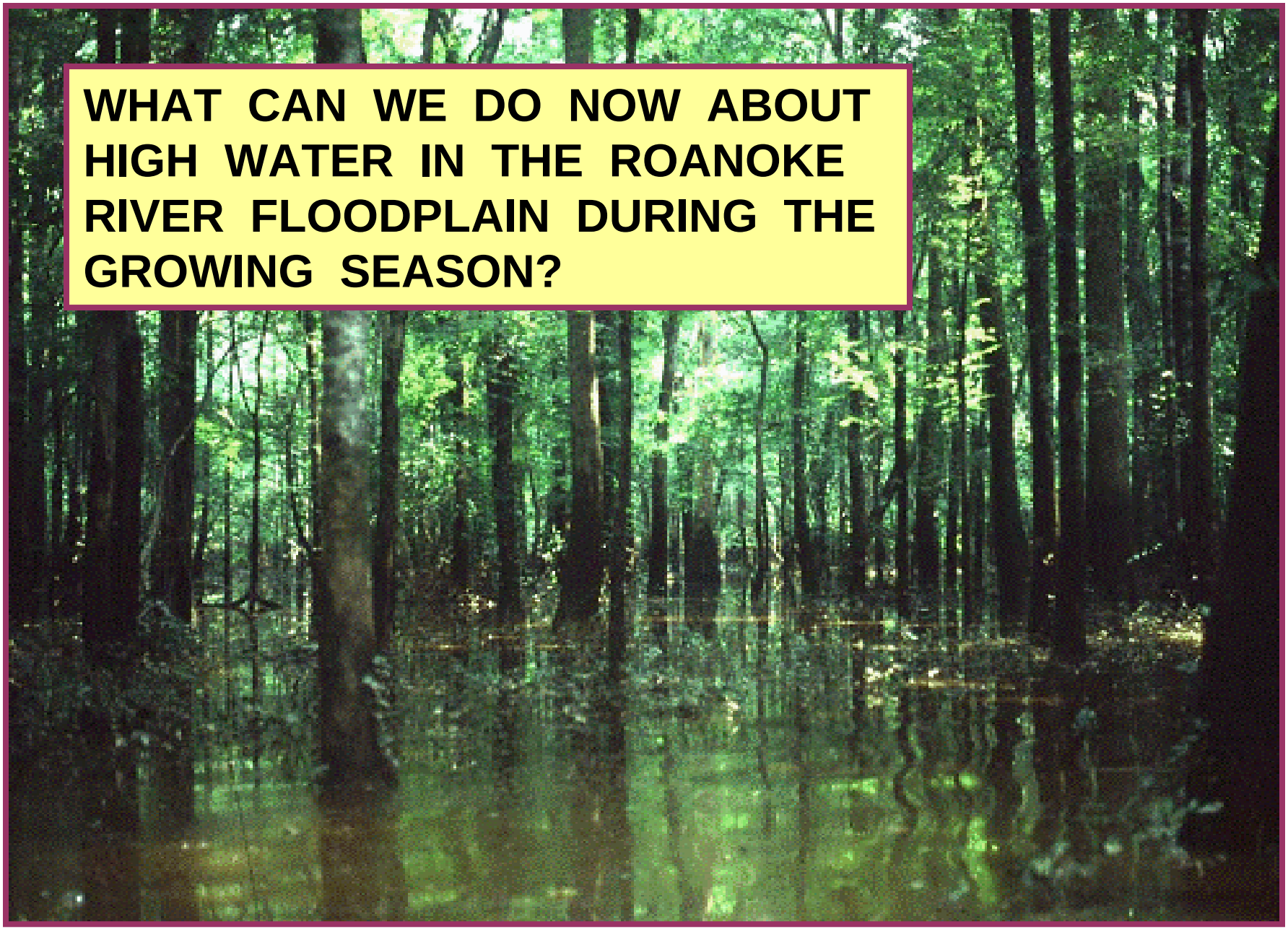
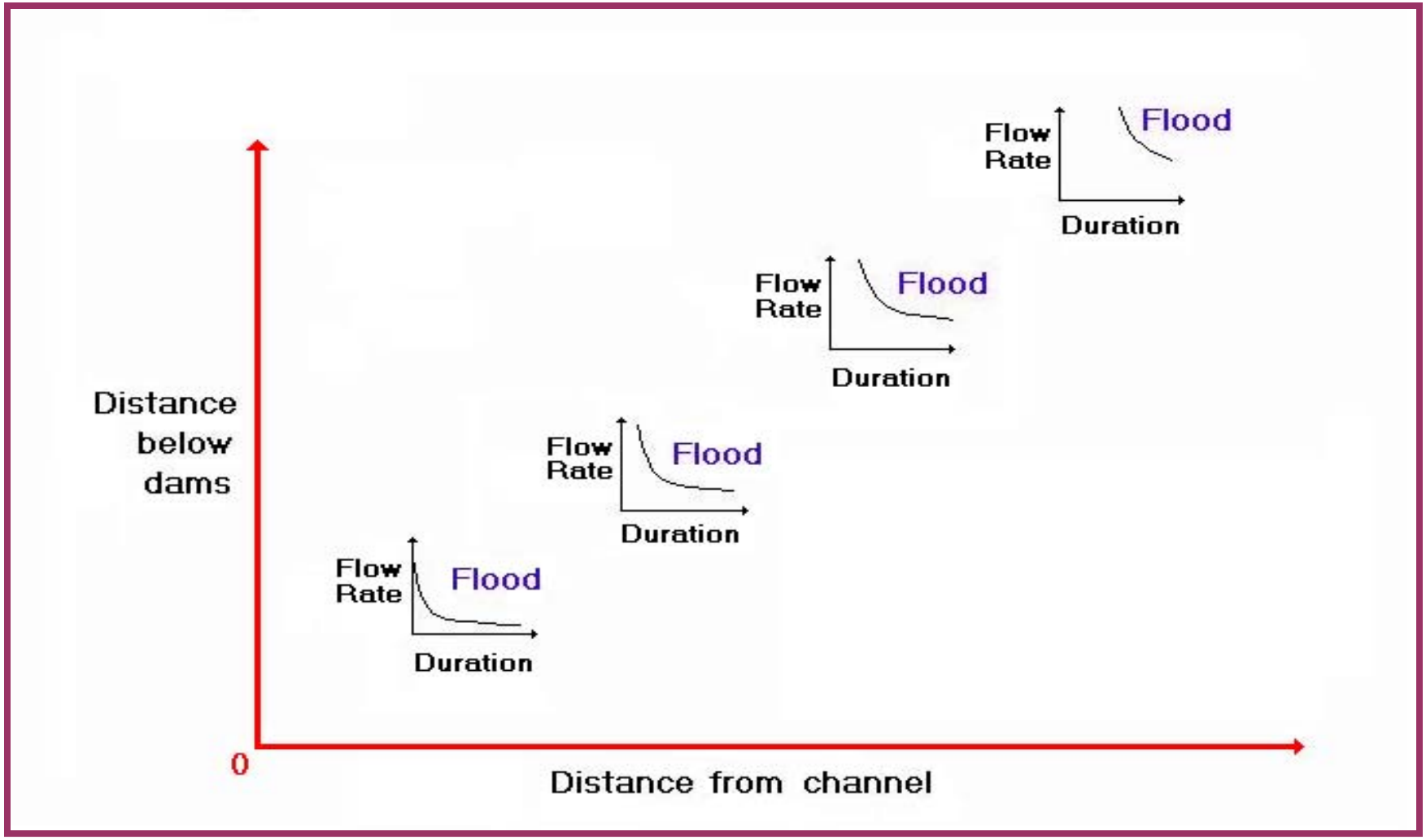
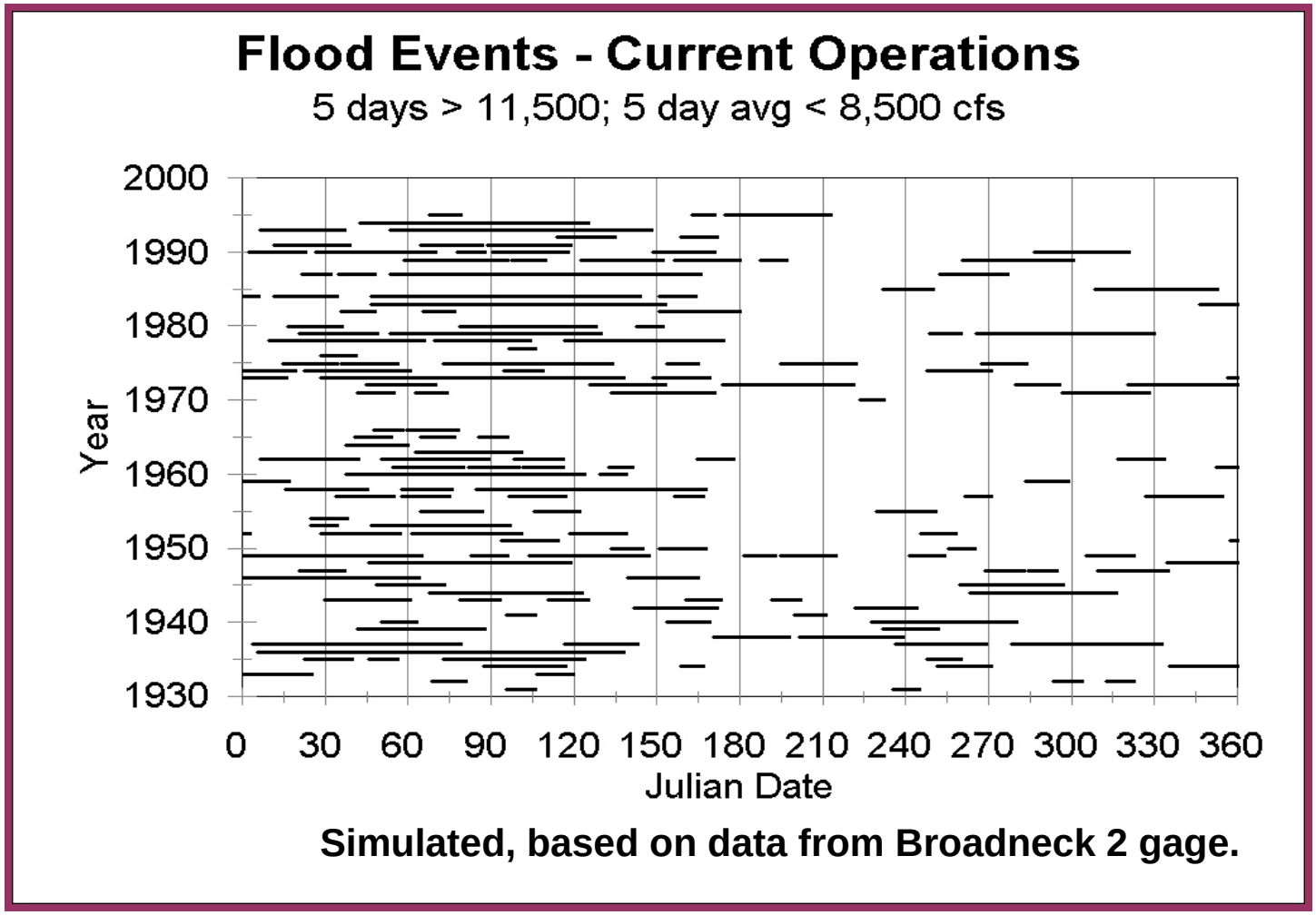

