Analysis of Appalachian's Proposal for Water Management

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Presented to RRBAC
15 April 2008

Today's Project Baseline

More residents, more visitors, more business …

- **Residences in the project area over 16,000**
- **Number of shoreline residences 7,353***
- **Number of residential boat slips 6,336 on SML***
- **25,000 registered boats within a 25 mile radius of the project**
- **29 marinas on SML, 5 DGIF ramps + SML State Park**
- **Estimated annual recreation days on SML (5.1M total)**
  - **Public facilities 577,840***
  - **Commercial marinas 1,744,721***
  - **Shoreline residents 2,777,000***

  2.3M
- **253,548 estimated angler hours of daytime fishing SML***
- **157,651 estimated angler hours of daytime fishing LVL***

***Source: Volumes II & VI, Appalachian License Proposal 26 March 2008**

Tools & Excellent Study Roanoke River Basin

- Truthed model (RRBROM) of project inflows, levels and discharges
  - New inflow data set (Mead & Hunt + 250cfs)
  - Project leakage (-300cfs)
  - Staunton River modeled to Brookneal and beyond

- Results of in-stream flow study
  - Staunton River habitat evaluated from Leesville to Clarkton

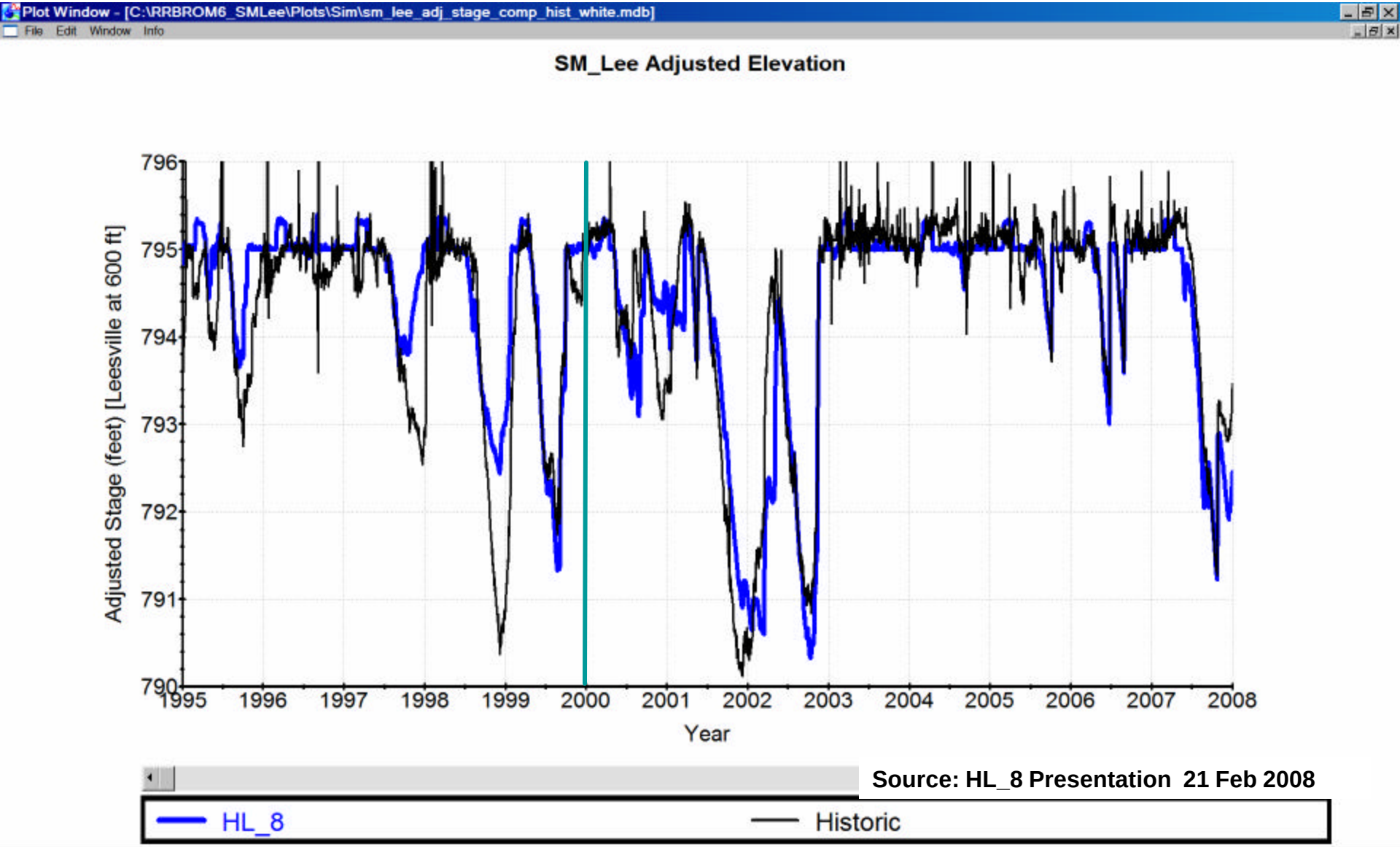
Ordered Attributes of a Balanced Protocol

1. Preserve the public safety
2. Promote habitat and a healthy fishery in and below the project
3. Provide public drinking water supplies
   - 24.9 MGD maximum average withdrawal
4. Augment flows for downstream recreation while providing public access to the waters of SML for recreation

Public Safety Concerns

RRBROM Model Results

SML Actual Level = less 2’ Power Pool



Source: HL_8 Presentation 21 Feb 2008

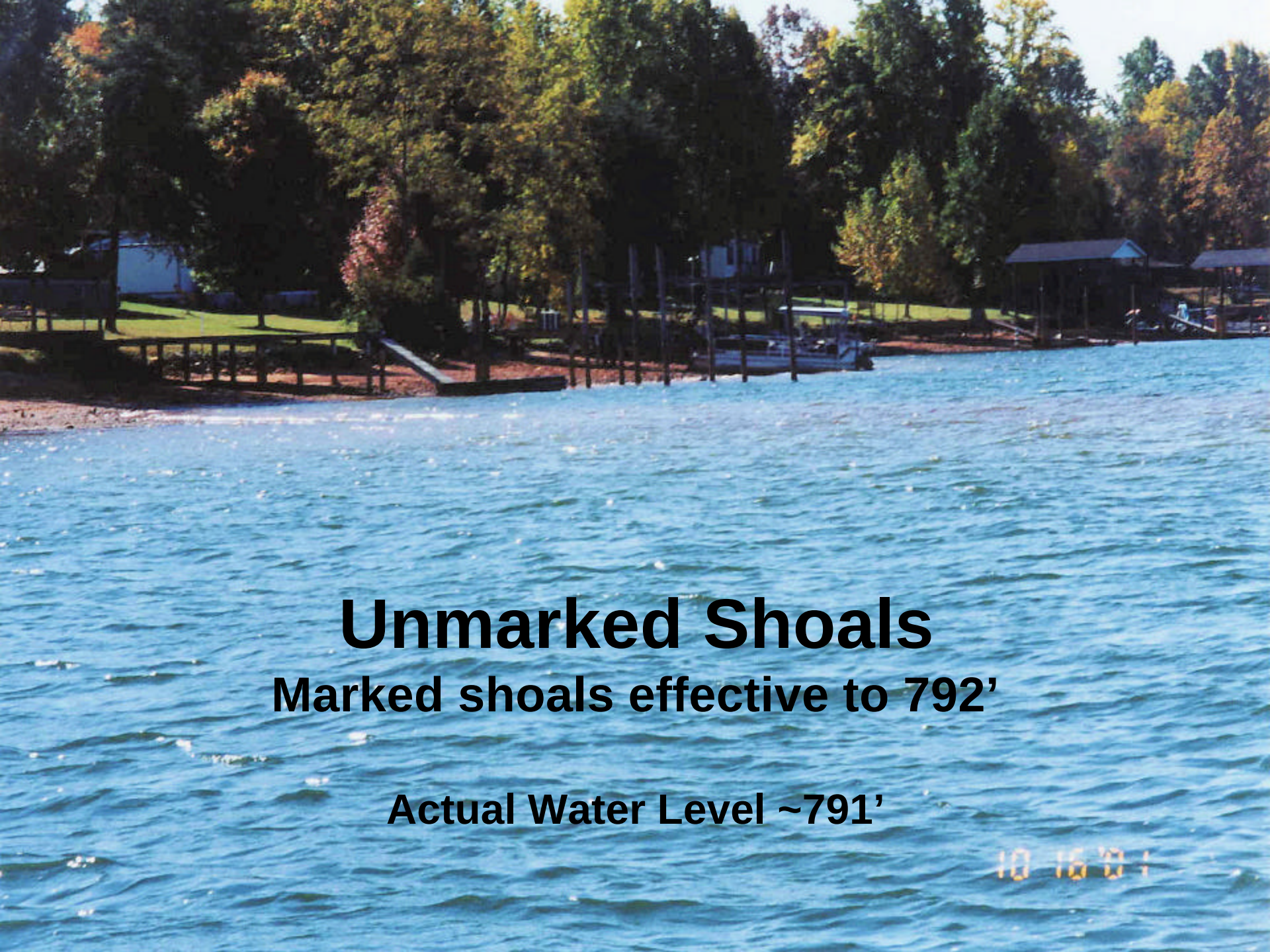
SML Volunteer Marine Fire Rescue & Dive Department

