

## Natural Hydrograph proposal

### 1. Description of the Proposal:

#### a. Number of Rises:

- i. Two rises is the acceptable model. Two peaks mimic the natural hydrograph on the targeted reach. The pallid tech working group generally favors this option.
- ii. One rise is generally not acceptable

#### b. Flood Control Targets/constraints:

- i. Add all the spring rise to flood control constraints.
- ii. Mitigation of any downstream impacts will be identified by the affected stakeholders. Long term mitigation measures should be addressed during the MRRIC process.

#### c. Timing, duration, magnitude, rise and fall rates of First Rise:

- i. Try to follow the timing of the historic hydrograph to the greatest extent possible. ( approximately use the 50 percentile of the spring rise as start date)
- ii. Duration Rise and Fall
  - ◆ Rise rapidly
  - ◆ Peak not Plateau
- iii. Magnitude
  - ◆ Use winter flow level plus 30 kcfs

#### d. Timing, duration, Magnitude of Flow Between Rises:

- i. Reflects timing from natural hydrograph and magnitude by navigation service level.
- ii. Release plan
  - ◆ Flat release
  - ◆ Flow to target

#### e. Timing, duration, magnitude, rise and fall rates of Second Rise:

- i. Timing
  - ◆ Try to follow the timing of the historic hydrograph to greatest extent possible. Which includes pallid technical groups proposal of 16° C temperature initiation regime
- ii. Duration and fall rates
  - ◆ Rise rapidly as possible
  - ◆ Drop by at least 30% then draw out declining limb
  - ◆ Peak not plateau
- iii. Magnitude
  - ◆ Use service level + max allowable release by NEPA in Master Manual (30kcfs) There is a question whether a 30K cfs release is authorized under NEPA for consecutive years. It is believed that this type of release is authorized for one of every three years. For the second Rise:

1. We propose a 30K cfs release above service levels for 2006
2. A return to a first rise peak that reflects 26K cfs release outlined in a 50<sup>th</sup> percentile dates: 50<sup>th</sup> percentile pulse framework taken from the lower third of the annual runoff for years 2007 and 2008
3. A return to to a 30K cfs release above navigation service level in 2009

**f. How does this address water availability? Variation for wet, normal or dry years (including Stop Protocols or precludes):**

- i. Follow forecast runoff for wet and dry years. Whatever is coming into the system is going out again.
- ii. Above 58.5 MAF of storage on March 15<sup>th</sup> means system will be evacuation mode. COE will plan storage evacuation during the time of year to coincide with the natural hydrograph.

**g. Volume of water used:**

- i. Greater than 1.512 MAF and Less than 3.84 MAF. This volume has yet to be calculated. We are using the values between the .50 % and .75% in the Normative table lower third.

**h. Level of and purposes for flexibility in its annual application (What is the intended flexibility given to USACE in its application of this proposal?):**

- ◆ The COE will be allowed flexibility to make releases from Gavins Point that approximate the 75% of the lower third of the normative hydrograph.

**2. Hydrograph chart (with sideboards visually noted):**

See attached Figure 1.

**3. Rationale for the proposal:**

- a. Biological
- b. Socio-economic
- c. Other:
  - i. This proposal supports the purpose and intent of the Wild and Scenic Rivers Act for the preservation and protection of the free flowing condition of selected rivers. Specifically, Section 10a of the Act directs federal agencies to protect and enhance the free flowing condition and Outstandingly Remarkable Values of selected rivers.

#### **4. Anticipated effects (positive or negative)**

- a. Proposal's anticipated effects on, or benefits to, Pallid Sturgeon (how does it assist in flow, timing, temperature, photoperiod, compare with historic hydrograph, comparison with historic flow percentiles, etc):
  - i. This proposal re-creates the natural hydrograph under the constraints of current NEPA under the Current Water Control Plan.
  - ii. Additionally, this proposal takes into account many of the recommendations of the pallid sturgeon technical group.
    - ◆ Follows natural temperature pattern relating to the first rise recommendation by the pallid technical committee.
    - ◆ The first of the bi-modal rise provides a habitat conditioning scenario and biological queue for migration and spawning
    - ◆ The second of the bi-modal rise would serve as the dispersal mechanism for the subsequent larval stages into appropriate rearing habitats.
  - iii. Potential negative impacts to the piping Plover should be noted. Due to the conditioning of piping plover to search for nesting habitats earlier in the year the second rise has the possibility of flooding out some plover nests. However, these birds are capable of re-nesting later on in the season or they have the potential to move to other systems natural flowing systems where habitat is available, like the Niobrara River.
- b. **Proposal's anticipated effects on, or benefits to, socio-economic factors (how does this Proposal appear to affect water used in the basin, how to flows attenuate, effect on reservoir levels, navigation impacts, what modeling helps understand the effects):**
  - i. mitigated impacts for downstream users
  - ii. fluctuation of reservoir levels will be reduced
  - iii. If supplemental water is needed under low water conditions, water allocated for this proposal will be pro-rated from other all other resource users.
- c. **Proposal's anticipated effects on, or benefits to, historic, cultural and burial sites (how does this Proposal appear to affect historic, cultural and burial sites in the basin, what modeling helps understand the effects):**
  - i. Keeps reservoir at flat level and reduces fluctuations for cultural resource stabilization.