WHAT CAN WE DO NOW ABOUT HIGH WATER IN THE ROANOKE RIVER FLOODPLAIN DURING THE GROWING SEASON?

Plan of Presentation:

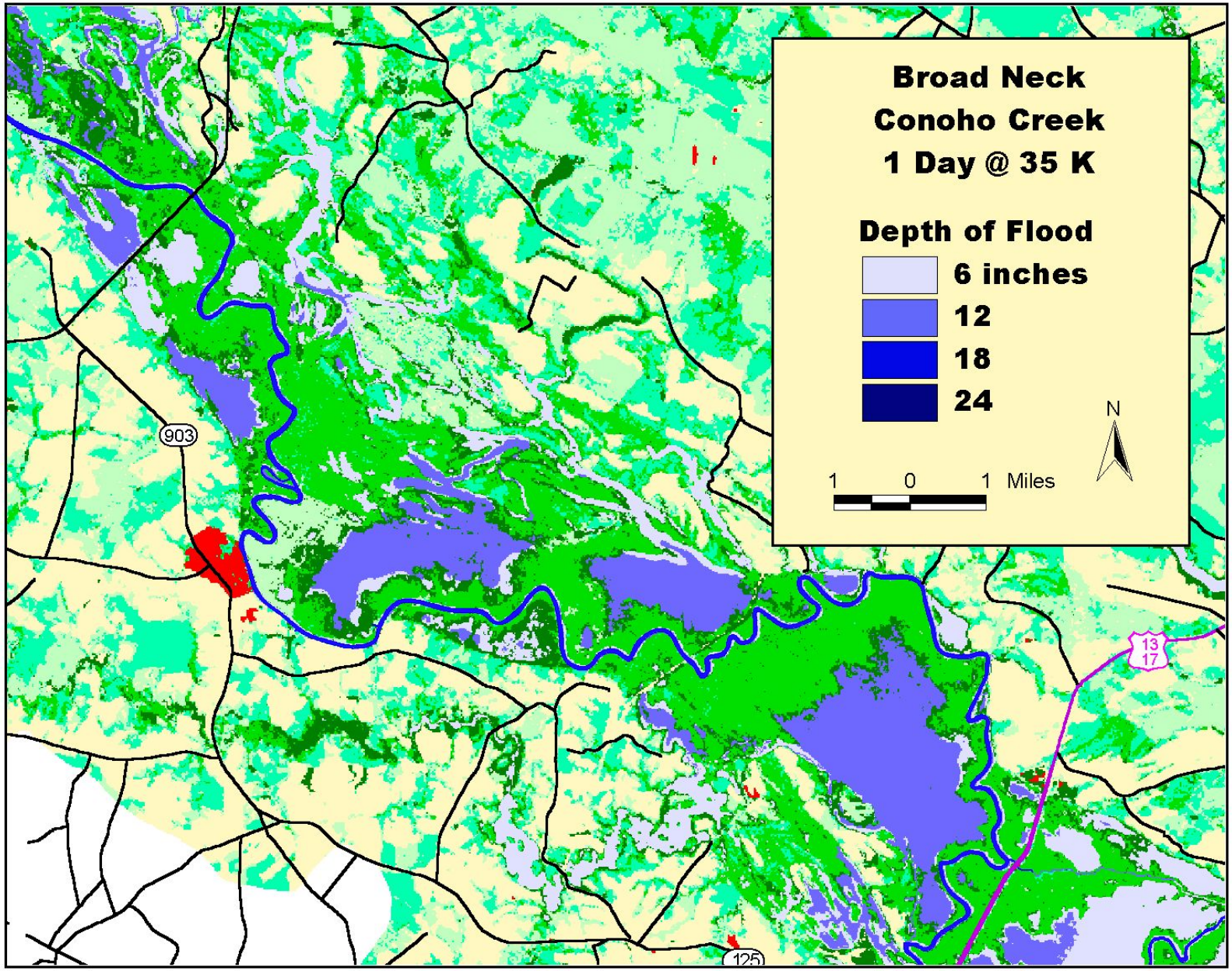
1. **Basic Principles**
2. **A General Solution**
3. **Organizational Constraints**
4. **A Specific Proposal**

