## Hydrologic Aspects of Raising US 441 Across Paynes Prairie

**Background**

The Paynes Prairie basin covers 16,055 acres and extends about 8 miles east to west and from 1-4 miles north to south. All waters within the park have been designated as Outstanding Florida Waters, pursuant to Chapter 62-302, Florida Administrative Code. Surface waters in this park are also classified as Class III waters by the Florida Department of Environmental Protection (FDEP). The basin marsh within Paynes Prairie is classified as the "disappearing lake variant" by the Florida Natural Areas Inventory. Periods of high water are essential for health and function of the marsh system.

**Hydrologic Setting**

Paynes Prairie is part of the Orange Creek Basin watershed, which includes Newnans, Orange and Lochloosa lakes.  Paynes Prairie receives water from Newnans Lake via Prairie Creek.  In the 1920s, efforts to drain Paynes Prairie included the construction of Camps Canal, which redirected all Prairie Creek flow away from Paynes Prairie into Orange Lake, see map below.  In the 1970s, a series of culverts were installed to recover about half of the flow back into the prairie to help restore the hydrology and ecology.  These culverts, termed the diversion structure, are currently being replaced by a project funded by FDEP and SJRWMD.

The Orange Creek Basin serves as a point of recharge of the Floridan aquifer through Alachua Sink and numerous sinks in Orange Lake – most noteworthy of which is Heagy Burry Sink.  Water flowing into Alachua Sink is thought to move north or northwest toward the Santa Fe River and associated springs, while water flowing into Orange Lake's sinks is thought to move south toward Silver Springs.
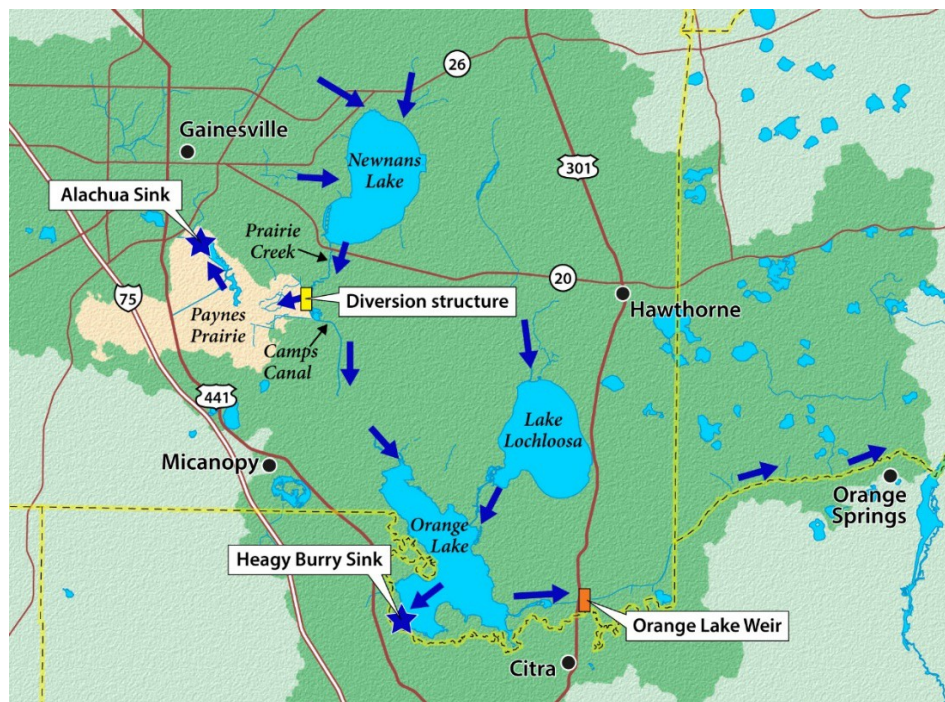


*Orange Creek Basin surface water hydrology.*

The watershed that feeds into Paynes Prairie covers 121,000 acres.  Typically, Prairie Creek provides approximately 21% of the inflows to Paynes Prairie via the diversion structure with other surface inputs (including Sweetwater Branch) contributing about 33% and direct rainfall providing 46% (chart below).

