

# Lake Murray

The Jewel of the Midlands



# How Lake Level Management Impacts Upstream Resources

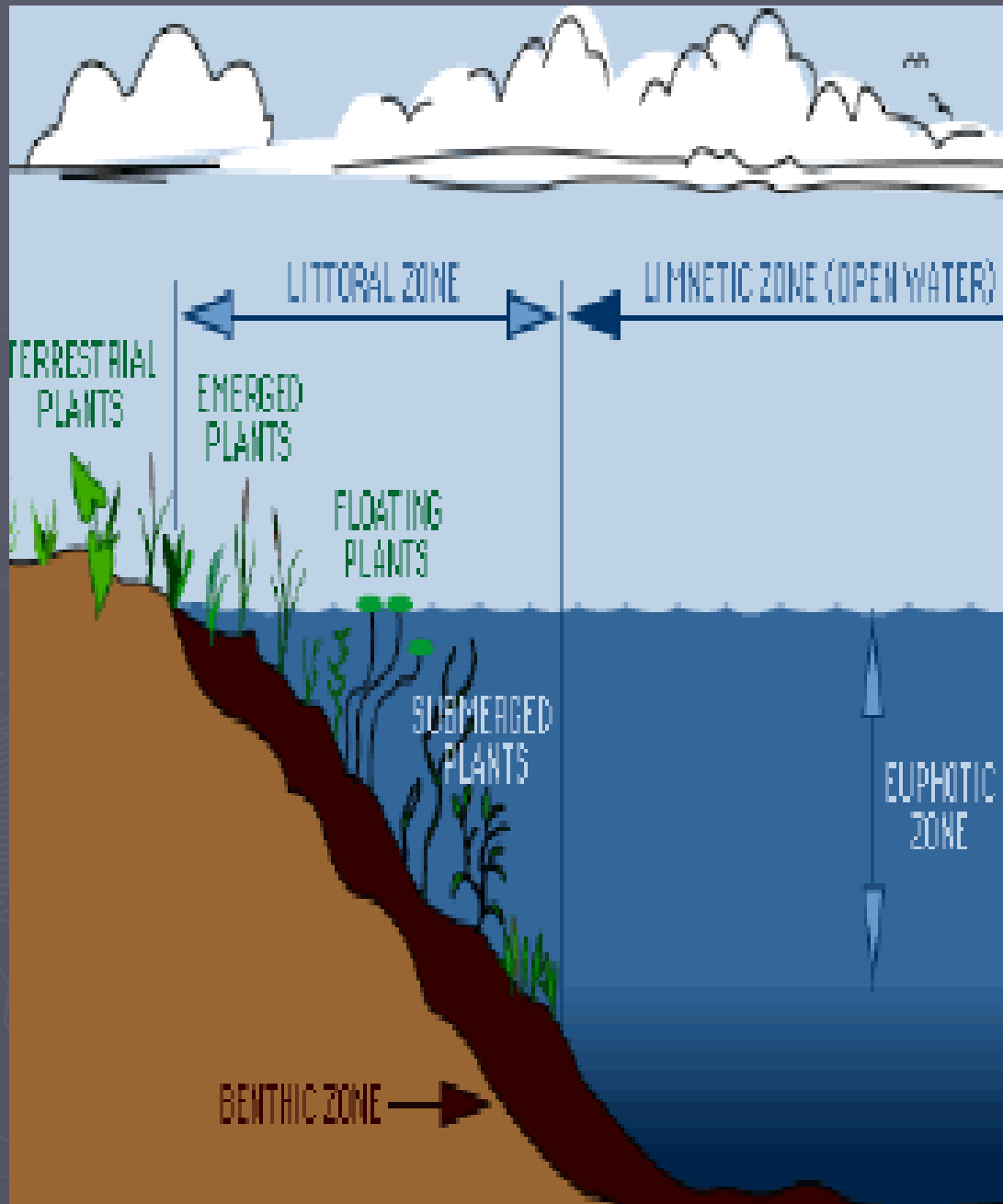
- Environmental
- Recreational
- Economic

# Environmental Resources

Vegetative shoreline needs to be inundated with water from Mar. 15 through the summer if possible.