- All volunteer, chartered 1975, 6 boats, 3 ISO certified [1]
  - 54,000 residents & visitors in protection area at season peak
  - Dispatched with 911; 24 / 7 / 365; EMT
  - 1st responder for structure fires w/1,000' of shore
  - 1st responder for near/on-water rescue & recovery
  - Haz-Mat; support for land based departments
- Mission impact due to "actual" SML water level
  - Above 793' no impact to mission
  - Below 792' use caution, at night, response times increase
  - Below 791' response times severely impacted
  - Below 790' extreme risk for volunteers, response curtailed
- USCG Aux concurs with MFR&DD water level impact [2]
  - USCG Aux ceases its patrols at 791' actual

Sources:
[1] Operational Impacts; Jack Gautier, Fire Chief, Smith Mountain Lake Marine Vol. Fire / Rescue 1-23-2008
[2] Impact Statement; Dalene G. Bailey PRCO-SHR, 5SR USCG Auxiliary 3-21-08

Navigation Aid B-13
Effective to 790’ in Main Channel

Actual Water Level 790.5’

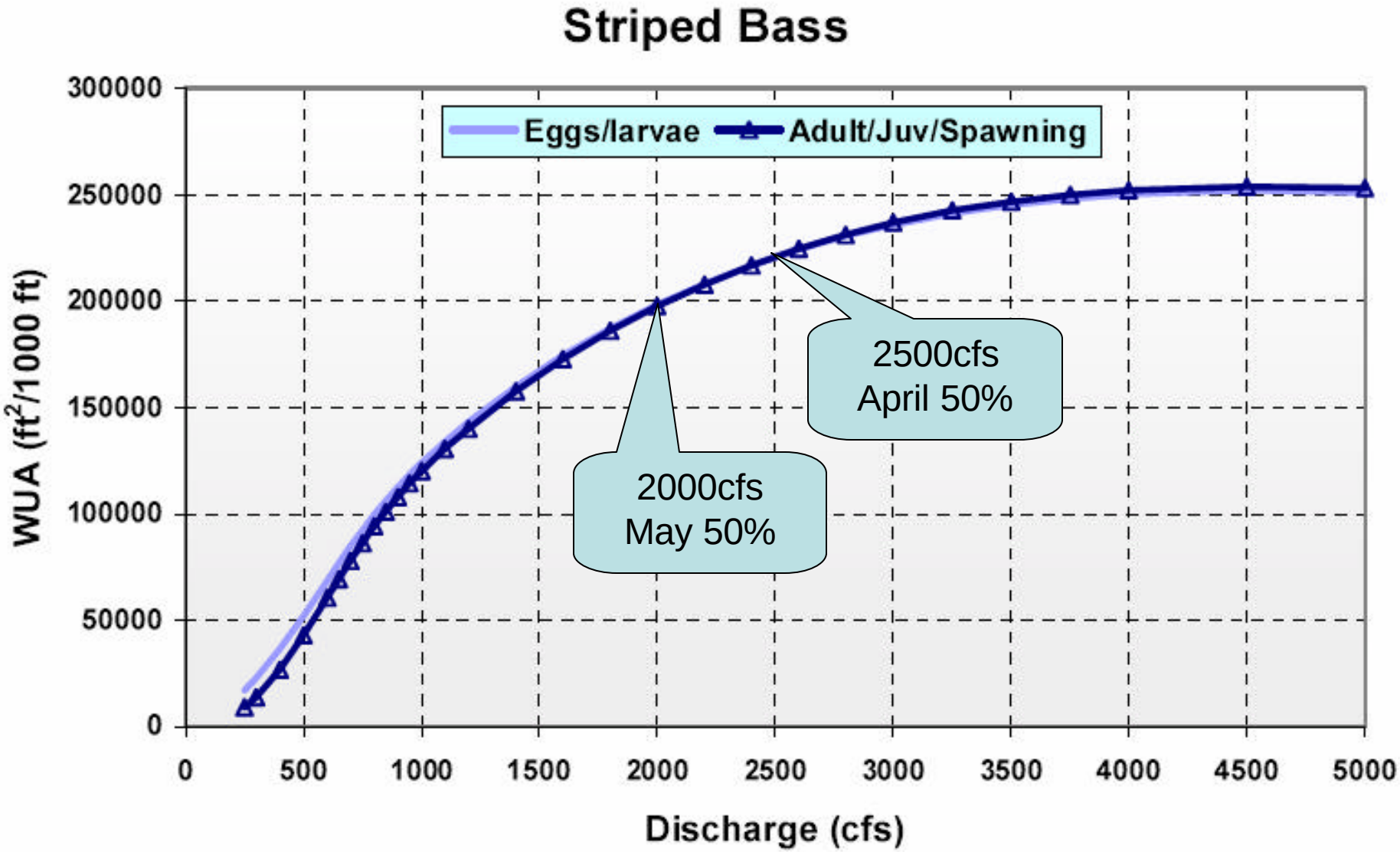

Unmarked Shoals
Marked shoals effective to 792’
Actual Water Level ~791’
10 16 '01

Navigable Channels Narrow
Actual Water Level 790.5’