#### **5. Brief description of monitoring methods and indicators:**

- a. What are the key indicators (whether positive or negative) to be monitored?
  - i. Implementation of a USGS gage site below the Gavins Point Dam should be considered
  - ii. Continued support from the Corps of Engineers on monitoring programs involving pallid sturgeon and the surrogate shovelnose sturgeon
  - iii. Increase funding for other aquatic research at a more ecosystem level including:

- ◆ The impacts of Large Woody Debris as habitat forming mechanisms
  - ◆ The role nutrients in the mainstem of the Missouri River.
  - ◆ Investigating solutions on how to transport sediment from up stream of Gavins point to below the dam.
- b. Pending creation of MRRIC, what interim processes should be used to monitor this proposal?

**6. Description of mitigation measures for the down stream stakeholders:**

- a. Corps of Engineers purchasing pumps to evacuate water above drainage flaps to mitigate for lost drainage capability during high water events.
- b. Re-engineering drainage canals, floodgates, and ditches to handle high water events during potential spring rises.
- c. Initiate the mitigation program by purchasing flooding easements along the Missouri River corridor.
- d. Corps of Engineers pursuing a Land acquisition program from willing landowners for conservation and floodplain development purposes in high priority affected areas (Nebraska City Area).

**Natural hydrograph option representing 2006 hydrograph**

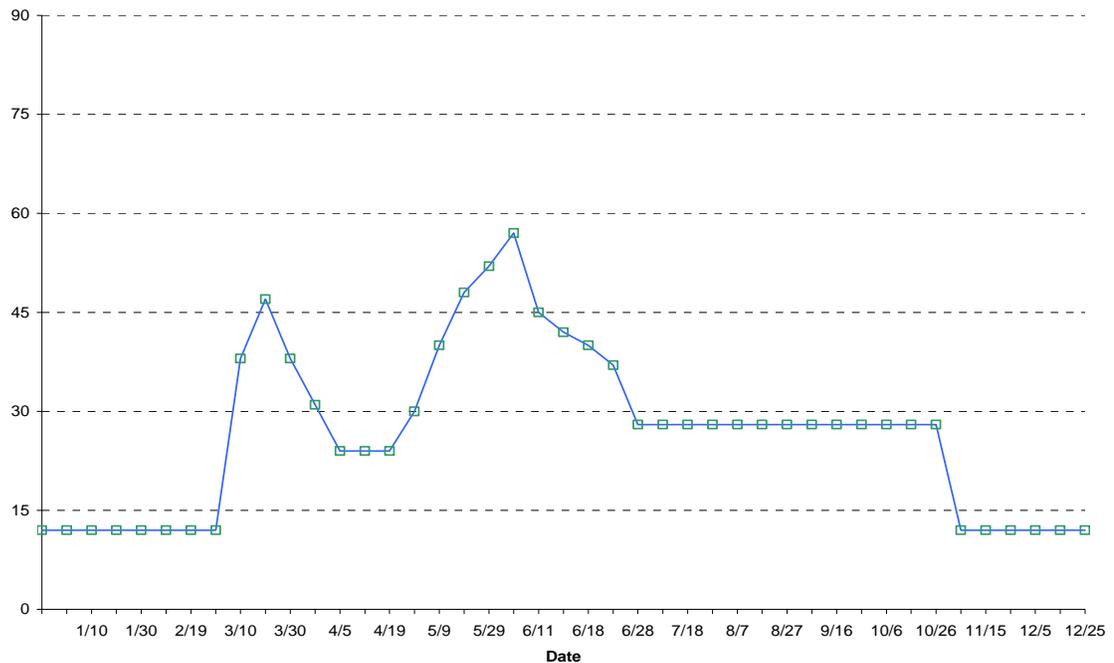


Figure 1. Chart showing Natural Hydrograph option 2006 flow scenario.