## Littoral Zone

- Crucial Component of Healthy Ecosystem
- Extends from the shoreline of a lake and continues to depth where sufficient light for plant growth reaches the sediments and lake bottom



Emergent vegetation needs to be inundated with water- Photo shows lake at 357'



# Vegetation in littoral zones provide many benefits.

- Food web interactions (It's just not fish)
- Refuge for small invertebrates against fish predations
- Habitat, food cover and nesting materials for birds
- Habitat for attached algae (phytoplankton)
- Spawning habitat for fish
- Habitat for piscivorous fish
- Refuges for small fish from predators
- Provides shade
- Contributes to better water quality

## Littoral Zone cont-



Water levels below 358' impact fishery and wildlife  
Photo below shows the lake at 356'





# Changes in lake level management improved conditions at Lake Greenwood

- DNR believed that crappie reproduction in Lake Greenwood had been adversely affected by Duke Power Company's (DPC) spring water level management.
- Extreme water level fluctuations during the spring spawning period may have been negatively impacting crappie spawning efforts. (Hayes and Penny 1992)
- These concerns resulted in an agreement with DPC to gradually change the lake level rule curve over a three year period. These changes first positively manifested themselves in the spring of 1993.
- On April 1, the beginning of the peak crappie spawning period, water levels were approximately one foot higher than historic levels. This resulted in the flooding of shoreline structure which normally would have still been exposed.
- Fall trap net catches later that same year showed that a dominant year class of crappie was produced in 1993. It was noted that in the two years prior to 1993, the CPUE of crappie in fall trap net samples averaged 1.55 crappie/trap net night.
- In the four years prior to the initiation of the rule curve change, CPUE has averaged 9.14 crappie/trap net night with a low of 3.25 recorded in 1996.

# Lake level management may be critical to lake's ecosystem

- “If lake management results in dry downs occurring frequently, for example every year or every other year, the littoral community will not have a chance to re-establish itself sufficiently to support aquatic animals.”
- “Dry downs that occur at the time when fish have spawned and/or when water fowl are using the littoral zone can have negative biological effects” *Dr. Karl Havens University of Florida 2008*
- “Considering all concerns, it is apparent that extreme measures should be undertaken as part of the relicensing to protect and enhance Lake Murray’s fishery and other environmental resources so that future generations can enjoy the lake as we do today. Lake level management may be our only tool to reverse the downward spiral.” *Lake Murray Fishermens Focus*

# Health of the Fishery

## Lake Murray

- Fishery in decline since 1991 (Hayes-2000)
- Fishery improved after dam remediation due to increased habitat
- Current condition still impacted by draw down
- Do not have 2008 data
- Fishing guides indicate decline in harvest and health (kn) since early 1990's

## Lower Saluda

- 5- year study (2001-2005)
- The electro fishing surveys revealed the lower Saluda River supports a diverse assemblage of fish species. This study's inventory of the river's fish composition and species abundance is believed to accurately reflect the river's fish community during spring and fall
- The mean relative condition of 1.08 calculated for all striped bass collected, showed these fish were in good post spawn condition.

# Areas that need water to provide benefits

**Shallow Coves-** Includes flats and gentle slopes which typically extend below the 358' to the 354' contour. Depending on water level, provide shallow water habitat and are usually inundated from early spring to the beginning of fall. A variety of grasses, sedges, and rushes occur in these areas.

## Areas that need water to provide benefits cont.

### **Button Bush and Willow Flats**

- These areas occur between the 358' and 355' contour with most of the vegetation concentrated at the 357' contour.
- In addition to button bushes and willows, river birch, sweet gum, and oak can be found. Herbaceous plants include water willows, fire weed, tooth cup panic grasses and forbs typical of the upper zone of shallow coves.
- These habitats function to stabilize shoreline and provide spawning habitat for a variety of fishes. They also provide shelter for larval and juvenile fishes.
- Button bush and willow flats cover 352 acres along 139.4 miles of shoreline.

## Areas that need water for proper function cont-

### Wet Flats-

- Wet flats exist in the upper lake between the bottomland hardwoods and shallow coves.
- Low wet flats have sweet gum and green ash dominated canopies with American elm, overcup, water hickory, red maple, sugar berry, water tupelo and sycamore. An open shrub layer occurs with button bush and deciduous holly. A patchy herbaceous layer consist of a variety of grasses and vines.
- Wet flats provide important wildlife habitat for the lake ecosystem and, when submerged are prime **feeding grounds for waterfowl**. During high water periods, they are also an important source of course particulate matter, which material forms an important supplement to fine and dissolved sources of nutrients supplied by inflowing rivers. The total area of wet flats is 495 acres over 15 miles of shoreline.

# Erosion

- A 1 foot drop in lake level can cause water to recede anywhere from 1 ft. to 40 ft. or more
- Exposed lake bottom during heavy rain events results in sediment run-off and increased turbidity.