Promote Habitat and a Healthy Fishery In and Below the Project

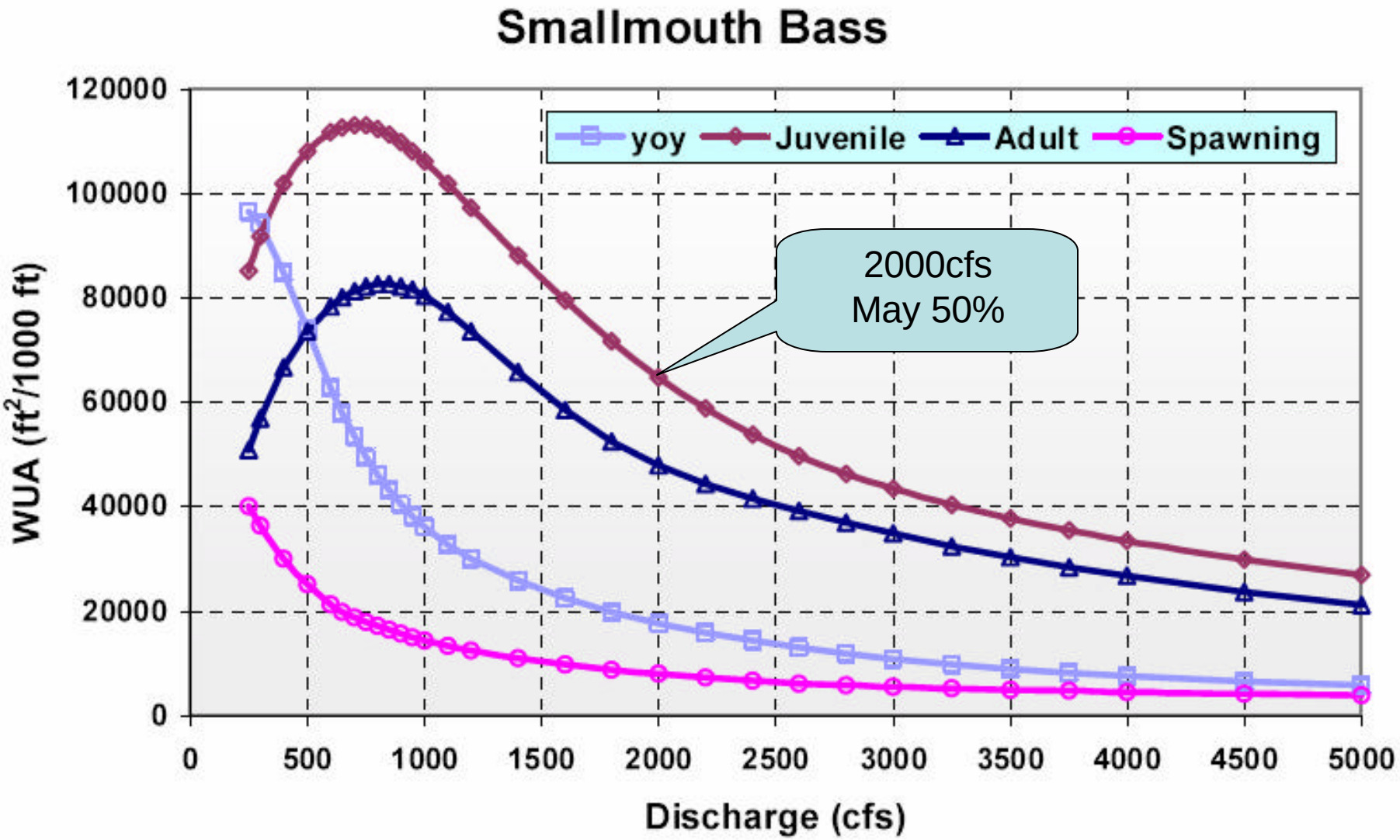
- ✓ Good assessment of downstream habitat using IFIM and PHABSIM
  - River wetted bank to bank with 500cfs flow at Brookneal
  - Amount of habitat varies seasonally (velocity vs. level)
- o No assessment of project level fluctuations on project habitat or fishery
  - Littoral zone
  - Wetlands
  - Shoreline erosion
  - Aquatic vegetation (hydrilla, Brazilian elodea)

Spawning Months April & May



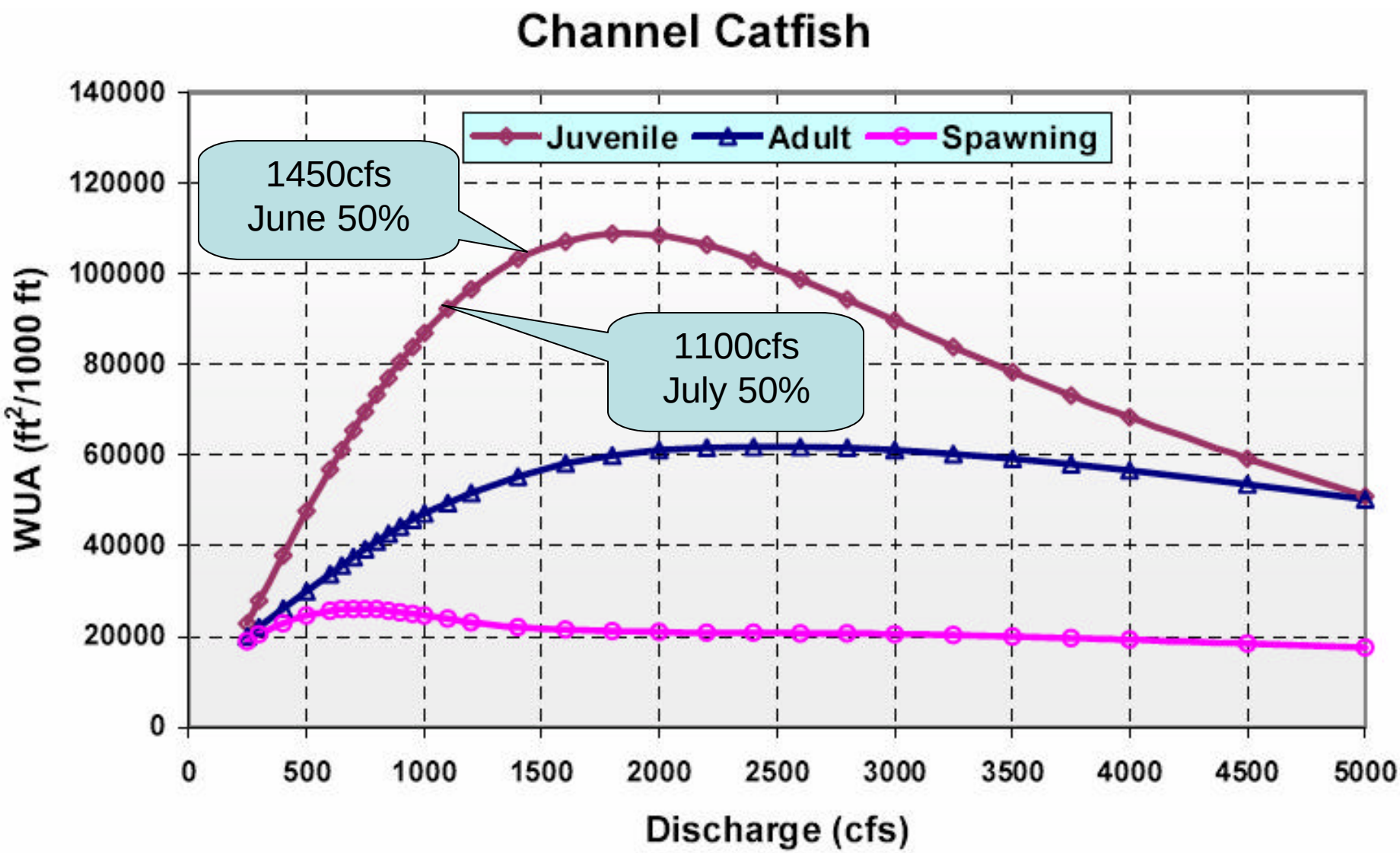
Source: Final Instream Flow Study 8-8-2007

