Interior Drainage behind Missouri River Levee Systems

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Normal Conditions:

- The river level is below toe of levees, and the land behind levees drains normally.
- Excess water from rainfall and local creeks is routed into interior drainage ditches.
- Drainage ditches flow to the river through culverts under the levees.
- Tieback levees prevent large tributary creeks and rivers from flooding farmland.

Current extended high flows on the Missouri River:

- Some levees have been overtopped or breached, flooding protected lands to the height of the river at the breach. Federal levees are typically constructed to a higher level than non-Federal levee, providing a higher degree of protection. If a levee is overtopped or breached, the levee may be intentionally breached at the downstream end of the system to minimize the amount of flooding and facilitate drainage once the river levels drop.
- Seepage under and through the levees is common when the river rises to or above the level of the toe of the levee. Seepage must be monitored by the levee districts to ensure that sand boils (seepage water carrying water eroded from the levee) do not develop. Control measures can be implemented. Uncontrolled sand boils can lead to levee failure.
- Saturated levees can increase the chance of erosion on the river side of the levee and bank sloughs on either side of the levee. Sloughs can also lead to levee failure. Seepage and failures from saturation are less a problem for the Federally constructed levees, since they are built with clay cores. Non-Federal levees are often constructed with just silty sand.
- Excess water from rainfall and local creeks as well as seepage is accumulating behind the levees that are not breached. Pumping is the only method available to remove ponded water, but the cost of pumping increases with the amount of pumping and the river level.
- Gravity drainage systems and the culverts under the levees work best when the river is well below flood stage. As the river rises, flow through the culverts slows. When it rises higher than the land behind the levees, drainage stops. Backflow from the river through the pipes is prevented with either mechanical slide gates or automatic flap gates.
- At flood stage, the river flows over the banks. Low pastures and riparian woodlands begin to get wet. At about 2 ft above flood stage, some high value crops planted in the strip of land between the river and the levees begin to get wet. At 2 to 5 ft above flood stage, the river rises to the toe of most levee systems, and levee erosion, levee saturation, and restricted drainage begins. Low-lying land behind the levees that may be affected by ponding is often used for collector ponds, wetland development, or low value pasture.

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- At river levels above 5 ft over flood stage, almost all levee districts will suffer some higher value field flooding. Even districts with good pumping operations will suffer decreased yields due to ground saturation.
- The 2011 Missouri River flood is unusual. Most floods rise and then fall naturally. This flood will extend for a long period, worsening the impacts of interior ponding.

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