# Vegetative Enhancement Program

- Each year SCE&G gives away 1000's of button bushes, willows, river birches, cypress trees to homeowners as a means refurbishing and enhancing the shoreline
- Each year SCE&G and DNR team up to plant vegetation on some of the islands
- DNR recently planted several test tracts of water willow in hopes of establishing more submerged aquatic plants.

Water levels below 357' for extended periods of time during spring and summer put this program at risk. Ex. A restoration project by SCE&G in Heron Cove which involved planting over 100 button bushes, willows, and river birches was wiped out because of two consecutive summers of levels below 357'.



# Loss of shoreline vegetation due low levels

Two consecutive springs and summers of low levels during the dam remediation killed approximately 80% of the of the button bushes and willows along the shoreline



# Recreation

- Low levels impact recreational opportunities
- Lake Residents are a vital part of recreation pool.
- Lake Murray currently has approximately 9000 docks with an estimated 2.5 persons per lake household. (Meade-Hunt 2002)The study did not take in to account the many relatives and friends who use the lake via private docks
- Based on the study, docks are used at an average of 2 times per week. The proposed shoreline plan would allow an estimated total build out of 13,500 docks during the next license period.

## Recreation cont-

- Assuming that the average family (2.5) goes boating an average of 2 times per week would result in two recreation visits per week x 52 weeks x 9000 households = 936,000 recreation visits per year. At total build out(13,500), approximately 1.4 million recreation visits per year would occur. In contrast, a survey at SCE&G parks found that approximately 435,000 users launched boats at these facilities during a 1 year period. No info is available regarding access at commercial facilities.
- Based on the Lake Murray Association's survey, lake residents begin losing use of their docks when the lake drops below the 356' elevation. At 354' approximately 50% of homeowners lose use of their docks. At 50%, a loss of 45,000 recreation days (per family) would occur during a one month period based on the Meade Hunt study.

# Federal Energy Regulatory Commission Acknowledges Importance of Private Docks

- FERC officials for years have approved private docks on Lake Murray as a means of enhancing recreational access and opportunities.
- Officials recently stated that private docks provide for the majority of recreation use at the project. (Lighthouse Marina EA- FERC -July 2008) Private docks play major role in FERC's obligation to protect and enhance recreational access.
- Lake levels above 356' provide optimum conditions for recreational opportunities.

# Boating Safety

- Based on our analysis, lake levels below 354' contribute to boating safety concerns due to unmarked hazards.
- A field survey in the Billy Dreher Island area in 2008 identified 12 unmarked hazards at levels 354' and below. This survey was conducted by the Lake Murray Homeowners Coalition (LMHOC) with the assistance of long time Newberry fishing guide Doug Lown.
- Mr. Lown indicated that he believed that DNR would need to add an additional 150 buoys lake wide in order to mark all significant hazards when levels drop below the 354' elevation.

# Economics

- Lake Murray residents spend approximately \$45 million each year on water based recreation activities. (Meade-Hunt 2002) This does not include the purchase of boats and does not include spending by relatives and friends.
- If 50% of homeowners lose the use their docks for one month during the summer, it would likely result in an estimated loss of 3.5 million dollars in water based expenditures. This assumes that 50% of the expenditures occur during the summer months. Lake businesses including marinas and restaurants would suffer.
- *Buffalo Creek Marina and Grill owner Karen Butler explained, “The majority of my business comes from residents who are looking for a destination to enjoy the on the water dining experience.”*

## Economics cont.- Tax Contributions

- In addition to real estate and personal taxes lake residents collectively spend almost 3 million dollars each year in sales taxes from water based recreation expenditures. (Not including boat purchases)
- It should also be noted that the average value of a lake front lot is approximately \$ 200,000.  $\$200,000 \times 9000 \text{ lots} = \$1.8 \text{ billion}$  – total market value.
- Lake residents contribute significantly to county tax coffers for the privilege of having a dock.

# Economics- Boat Purchases

- It is estimated there are 44,000 registered boats in the four county area
- It's likely that one third to one half of those boats are owned by lake residents
- A lake level management plan that restricts homeowner use of docks impacts boat sales
- *Alan Gliddens of Captains Choice Marine stated “ 90% of my business comes from lake residents and low summer levels could kill his business”*



# Economics cont- Property Values and Real Estate sales

- A lake level management scheme that results in low lake levels will impact property values and real estate sales, especially properties on the market during the recreation season.
- Recently the LMHOC received an email from a bank executive from Florida deciding against retiring on Lake Murray because of concerns about low levels.