Spawning Month May



Source: Final Instream Flow Study 8-8-2007

Spawning Months June & July



Source: Final Instream Flow Study 8-8-2007

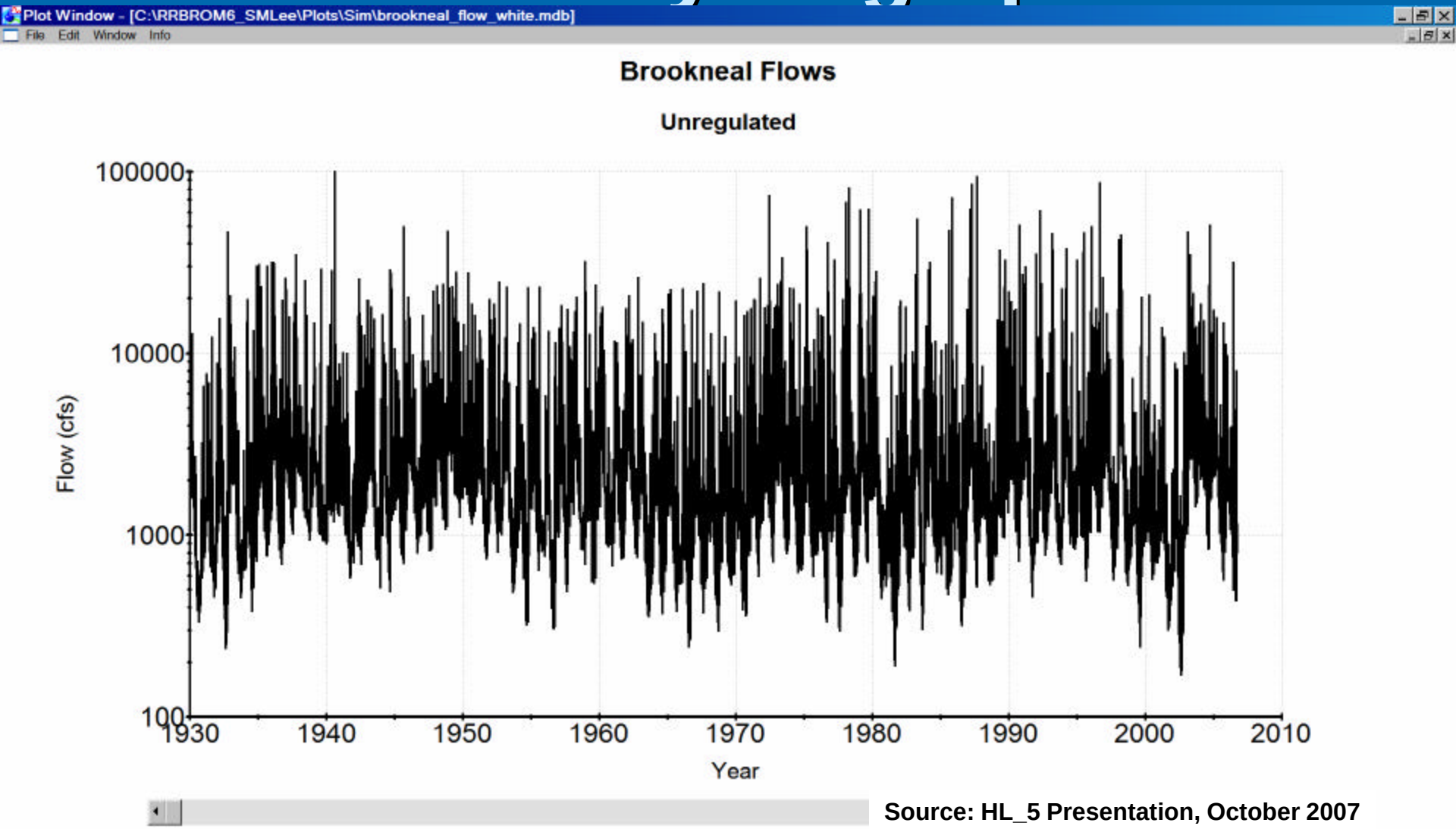
In-stream Flow Assessment

- Striped bass, walleye, and American shad spawning index curves tend to crest at relatively high flow levels.
- All other spawning life stages (smallmouth bass, northern hogsucker, chub, redbreast sunfish, and channel catfish) higher index values tend to occur at lower flow levels.
- Juvenile and fry stages increased habitat at lower flows.
- Adult stages increased habitat at higher flows

- *"Because of these differences between life stages, interpreting and using WUA/PHI curves to make flow decisions can be complex."*

Source: Final Instream Flow Study 8-8-2007

Why Not Follow the Natural Hydrograph ?



Source: HL_5 Presentation, October 2007

Mimic Nature's Flow Regimen

- Natural flow patterns result in sustainable, bio-diverse ecosystems
- Natural flow variation essential for a healthy river
- Scientist's do not fully understand interrelationships between flows, habitat and species diversity
- Wide-spread national scientific consensus
  - Nature Conservancy
  - In-stream Flow Council
  - American Rivers
  - Hydro Power Reform Coalition
  - Academia

Some References

- The Sustainable Rivers Project; http://www.nature.org/initiatives/freshwater/partnership/
- American Rivers Citizen Guide Water Quantity and Instream Flow; http://www.americanrivers.org/site/PageServer?pagename=AR7_Guide_WaterQuantity
- Issues in Ecology Number 10 Winter 2003; SUSTAINING HEALTHY FRESHWATER ECOSYSTEMS by Jill S. Baron, N. LeRoy Poff, Paul L. Angermeier, Clifford N. Dahm, Peter H. Gleick, Nelson G. Hairston, Jr., Robert B. Jackson, Carol A. Johnston, Brian D. Richter, Alan D. Steinman
- ECOLOGICALLY SUSTAINABLE WATER MANAGEMENT: MANAGING RIVER FLOWS FOR ECOLOGICAL INTEGRITY; BRIAN D. RICHTER, RUTH MATHEWS, DAVID L. HARRISON, AND ROBERT WIGINGTON; http://www.nature.org/initiatives/freshwater/misc/
- River Research and Applications 22: 297–318 (2006); A COLLABORATIVE AND ADAPTIVE PROCESS FOR DEVELOPING ENVIRONMENTAL FLOW RECOMMENDATIONS; BRIAN D. RICHTER, ANDREW T. WARNER, JUDY L. MEYER and KIM LUTZ
- Case Study: FERC HYDROPOWER DAM RELICENSING, ROANOKE RIVER NC;

  http://www.nature.org/initiatives/freshwater/work/art16855.html

Provide Public Drinking Water Supplies

- 24.9 MGD max average withdrawal
  - Input from regional planning agencies for year 2040
- Modeled 12.5 MGD withdrawal (19.3cfs)
  - Assumes 50% of withdrawal returned

Augmenting Flows For Downstream Recreation

Source: Final Instream Flow Study 8-8-2007

Hale Islands @ 695cfs

Canoe 0 -- Stage 6.24’

Source: Final Instream Flow Study 8-8-2007

Hale Islands @ 1,018cfs

Fishing – best at mid flow

Stage 6.60’