**Paynes Prairie Water Budget**
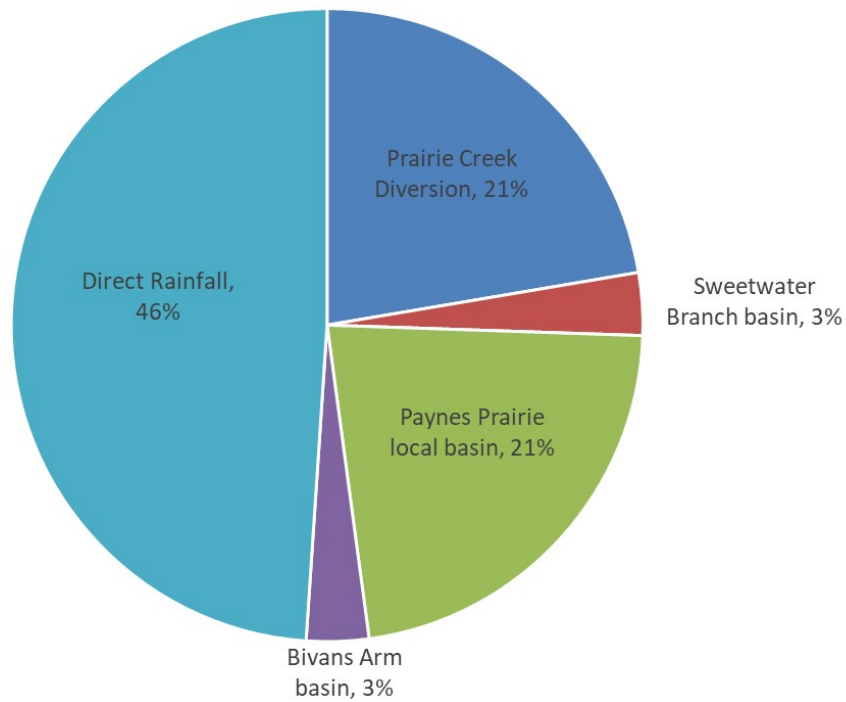


*Water inputs to Paynes Prairie.*

The presence of sinks contributes to widely fluctuating water levels and provides the opportunity for surface floodwater storage and aquifer recharge. The chart below illustrates surface water levels from 2010 to 2018.
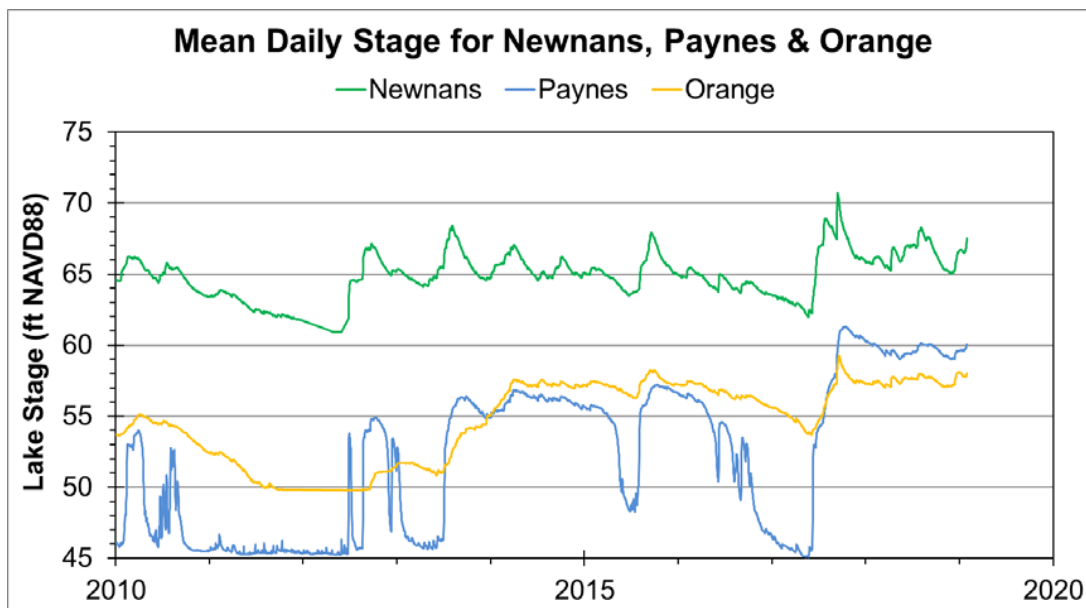


