

GOOD CONTROL

- Fluridone
- Penoxsulam

Eurasian Watermilfoil

Grass Carp – low preference

EXCELLENT CONTROL

- 2 4-D
- Carfentrazone
- Diquat + Copper
- Endothall
- Penoxsulam
- Triclopyr

GOOD CONTROL

- Bispyribac
- Copper
- Fluridone
- Flumioxazin
- Imazamox

Giant Salvinia & Azollo

EXCELLENT CONTROL

- **Fluridone**
- **Glumioxazin**
- **Imazamox**
- **Penoxsulum**

GOOD CONTROL

- **Carfentrizone**
- **Copper**
- **Diquat**
- **Glyphosate**

Hydrilla

Upper leaves whorls of 3 while lower leaves are small and opposite. Serrated leaf margins -underside leaf toothed.

Grass Carp - High Preference

EXCELLENT CONTROL

- Bispyibac
- Fluridone
- Penoxsulam

GOOD CONTROL

- Copper
- Diquat
- Endothall
- Flumioxazin
- Imazamox

Parrot's Feather

Grass Carp - Low Preference

EXCELLENT CONTROL

- 2 4-D
- Diquat+Copper & Suractant
- Endothall
- Fluridone

GOOD CONTROL

- Flumioxazin
- Imazamox
- Imazapyr
- Penozsulam
- Triclopyr
- Florpyrauxifen-benzyl

Pickerelweed

EXCELLENT CONTROL

- **Imazamox**
- **Imazapyr**

GOOD CONTROL

- **2-4D**
- **Diquat**
- **Triclopyr**

Potomogeton Pond Weed

Grass Carp - Moderate Preference

EXCELLENT CONTROL

- **Endothall**
- **Fluridone**
- **Imazamox**

GOOD CONTROL

- **Diquat**
- **Copper + Diquat**
- **Bispyribac**
- **Flumioxazin**
- **Imazapyr**
- **Penosulam**

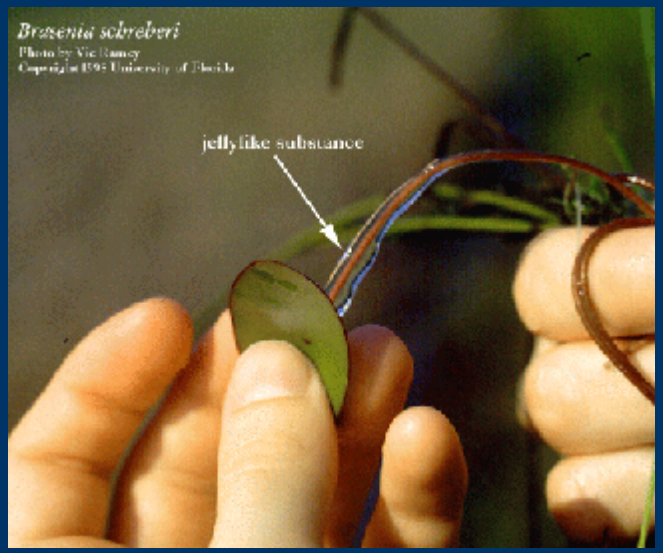
Soft Rush

- **Glyphosate**
- **2 - 3 ounces per gallon in tank.**
- **Spray to wet on a sunny day.**

Dollar Bonnet – Water Shield

Seeds & Leaves Highly Prized Forage of Waterfowl.

Slimy stems, bottoms & large tuberous root make control difficult.



EXCELLENT CONTROL

Navigate, Weedar 64, Restore = 2 4-D

Habitat, Arsenal, Polaris = imazapyr. Use Adjuvent

GOOD CONTROL

Sonar/Avast - Fluridone

Clipper - Flumioxazin

Rodeo, Aquamaster, Eraser AQ, Touchdown Pro, Aquaneat, Reguge = Glyphosate

Clearcast = Imazamox

Florpyrauxifen-benzyl

Water Hyacinth

EXCELLENT CONTROL

- 2-4D
- Bispyribac
- Diquat
- Imazamox
- Imazapyr
- Penoxsulam
- Triclopyr

GOOD CONTROL

- Glyphosate
- Florpyrauxifen-benzyl

Water Pennywort

Grass Carp – Moderate

EXCELLENT CONTROL

- **2-4D**
- **Imazapyr. Use Adjuvent**
- **Triclopyr**

GOOD CONTROL

- **Bispyribac**
- **Diquat**
- **Flumioxazin**
- **Glyphosate**
- **Penoxsulam**
- **Florpyrauxifen-benzyl**

Water Primrose

Excellent Control

- Glyphosate
- Imazamox
- Imazapyr
- Triclopyr
- 2-4D