Source: Final Instream Flow Study 8-8-2007

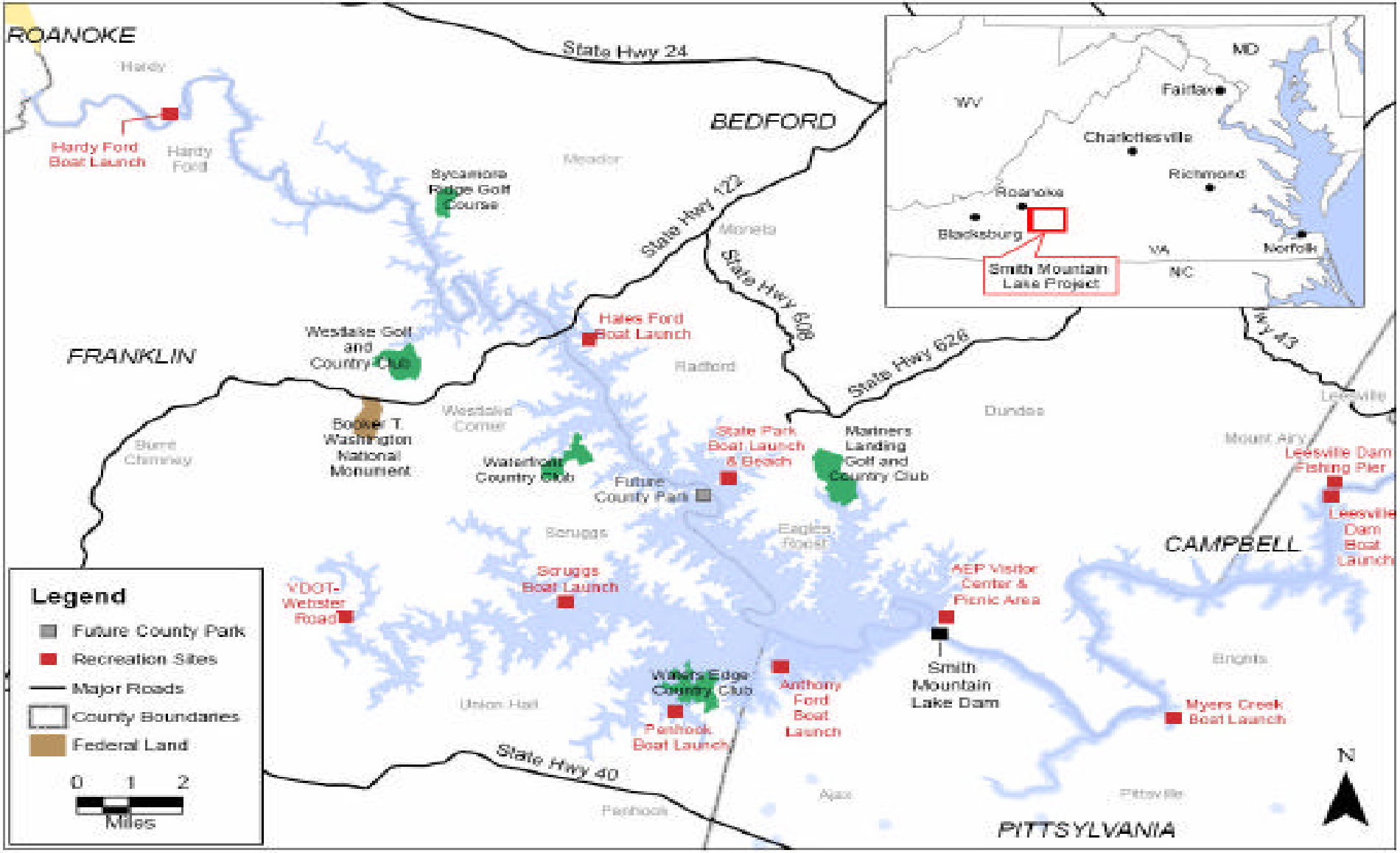
Hale Islands @ 2,065cfs

Boating – best at mid and high flow

Stage 7.65’

Source: Final Instream Flow Study 8-8-2007

Provide Public Access to the Waters of SML for Recreation

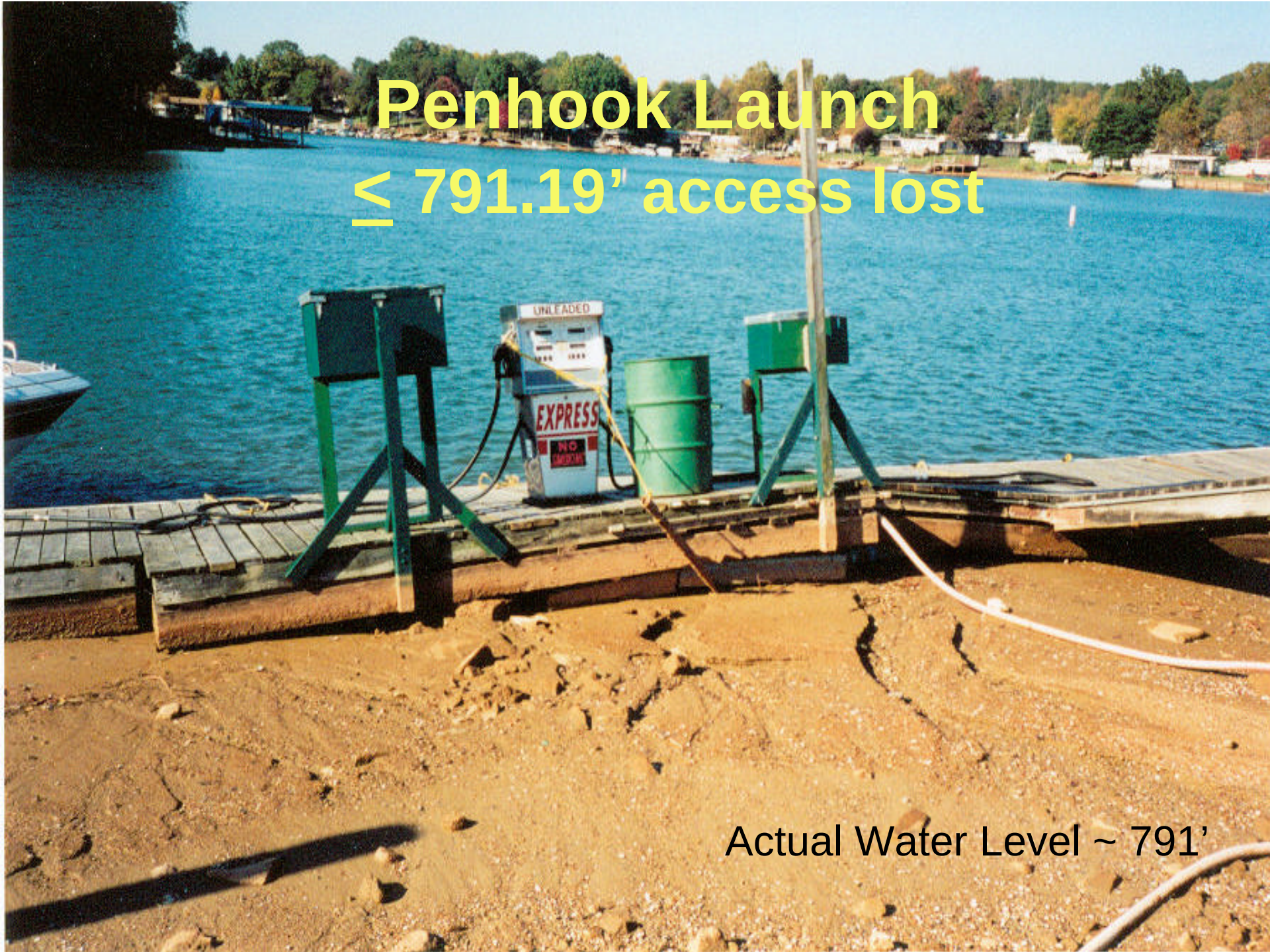


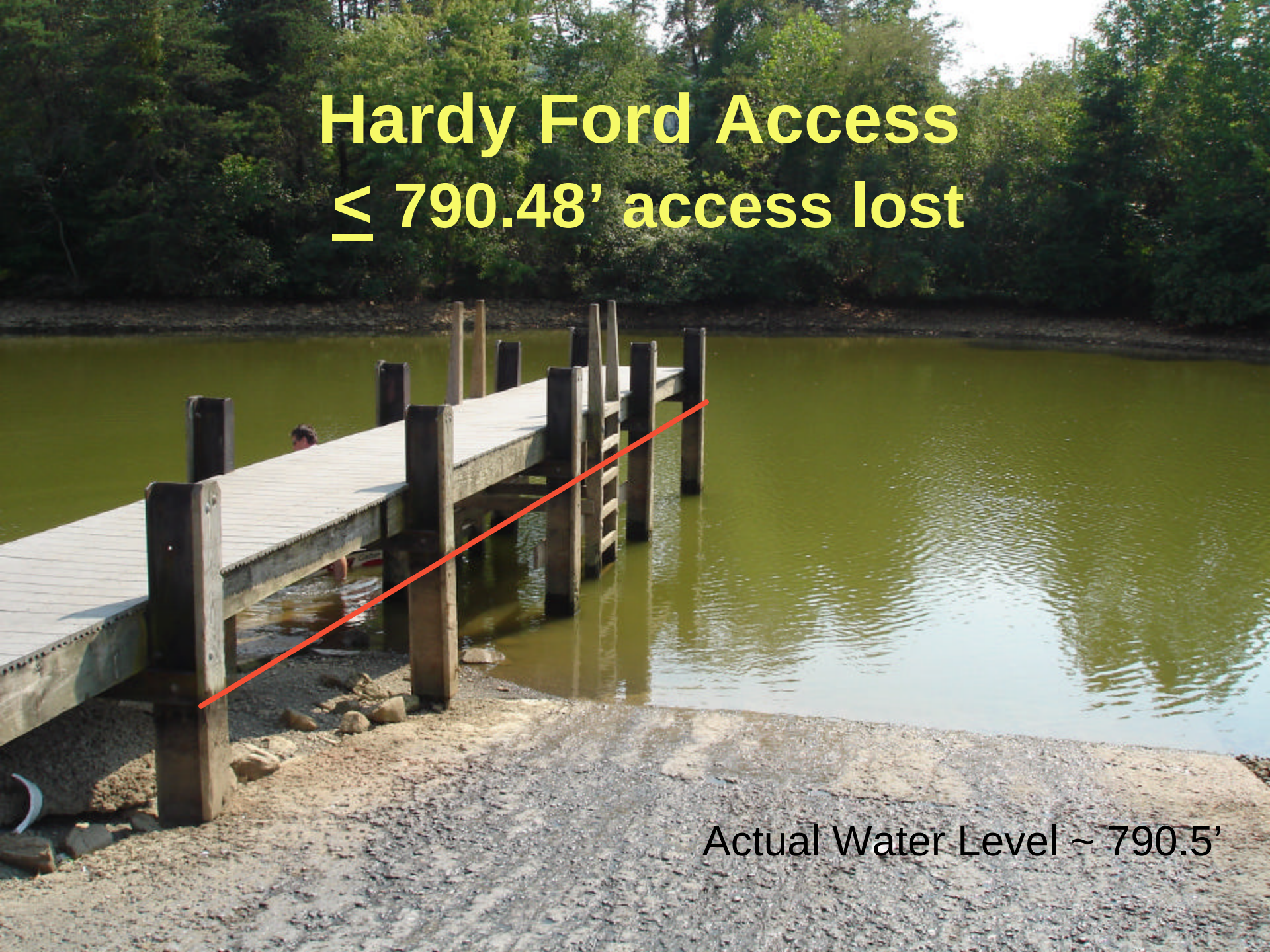
DGIF Maintained Public Launch Ramps on SML