*Mean daily water levels on Newnans and Orange lakes and Paynes Prairie since 2010.*

**Water Storage Benefits**

Raising U.S. 441 would increase the basin's volumetric carrying capacity, allowing it to store greater volumes of water (see below) without threat to the roadway and traffic. Additional examination of potential constraints such as other roads, adjacent properties and operation of the Sweetwater Wetlands Park would be required to determine acceptable water levels.

### Paynes Prairie Water Storage as a Function of Water Level
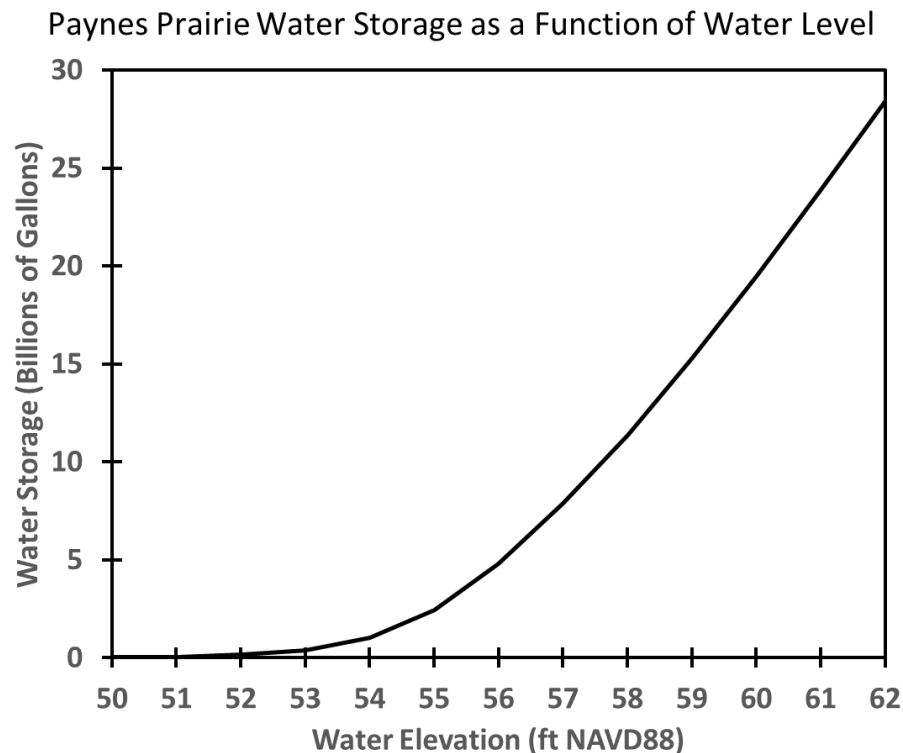
*The potential water storage capacity of Paynes Prairie at varying elevations.*

### Benefits to Lower Santa Fe Minimum Flows and Levels (MFLs)

The MFLs for the Lower Santa Fe River and associated springs were adopted by FDEP in 2015 (Chapter 2015-128, Laws of Florida), following the request from the Suwannee River Water Management District (SRWMD) Governing Board in 2013 due to system's reliance upon groundwater recharge from within both the SJRWMD and SRWMD, including flows from Alachua Sink in Paynes Prairie. The MFL for the system is not currently being met and is designated as in recovery, meaning that the system needs more flow to be ecologically healthy. The recovery strategy for the system was adopted in 2014 (SRWMD 2014) and is under re-evaluation this year. Raising U.S. 441 would allow for additional water storage in Paynes Prairie. This additional storage could increase recharge to the Upper Floridan aquifer through Alachua Sink and increase flows in the Lower Santa Fe River and associated springs, helping to meet the recovery requirements defined in the MFL.

### Ecological Benefits to Paynes Prairie

The ecological benefits of water level fluctuations to wetland systems are well known. An assessment of these have been summarized in a separate document available from FDEP.