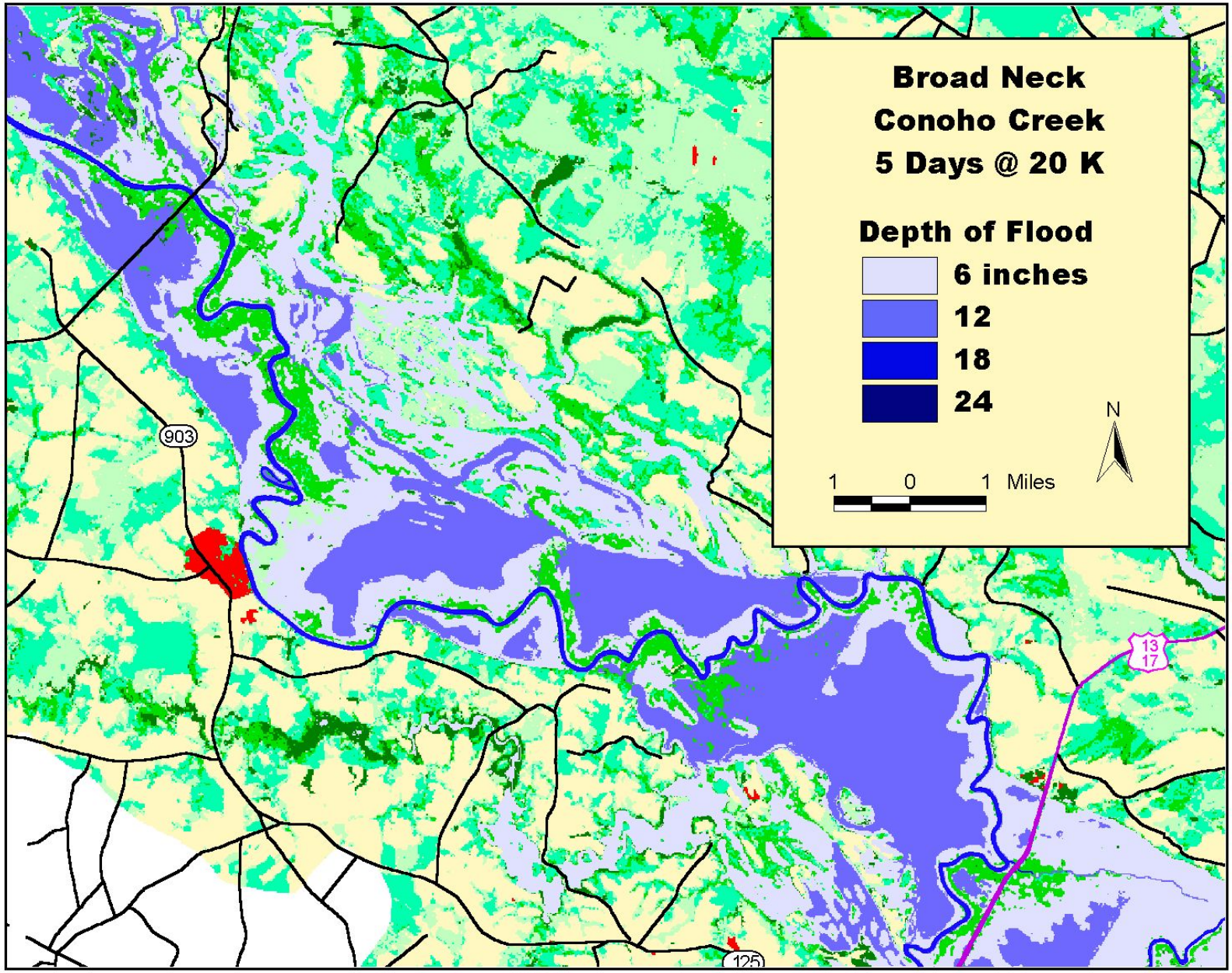


The relationship between flow volume and flooding is complex, strongly local, and non-linear.



The rates and thresholds for water to enter and then leave the floodplain are not the same.


Broad Neck
Conoho Creek
1 Day @ 35 K
Depth of Flood
6 inches
12
18
24
N
1 0 1 Miles
903
13
17
125


Broad Neck
Conoho Creek
5 Days @ 20 K
Depth of Flood
6 inches
12
18
24
N
1 0 1 Miles
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17
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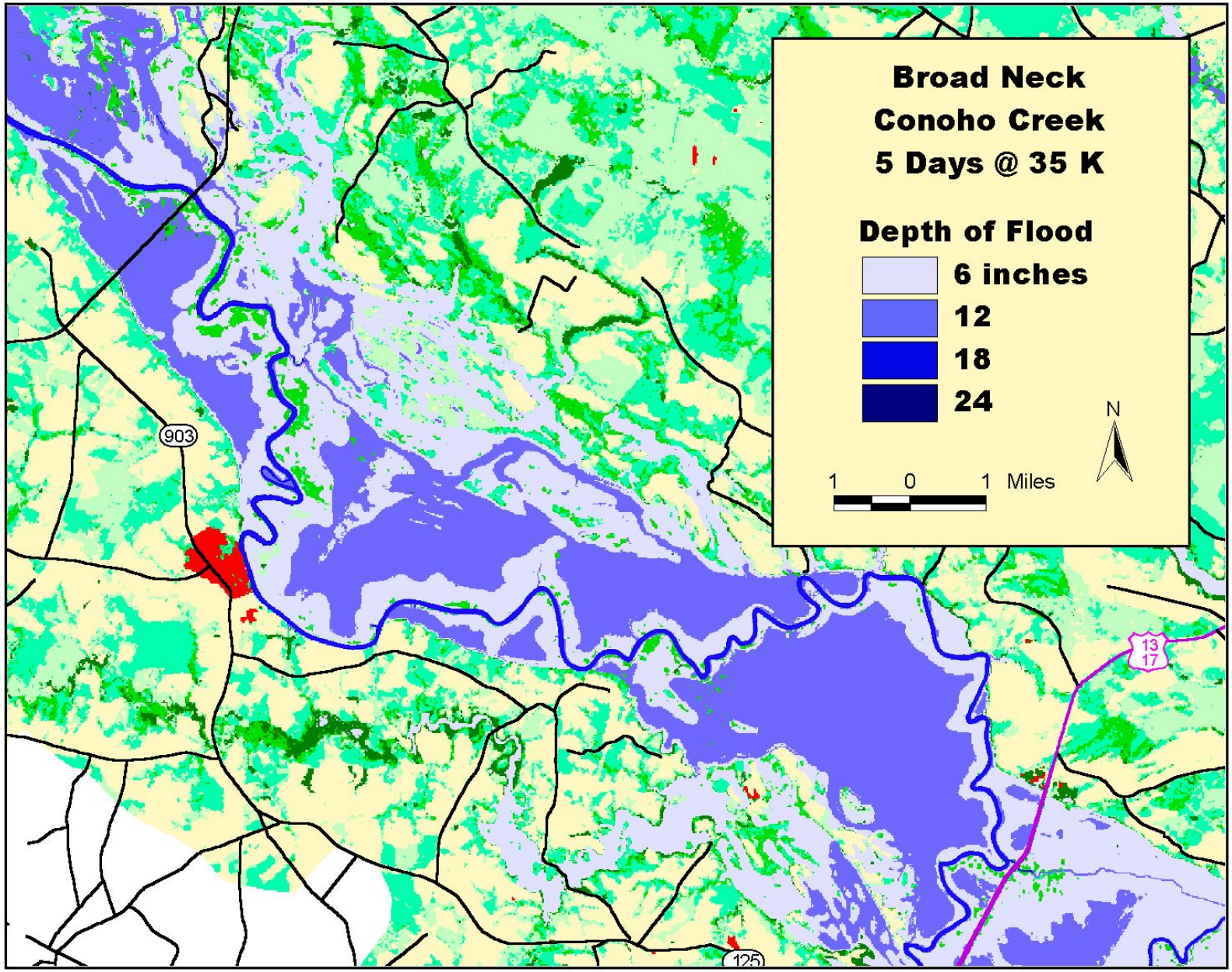

Broad Neck
Conoho Creek
5 Days @ 35 K
Depth of Flood
6 inches
12
18
24
N
1 0 1 Miles
903
13
17
125

Definitions: A flood is water at or above the surface of the ground. A high flow is one that is above the threshold for locally initiating a flood.

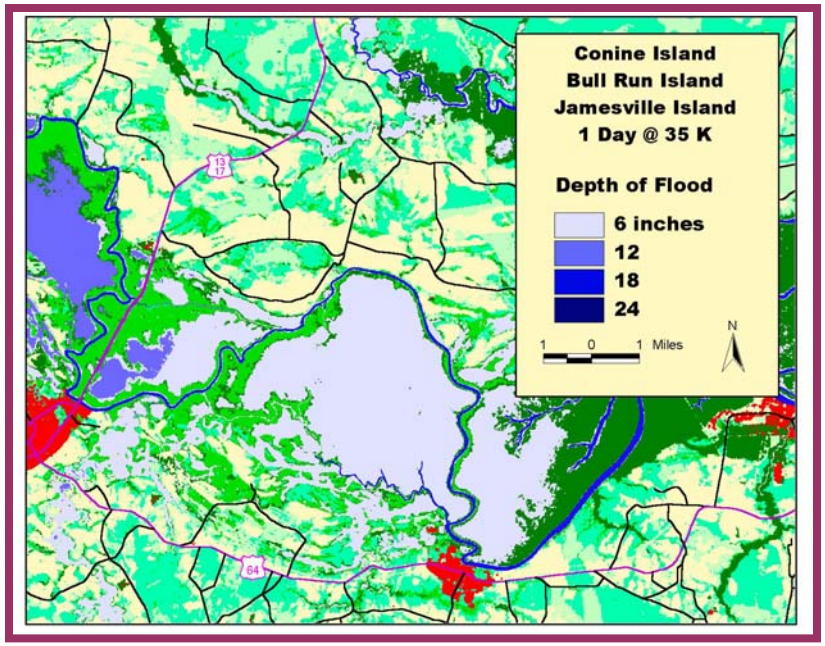
At Broadneck:

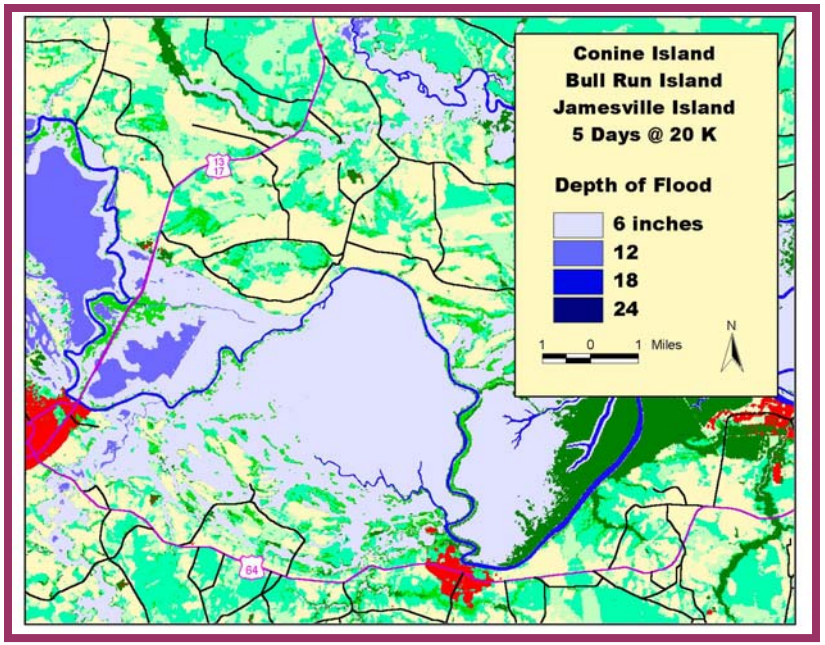
One day of 35,000 cfs floods a lot less land than five days of 20,000 cfs.

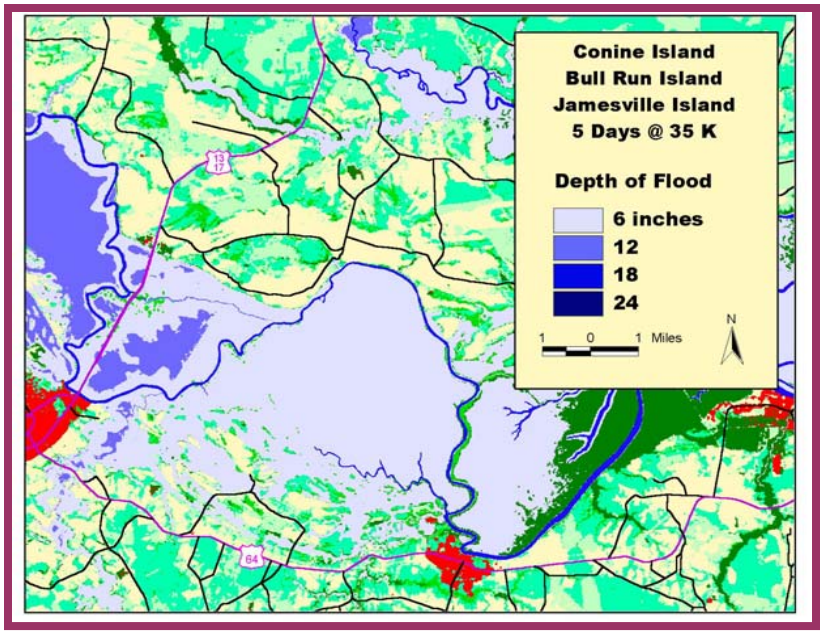
Five days of 35,000 cfs do not flood much more land than five days of 20,000 cfs.

Duration of high flows is more influential for causing flooding than volume of high flows.

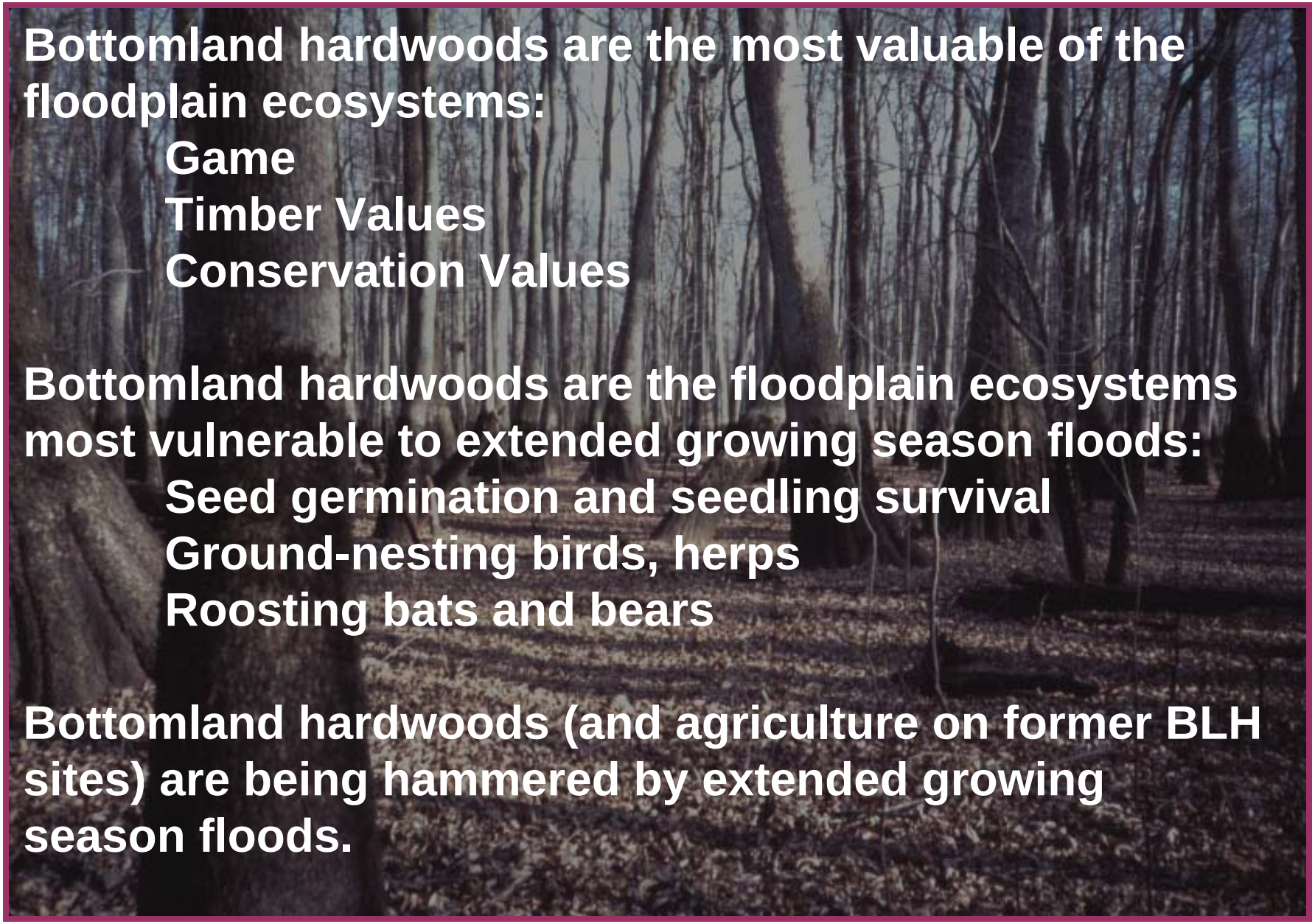
<u>Duration, not volume, of high flows is the most important issue for downstream lands.</u>







This is just as true at Bull Run as it is at Broadneck.



Bottomland hardwoods are the most valuable of the floodplain ecosystems:

- **Game**
- **Timber Values**
- **Conservation Values**

Bottomland hardwoods are the floodplain ecosystems most vulnerable to extended growing season floods:

- **Seed germination and seedling survival**
- **Ground-nesting birds, herps**
- **Roosting bats and bears**

Bottomland hardwoods (and agriculture on former BLH sites) are being hammered by extended growing season floods.