- Public Ramps -- 577,840 annual recreation days

Ramp	Depth[1]	Memorial Day to Labor Day Season access since 1995	
Hardy Ford	787.48’	≥ 790.48’ access	or 90%
Hales Ford	788.97’	≥ 791.97’ access	or 70%
State Park	787.82’	≥ 790.82’ access	or 85%
Scruggs	789.42’	≥ 792.42’ access	or 55%
Anthony Ford	788.32’	≥ 791.32’ access	or 83%
Penhook	788.19’	≥ 791.19’ access	or 85%

[1] Source: Volume II, Appalachian License Proposal 26 March 2008


Penhook Launch
≤ 791.19’ access lost
UNLEADED
EXPRESS
NO
Actual Water Level ~ 791’

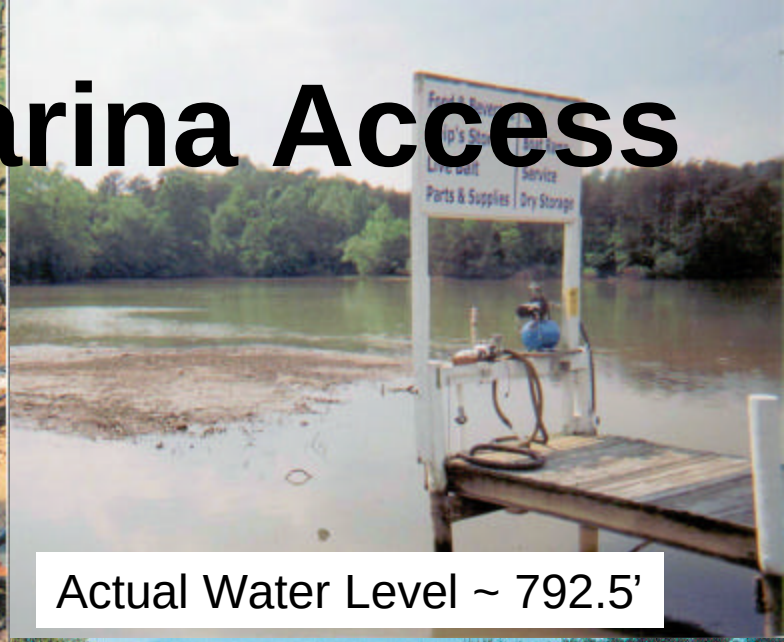

Hardy Ford Access
≤ 790.48’ access lost
Actual Water Level ~ 790.5’

Provide Public Access to the Waters of SML for Recreation (cont.)

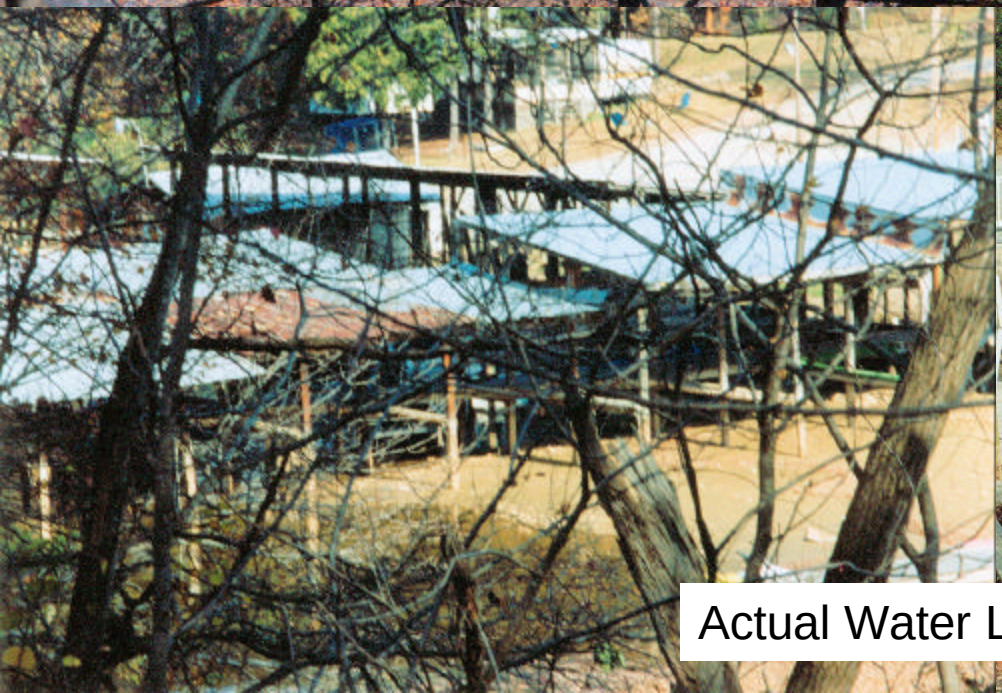
- **Marina Access -- 1,744,721 annual Rec Days**
  - BayRoc lost access at 791'or 12% since 1995
  - Others limited by depth, lift drop and regulation
    - Lift design works to 5' fall (requires 8' depth) (5%)
    - Dredging limited to 6' or 789' depth (30%)

- **Private Access -- 2,777,000 annual Rec Days**
  - Limited by depth, and lift drop

Marina Access



Actual Water Level ~ 792.5’