*“If you want to hear what low lake levels did to Okeechobee, formerly the world’s greatest bass lake, talk to the area business people. Enjoyed Lake Murray , and while I did not catch a lot of fish, it was a good trip. But after considering what you guys are up against (lake levels that I am leaving Florida about) I will make Lake Fork , TX my home. Best of luck to you and your cause.*

Best wishes,

Walter J. Serbon

# How do we develop a water sharing plan?

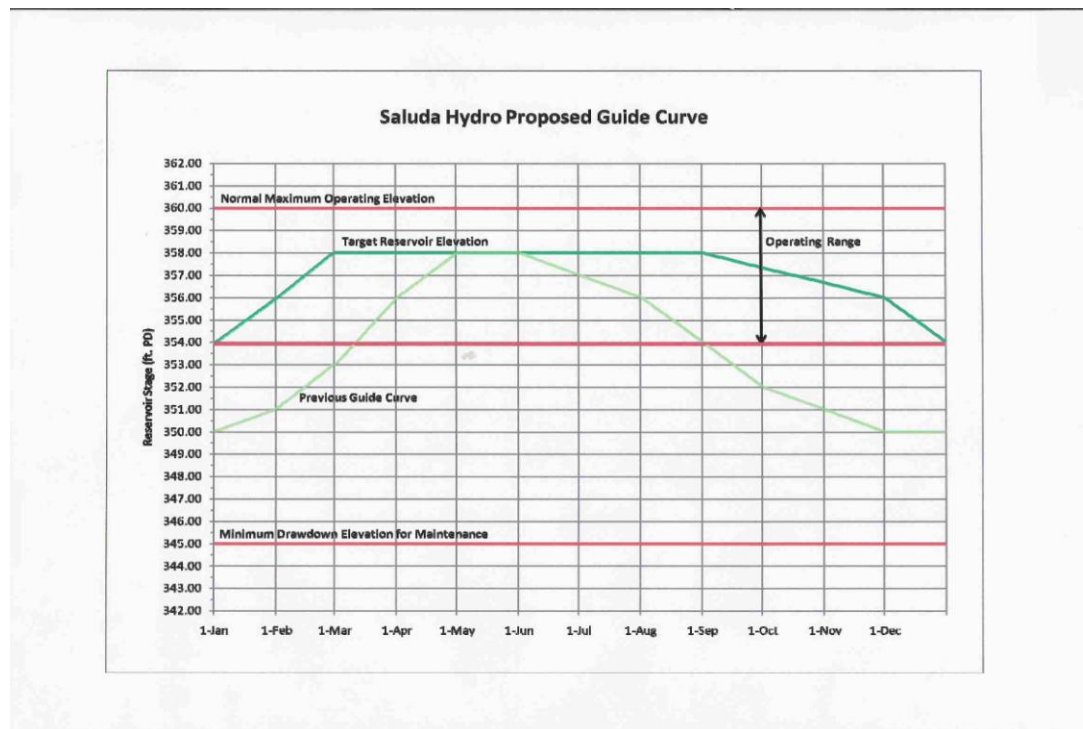
- Understand and consider the value of competing resources
- Clearly understand the consequences to both downstream and upstream resources as a result of an LIP proposal.
- Consider worst case scenario
- Consider probability of potential impacts
- Establish priorities
- Consider operating in “real time” vs. trying to predict inflows

## The Value of Lake Murray's Resources

- 650 miles of shoreline
- 40 miles long and 14 miles wide at widest point
- 47,500 acres
- 1.5 million recreation visits
- 20,000 boats at private docks
- Homeowner expenditures -\$45 million = \$3 million sales tax (not including boat purchases)
- 1.9 billion dollars in real estate ( not including lake access lots)
- 28 access areas, 51 boat ramps, 32 marinas, 6 fishing piers, 19 parks, 38 picnic areas, 68 cottage/cabin sites, 16 camping areas, and 464 tent/trailer/RV sites
- Tourism- \$300 million (- “ Vacationers want high levels to fish the vegetative shoreline and want safe lake to navigate.” Rick Kellemeier owner Lake Murray Vacation Rental)
- Fishery Values- 1.4 million angler hours- 650,000 lbs of fish caught (1991)
- Major fishing tournaments – \$40 million

# Developing a lake level management strategy which protects and enhances lake resources.

Operate between 354' and 356' as target min. based on watershed conditons.