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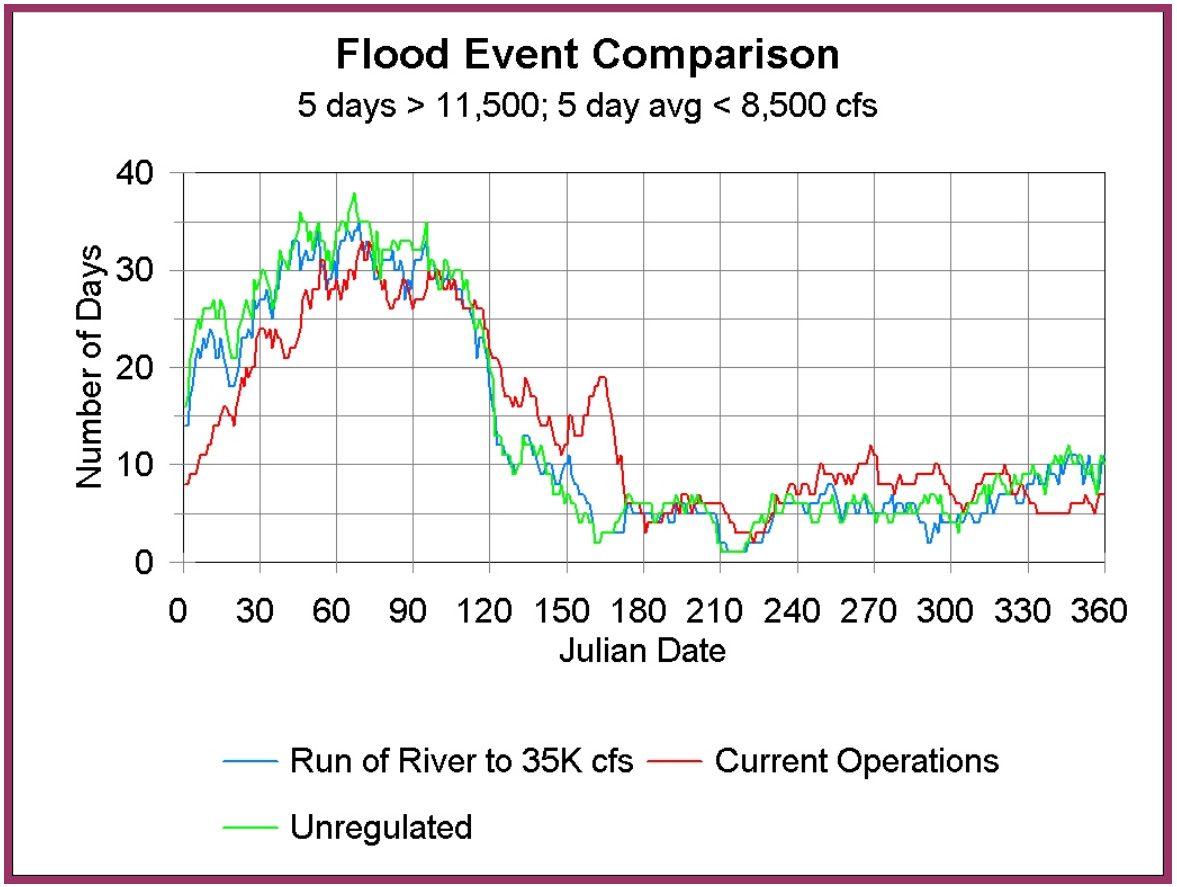
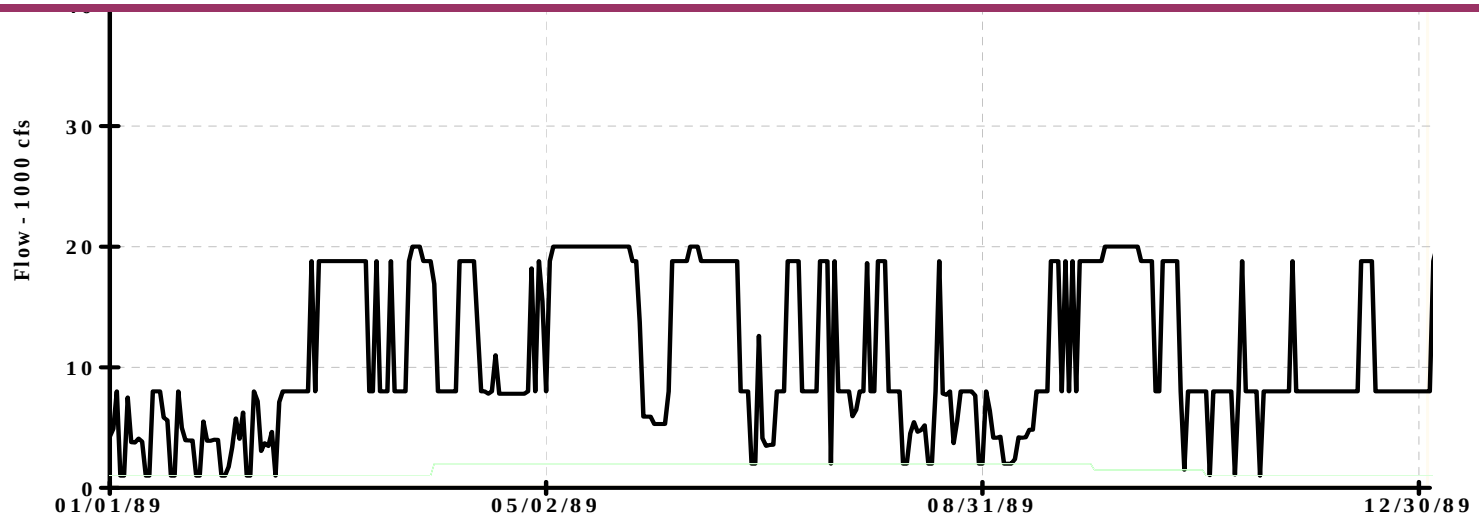
TNC has proposed that USACE adopt the following modification in its operating plan for Kerr Dam:

1. **Adopt the minimum releases in the Dominion Settlement, including spawning releases.**
2. **Keep the present guide curve.**
3. **Keep the water quality "betterment plan."**
4. **Otherwise, release water on a schedule that closely approximates water-in equals water-out up to a maximum of 35,000 cfs, except…**
5. **When the current rule requires releases of more than 35,000 cfs, follow the current rule.**
6. **Employ a reasonable lag (e.g. a day or two) to implement this strategy.**

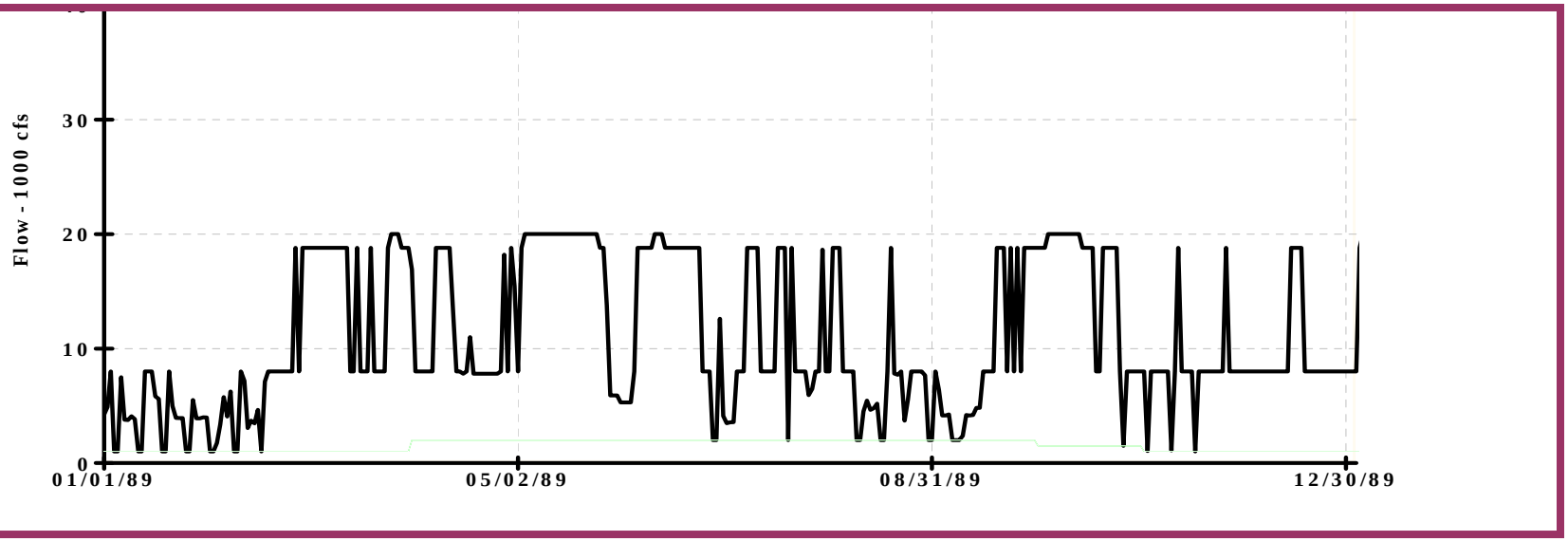
BENEFITS:

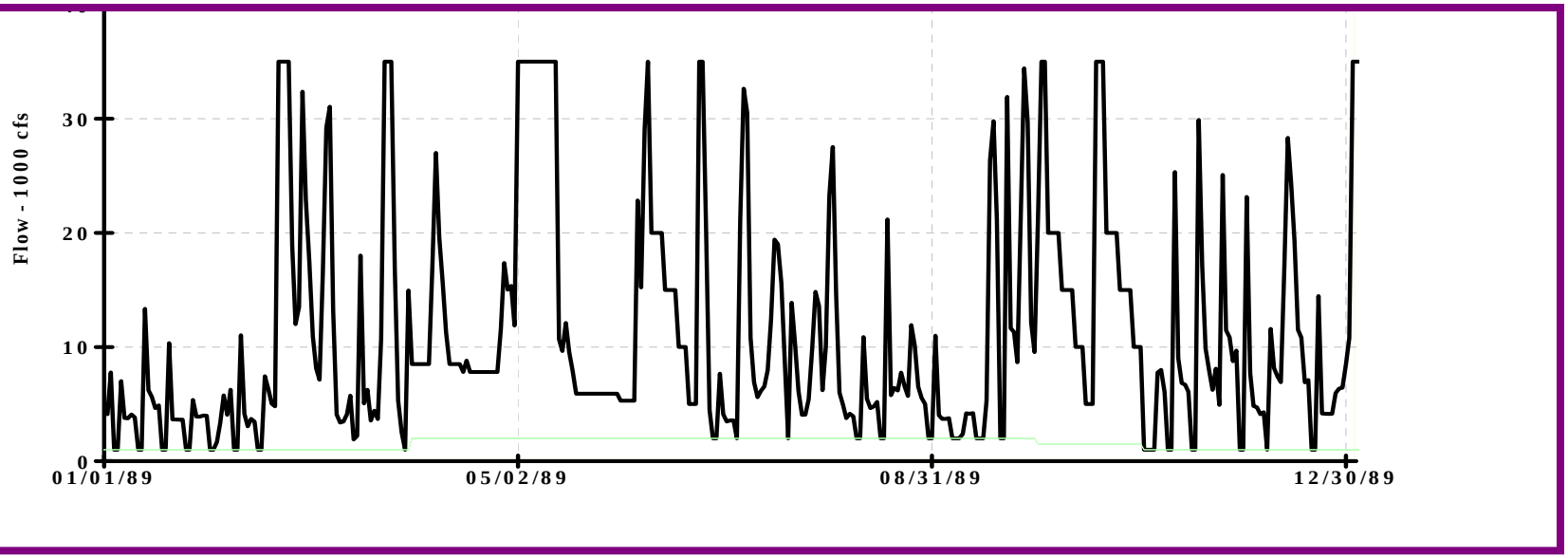
1. Drastically reduced flooding in bottomland hardwoods.





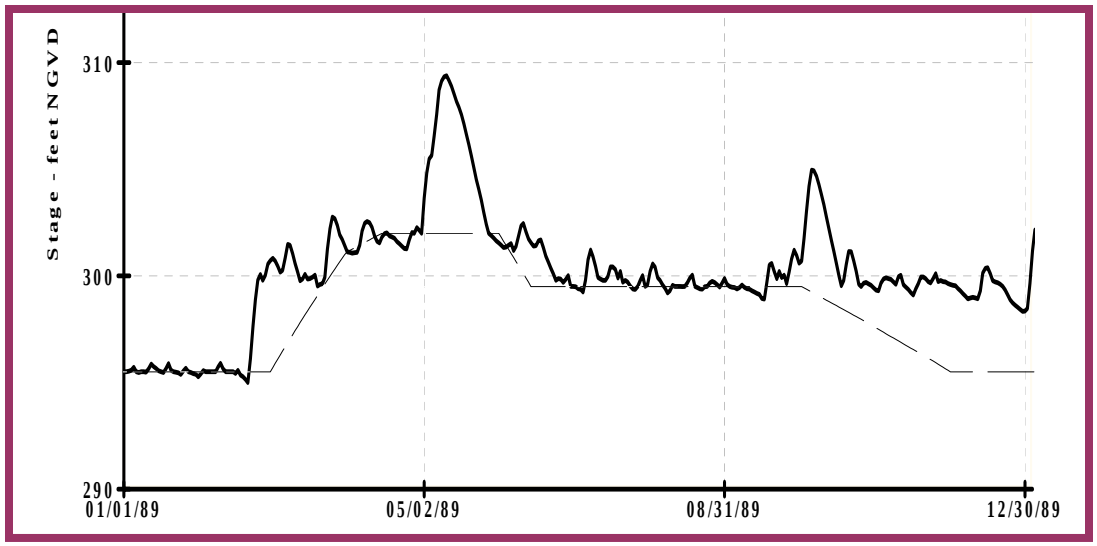
1989: A Very Wet Year


Flow - 1000 cfs
30
20
10
0
01/01/89
05/02/89
08/31/89
12/30/89


Flow - 1000 cfs
30
20
10
0
01/01/89
05/02/89
08/31/89
12/30/89

BENEFITS:

2. Very significant reduction in deviations from the guide curve, so lake levels stabilize, recreation and property values increase, and shoreline erosion is reduced.



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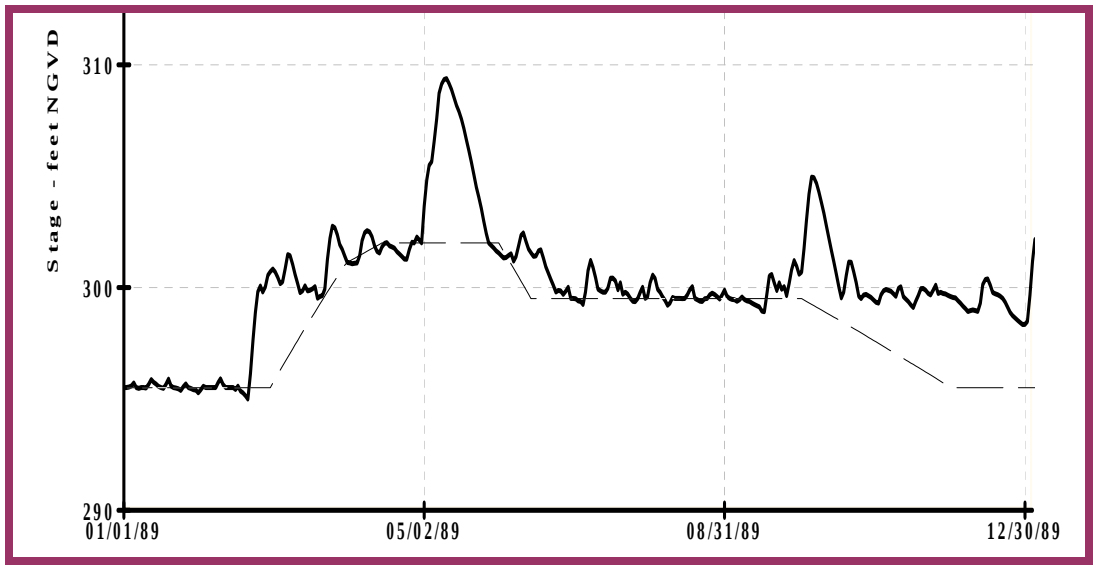
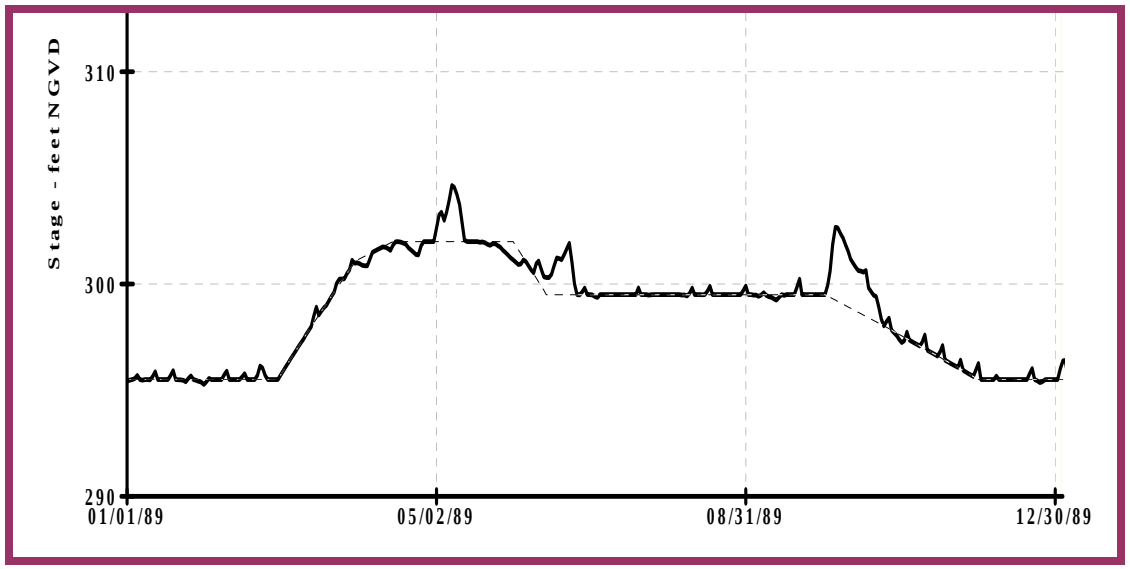