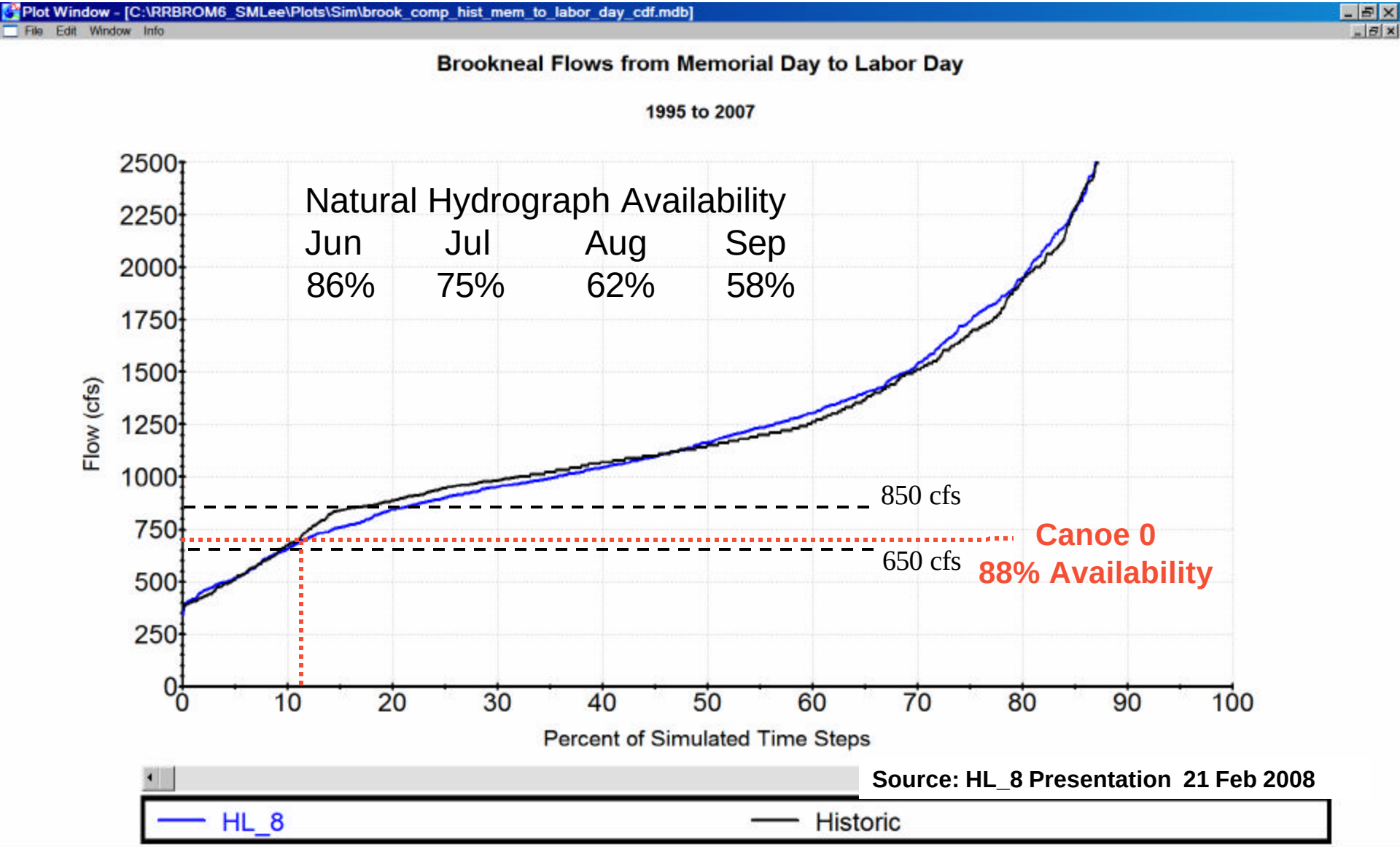
Actual Water Level ~ 790’

Private Access

Preserve the public safety

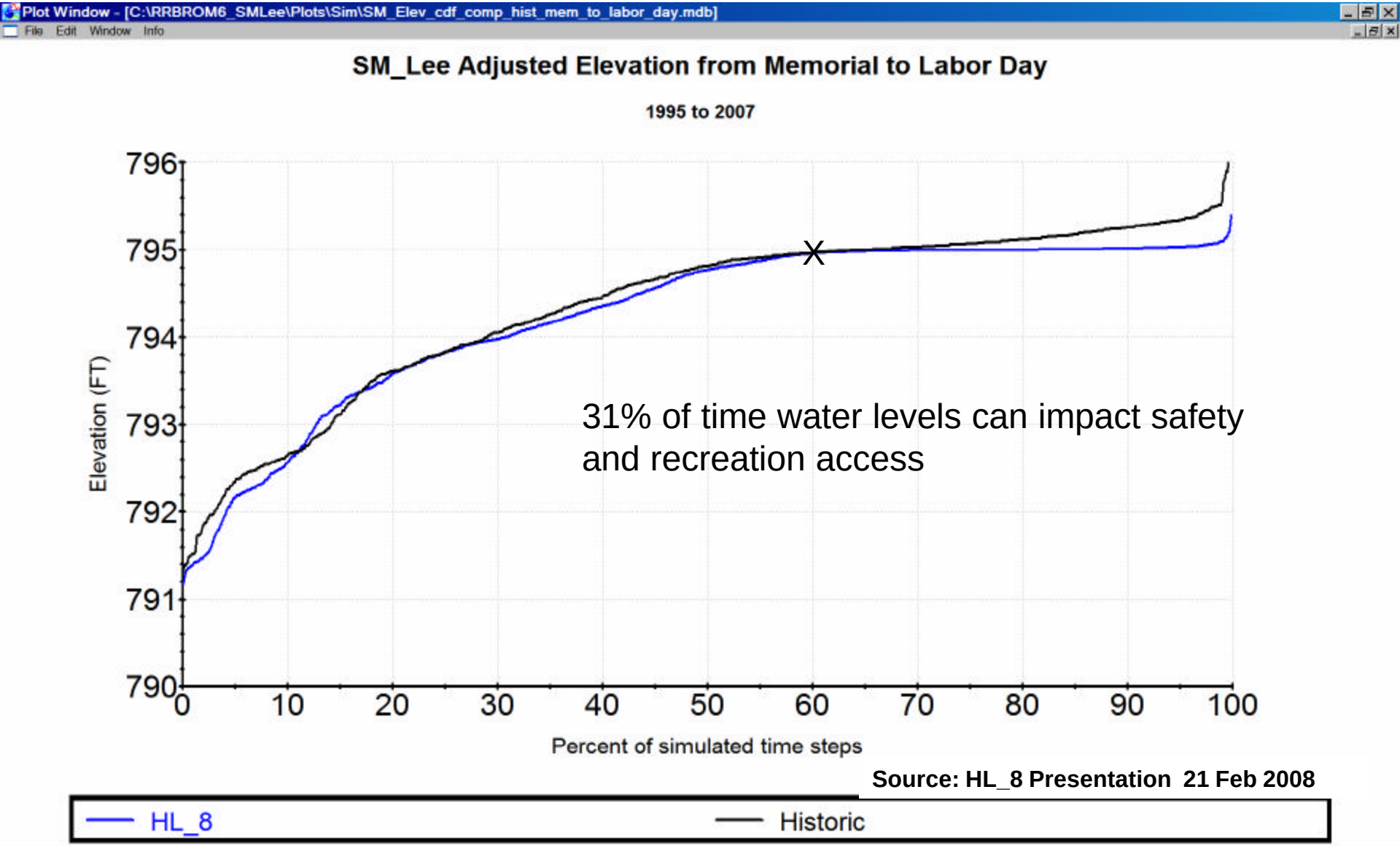
Canoeing thru Hale Islands

Includes weekend days and weekdays



Source: HL_8 Presentation 21 Feb 2008

SML Recreation Season Impacts



Source: HL_8 Presentation 21 Feb 2008

HL-8 vs. Natural Hydrograph @ Brookneal

	50% Pt.	Augment	Aligns	Recharge
Jan	2,100	18%	57%	25%
Feb	2,550	13%	20%	67%
Mar	2,650	1%	4%	95%
Apr	2,500	0%	85%	15%
May	2,000	65%	25%	10%
Jun	1,450	65%	27%	8%
Jul	1,100	80%	20%	0%
Aug	850	85%	10%	5%
Sep	750	70%	15%	15%
Oct	850	60%	25%	15%
Nov	1,100	25%	65%	10%
Dec	1,600	25%	67%	8%

Recommendations

1. To Address Habitat Concerns …
   - Stream flow:
     - Move to continuous release from Leesville
     - Mimic natural hydrograph with releases
     - Striper release IAW DGIF floor
2. To Address Safety Concerns …
   - Project levels:
     - Safety floor of 792’ actual on SML
     - Protracted low flow periods 791’ actual

Recommendations (cont.)

