

IMPACT OF FLOODING ON BOTTOMLAND HARDWOODS

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Thank you for your inquiry about the impact of the current flooding on timber resources in the Mississippi Delta. This is indeed an historic flooding event in the Yazoo Basin. We have received questions about the potential impact of extended flooding on the bottomland forest. Due to the unpredictable nature of events like this there has been very little research on flooding impacts on natural bottomland forests. Most of our knowledge on the impacts of soil flooding is based on greenhouse studies of seedling physiology.

Probably the most significant synthesis of flooding impacts on mature bottomland forests in the Mississippi Delta was conducted by Mr. Walt Broadfoot, particularly after the 1973 Mississippi River flood. Broadfoot described beneficial effects of growing season flooding, as well as adverse effects. He also discussed species tolerance to long-term flooding events and effects of flooding on hardwood seedlings.

Growing season floods can improve growth of dominant vigorous hardwoods because soil moisture, which typically limits growth, is recharged by the flood waters. Broadfoot observed that "in the Steele Bayou Sump and Yazoo River backwater area north of Vicksburg, MS, diameter growth of dominant trees of the principal native species was 50 to 100 percent greater in flood than in nonflood years." In a study of the responses of mature trees to the annual impoundment of rainwater from December through June over 16 years, Broadfoot reported increased growth by 25 to 90 percent, particularly in cottonwood, sweetgum, and green ash. Water impoundment did not increase the incidence of disease or insect attack.

Conversely, prolonged flooding over successive growing seasons can have adverse effects on bottomland forest trees. The intensity of effects varies by species, but stress intensifies with increased depth and duration of flooding, greater stagnation of flood waters, the presence of sediment in the flood water, and significant deposition of sediment. These factors can lead to oxygen deprivation in the rooting zone, which is the ultimate cause of tree stress. Typical symptoms of these adverse effects include: decreased growth, leaf yellowing, downward curling of leaves, leaf abscission, absence of fruiting, branch dieback, and increased susceptibility to diseases and insect attack. Chronic adverse effects can lead to mortality.

Species diversity on bottomland hardwood sites leads to a range of flood tolerance among species. A flood-tolerance classification (synthesized from a variety of publications) of common hardwood species native to the MS Delta is attached. Most species are at least moderately tolerant of flooding and some species can endure continuous flooding over several years. The response of a particular forest stand therefore depends on its species composition.

may benefit from dormant season flooding. They may also benefit from brief growing season flooding, as long as they are not completely inundated or receive substantial sedimentation. If complete inundation lasts for more than two consecutive weeks during the growing season, seedlings generally die back to the ground, but some may sprout after floodwaters recede.

Unfortunately, we lack the ability to predict the effects of this year's flood on the timber resources of the Mississippi Delta. It is interesting to note, that a 1932 inventory of forest resources in the Mississippi Delta showed no ill effects of the 1927 flood. This indicates that the forests in this region are resilient and can recover from unpredictable flooding. In fact, flooding was not on the list of detrimental agents when the author of the 1932 inventory stated that "mortality estimates include volume losses due to normal causes, such as crowding in dense stands, suppression, and maturity, and also losses due to destructive agencies, such as fire, wind, rot, and insects."

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Attachment: Delta Hardwoods flood tolerance table

FLOOD TOLERANCE
Delta Hardwoods

MODERATELY INTOLERANT¹

red mulberry
cherrybark oak
Delta post oak

Shumard oak
swamp chestnut oak

MODERATELY TOLERANT²

sweetgum
honeylocust

water oak
pecan

TOLERANT³

green ash
cottonwood
American elm
cedar elm
sugarberry
waterlocust

boxelder
Nuttall oak
willow oak
persimmon
sycamore

VERY TOLERANT⁴

baldcypress
water tupelo
overcup oak

water hickory
black willow

¹ **Moderately Intolerant** – able to survive flooding for periods of up to 1-2 weeks during the growing season, but mortality is high if flooding persists longer.

² **Moderately Tolerant** – able to survive flooding for periods of up to 1-3 months during the growing season, but mortality is high if flooding persists longer.

³ **Tolerant** – able to survive deep flooding for most of the growing season, but mortality is high if prolonged flooding occurs consecutively for several years.

⁴ **Very Tolerant** – able to survive continuous flooding for more than 1 year.