Stage - feet NGVD
310
300
290
01/01/89
05/02/89
08/31/89
12/30/89

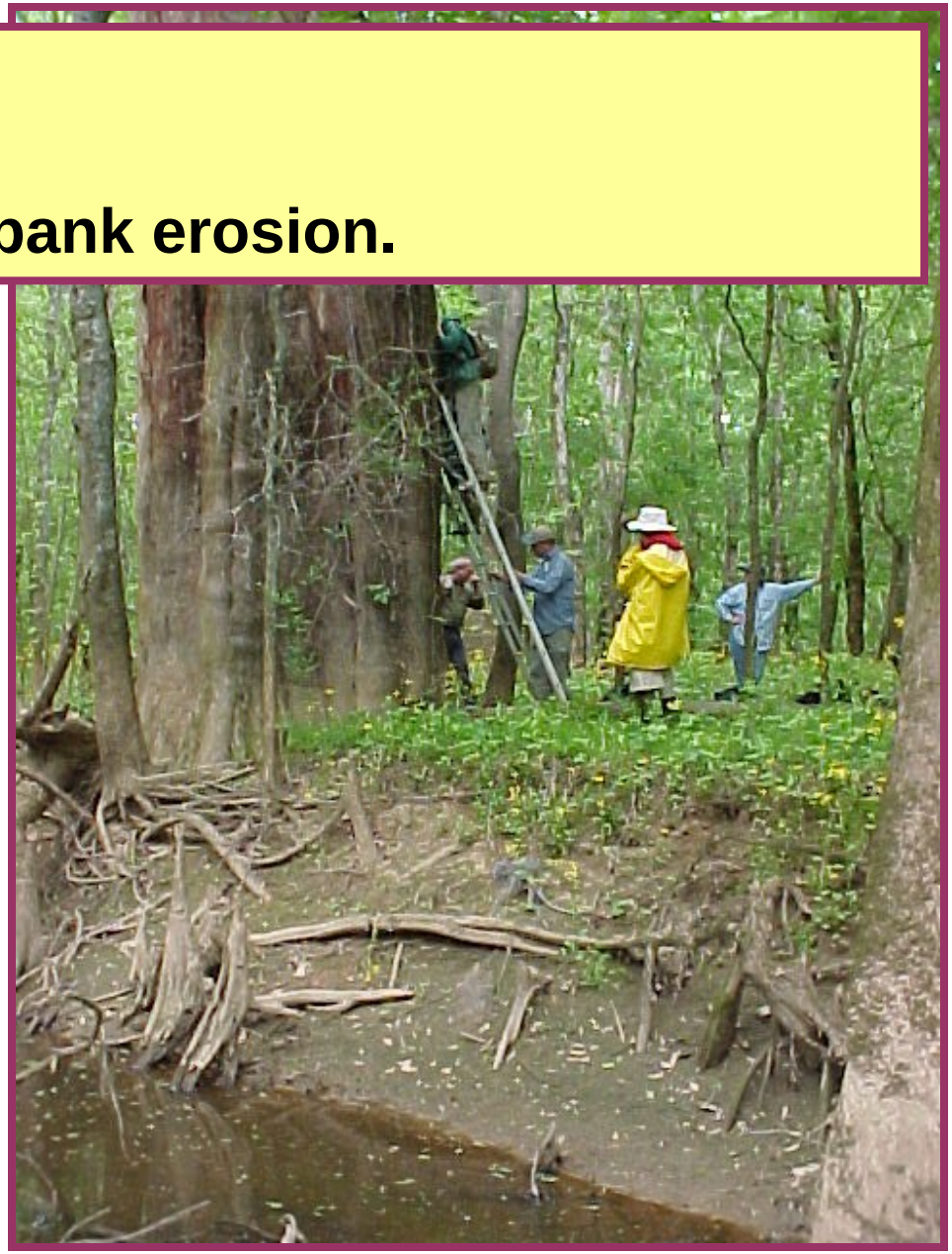

Stage - feet NGVD
310
300
290
01/01/89
05/02/89
08/31/89
12/30/89

BENEFITS:

3. Increased flow-through produces enhanced water quality in Kerr Reservoir, Lake Gaston and Roanoke Rapids Reservoirs, and downstream. Water would stand in the floodplain less often and for shorter times. The water quality betterment policy would not have to be implemented as often.

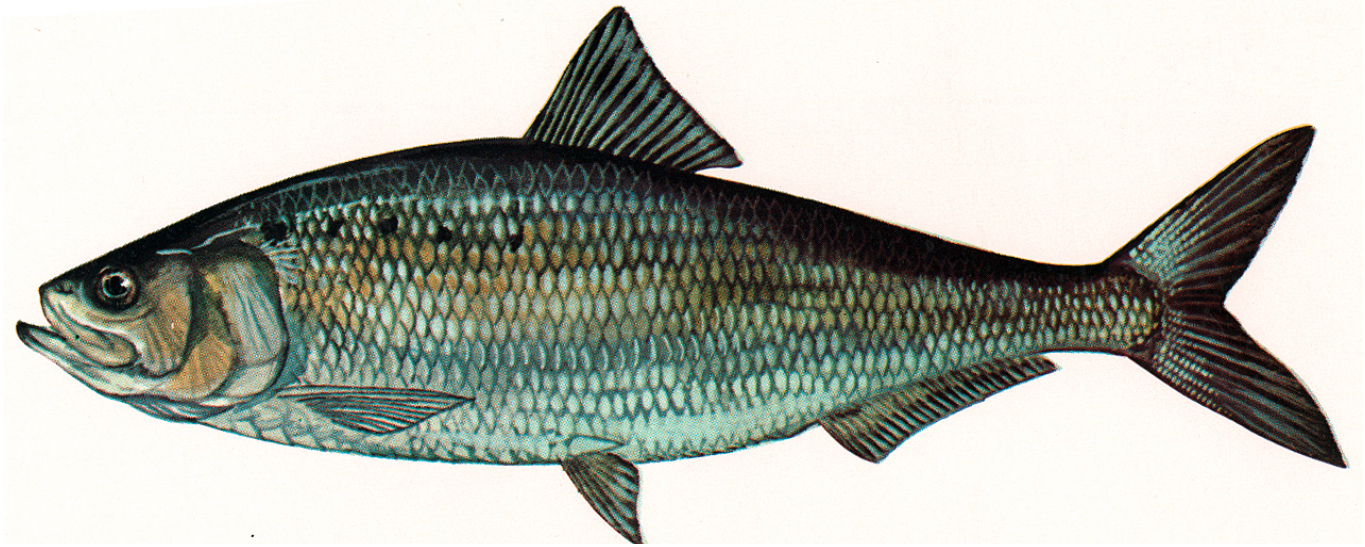
BENEFITS:

4. Drastic reduction in bank erosion.



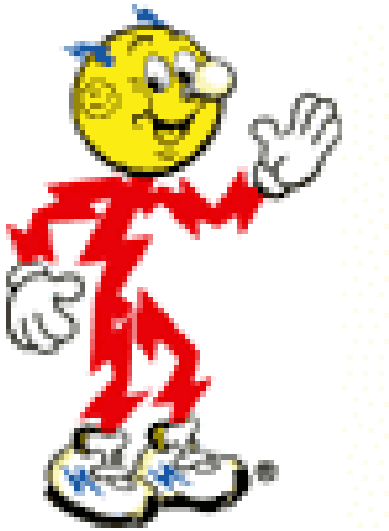
BENEFITS:

5. Drastic reduction in the differences between natural flows and managed flows (the organizing principle of the TNC – USACE Sustainable Rivers Program). This would produce additional, significant benefits for the in-stream and riparian ecosystems.



NO IMPACT:

The proposed strategy would not affect SEPA's ability to meet its firm power commitments.



COSTS:

1. The proposed strategy would definitely reduce the amount of <u>secondary</u> power produced at Kerr, and it would definitely (albeit rarely) cause Dominion to spill water at Roanoke Rapids. Lost power (MWH) based on the RRBROM for the period of record:

USACE 2.2%

Dominion 3.4%

COSTS:

2. In addition, the proposed strategy would definitely reduce the value of the secondary power produced at Kerr, and it would definitely (albeit rarely) reduce the value of power produced by Dominion. Both of these effects stem from scheduling effects (generating power when it is worth less than its maximum value). Lost value ($) based on the RRBROM for the period of record:

USACE 5%

Dominion ?