3. To address recreation needs below project …

Recreational releases of 650cfs:

- Striper Festival; Memorial Day; Float Day; July 4th; Labor day
- Additional times when actual project level ≥ 792’
  - Weekend 2 day releases = .62’ project level
  - Weekend 3 day releases = .93’ project level
  - Continuous releases = 2.48’ project level

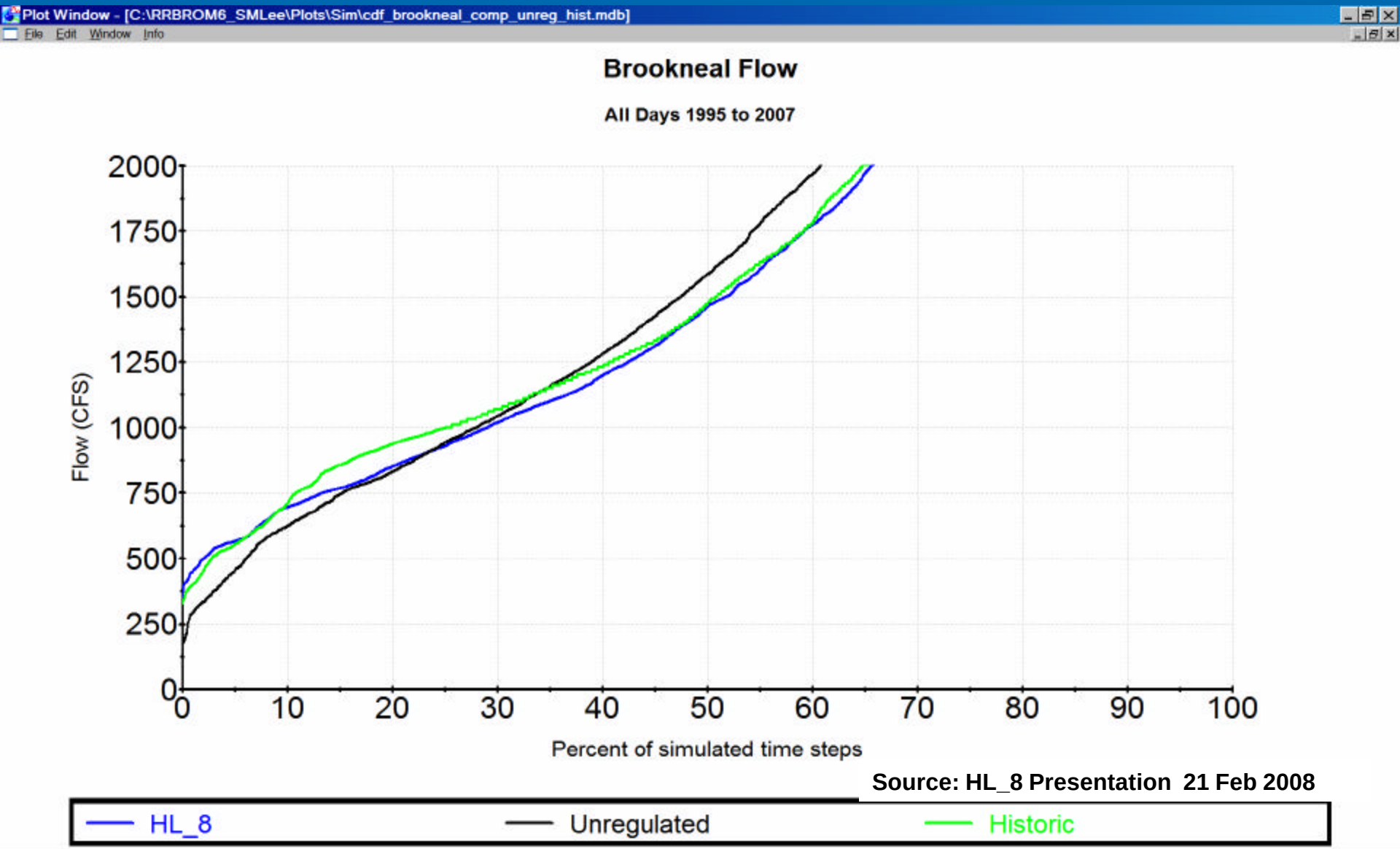
Improve river access:

- Clear log jam in Millrace Sluice (North channel)
- Add access at Goose Creek; Taber; Melrose and Little River Channel @ Long Island (bateaux passage in South Channel)

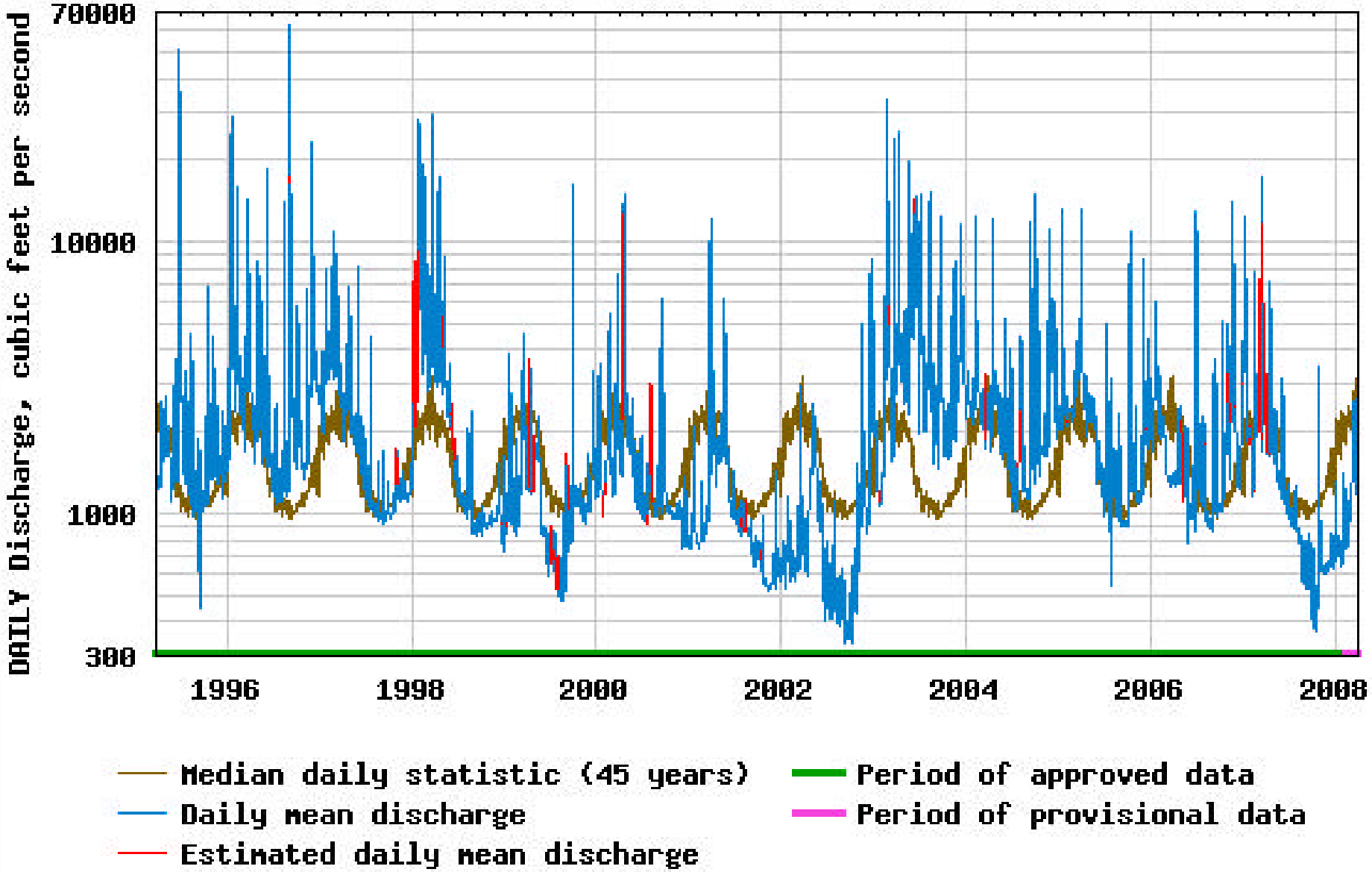
Questions & Comments

Back Up Slides

Natural Hydrograph Time Series



Source: HL_8 Presentation 21 Feb 2008

USGS

USGS 02062500 ROANOKE (STAUNTON) RIVER AT BROOKNEAL, VA