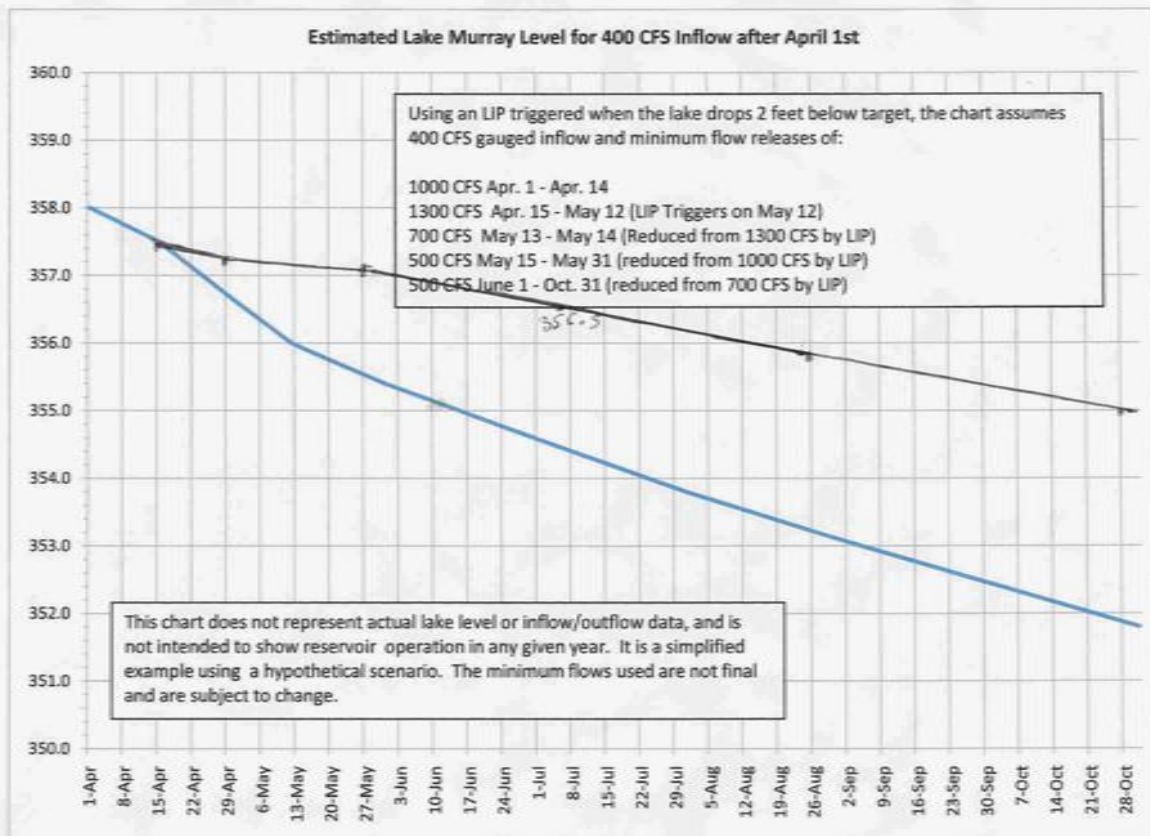
# LIP Proposal

- SCE&G should operate placing priority on conserving water in the reservoir by adhering closely to the guide curve.
- Minimum lake level for late December should be between 354' and 356' based on the watershed condition. SCE&G should bring lake to 358' by March 1, and maintain that level until Sept. 1. SCE&G should gradually bring lake down to 356' by Dec. 31.
- Target downstream flows should be provided until the lake drops 6 inches off guide curve. Then flows should be reduced to 400 cfs until the lake rises back to the guide curve. If at anytime the lake should drop below two feet of the guide curve outflows would be reduced to 400 cfs. During “official” drought conditions flows should be reduced to 400 cfs.

## Worst case scenario using 2ft trigger

- On April 1, Lake is at 358'
- Inflows are 250 cfs and continue until Aug. 31
- Water withdrawals and evaporation account for 250 cfs.
- On May 7, the lake is at 356', on June 1 the lake is at 355.5, on July 15<sup>th</sup> the lake is at 354.3' and on August 31 the lake is at 353'. If drought continues the lake hits 350.2 on Dec. 31.

# LIP comparing 6" vs 2 ft. trigger



## Worst case cont.- Impacts

- Water recedes out of littoral zone impacting spawning activity and other important ecosystem functions.
- Recreation opportunities impacted due to loss of docks  
For every 1000 docks lost, 2000 recreation visits per week.
- For every 1000 docks lost, \$10,000 lost in revenues per week.



## Worst Case Scenerio using 6” trigger

- Using a 6” trigger, the lake would be at 357.5 on April 10, on June 1 the lake would be at 356.4’, on July 15 the lake would be at 355.2’ and on Aug. 31 the lake would be at 354.’