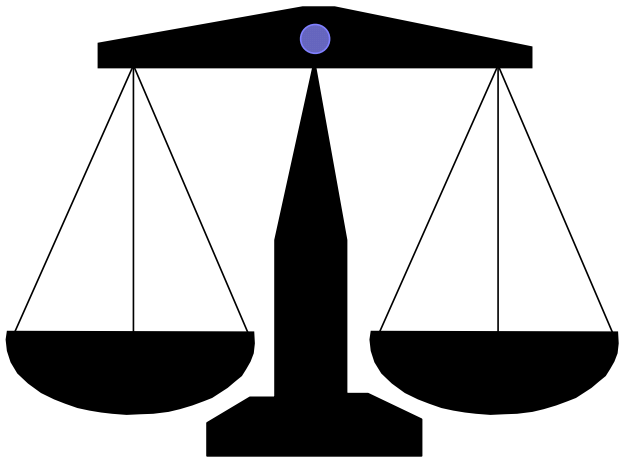
NOTE:

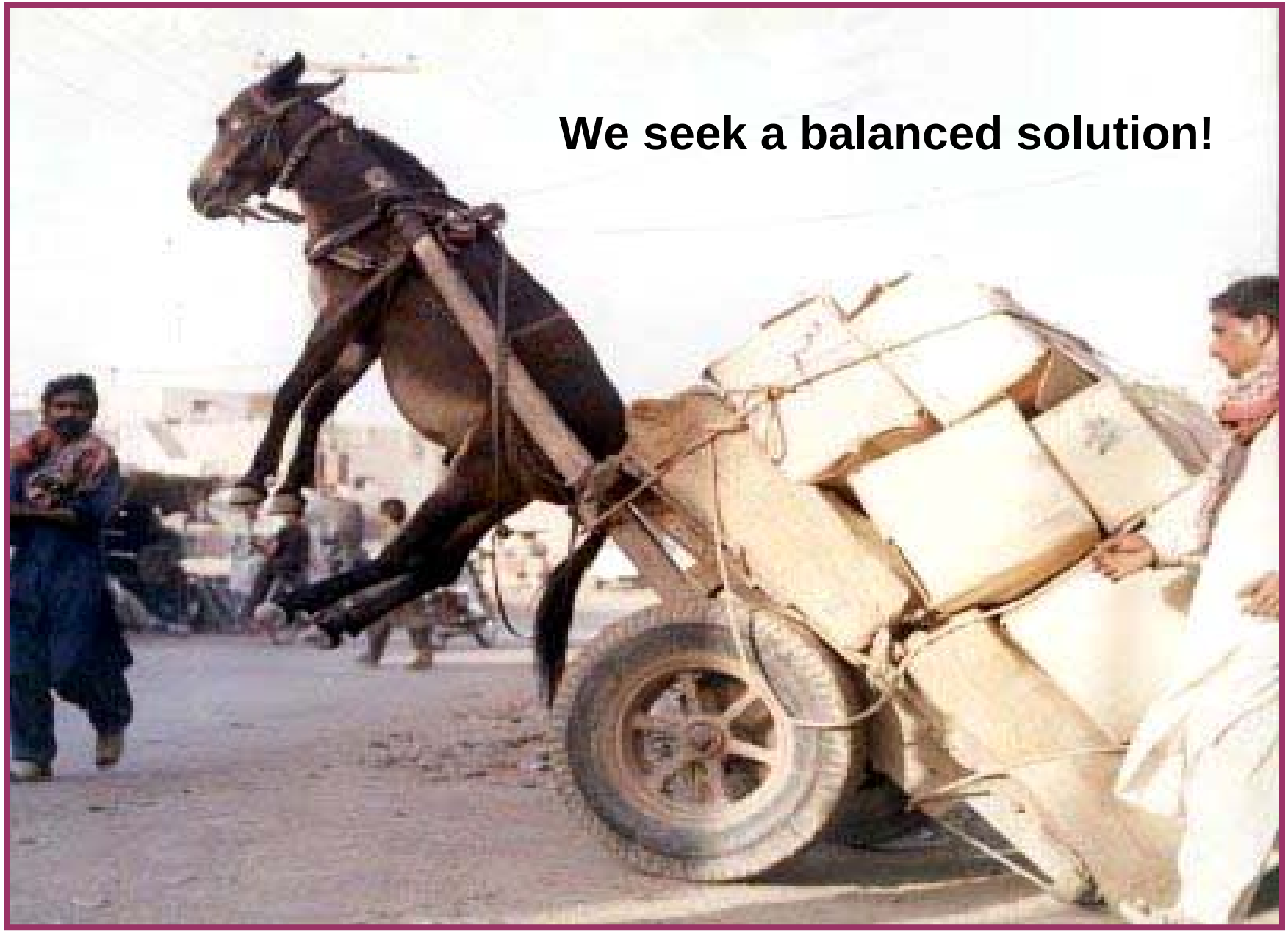
TNC has conducted a legal review, and we do not believe that the following are authorized purposes of Kerr Dam. More to the point, <u>we strongly believe these goals cannot justify causing floods on downstream flood-control clients</u>:

a) Maximizing the amount of secondary power produced;
b) Optimizing the value of secondary power produced;
c) Protecting Dominion from spilling water; or
d) Helping Dominion optimize the value of power produced.

We envision that the Lower Roanoke River will be managed so that conservation of natural resources and native ecosystems, recreation, flood control, economic development, and hydropower production are balanced in ecologically and economically sustainable ways.

In the present situation, if we are persuaded that our concern for downstream ecosystems will make power production economically unsustainable, we offer compromise. On the other hand, if power production causes downstream ecosystems to be ecologically unsustainable, we expect compromise.




We seek a balanced solution!

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BRIEF HISTORY:

1. **1990, TNC opened negotiations with USACE**
2. **1996, USACE completed "Initial Appraisal Report." TNC and NC DWR launched effort to get 216 Study funded.**
2. **2000, USACE launched 216.**
3. **2001, USACE completed "Reconnaissance Report." TNC first formally proposed the modified policy just presented.**
4. **2002, Driest year on the Roanoke. TNC and USACE launched the "Sustainable Rivers Program."**
5. **2003, Wettest year on the Roanoke. TNC proposed the modified operating policy again. The proposal was tabled until completion of the 216. However, USACE assured TNC that, in future high in-flow events, *ad hoc* solutions would be jointly crafted to minimize growing season floods.**
6. **2004, USACE published schedule for completion of the 216 by the end of <u>September 2008</u>. With tropical storms Bonnie and Charlie on the way, TNC requested USACE to release water at maximum rates up to 35,000 cfs to avoid converting to weeks of 20,000 cfs flows. USACE rejected TNC's request pending buy-in from stakeholders and authorization from South Atlantic Division.**

ORGANIZATIONAL CONSTRAINTS:

1. **No proposal for <u>systematically</u> altering Kerr operations can be adopted until the 216 Study is completed.**

2. **However, a formal process for responding to high in-flow events on an *ad hoc* basic to minimize downstream damages can be adopted now.**

3. **South Atlantic Division has to approve the process.**

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ASSUMPTIONS:

1. **We should all continue to support the 216 study, but the 216 study can't be a reason to avoid corrective action on behalf of the project's primary authorized purpose: flood control.**

2. **All stakeholders have to have an opportunity to be involved in determining the corrective action.**

3. **The end state of the Section 216 Study and the Sustainable Rivers Program is intended by TNC and USACE and many others to be an adaptive management program for Kerr Dam to include its upstream and downstream stakeholders.**

WE PROPOSE:

1. **We should design a strategy for convening a small team of designated stakeholder representatives whenever a high in-flow event is forecast.**

2. **The default response at Kerr should be to release water at maximum values up to 35,000 cfs (modified by anticipated in-flows downstream). Any water stored during the event should be released as soon as possible at maximum values up to 35,000 cfs.**

3. **The stakeholder team, including USACE, should decide how and how much to deviate from the default.**

4. **Since adaptive management is the desired end state for the 216 and the Sustainable Rivers Program, we should start managing adaptively now. The *ad hoc* strategy we propose should be monitored carefully and its results treated as real-time, real-world input to the 216 study.**

<u>Make the ad hoc solution part of the 216 study!</u>

5. **USACE and the stakeholders should make plans to complete the 216 by the end of September 2006, two years earlier than the current plan. For now, we should focus on baseline and survey data, then we can conduct long-term studies for decades as part of the adaptive management program.**

6. **USACE should be a fully participatory member of the Dominion cooperative management teams, and all section 216 investigations should be coordinated with them to optimize geographic and topical complementarity.**

TNC respectfully requests that USACE respond to the previous six points of this proposal in writing.

As a negotiator, he had ice in his veins,
but his tail betrayed him.