

Lake Tarpon Structure (S-551) Feasibility Study
*Maintaining Flood Risk Management and Freshwater Protection
under Changing Hydrologic Conditions*

Summary:

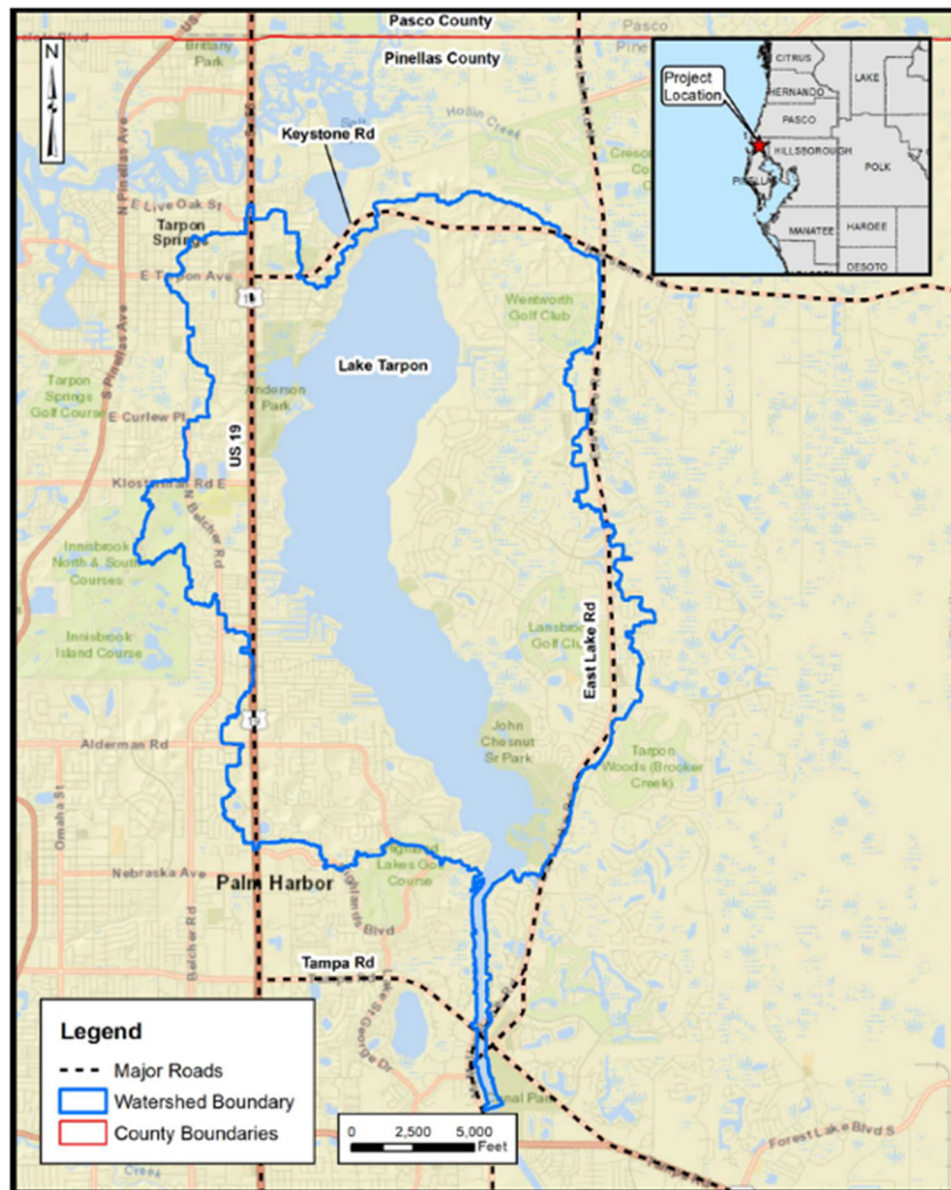
- The U.S. Army Corps of Engineers (USACE) built Lake Tarpon Structure (S-551) and Outfall Canal (C-351) to regulate Lake Tarpon water levels for flood protection and management of freshwater conditions in the lake. The Southwest Florida Water Management District (District) is responsible for operation and management of these facilities.
- Lake Tarpon is a significant recreational and economic asset in Pinellas County.
- High tide and storm surge events made worse by sea level rise have led to overtopping of S-551 and reduction in ability for passing flood water from the lake to Old Tampa Bay, increasing the potential for flooding and affecting public safety and emergency response.
- The USACE completed a 216 Assessment resulting in the recommendation that a feasibility study should be performed to identify adaptation alternatives to address the decline in level of service.
- The USACE is prepared to move forward with a feasibility study dependent on federal funding. The District has budgeted a \$1.5 million funding match. The next step is to garner community and Congressional support to allocate funding to the USACE.

Constructed by the USACE in 1969 as part of the Four River Basins, Florida Project, S-551 water control structure regulates Lake Tarpon water levels for flood risk management and freshwater resource protection. Located on C-351, the structure provides the sole surface water outlet from Lake Tarpon to Old Tampa Bay. Since 1974, the District has operated and maintained S-551 as part of its regional water management system.



The canal and structure function to regulate water levels on Lake Tarpon for flood risk management and to prevent saltwater from flowing upstream from Old Tampa Bay into Lake Tarpon. Lake Tarpon is a freshwater lake with a surface area of approximately four square miles, located fully within Pinellas County. It is the receiving waterbody for a watershed covering roughly 35 square miles. Brooker Creek is the largest tributary that drains into Lake Tarpon. The sole surface water outlet from Lake Tarpon is via C-351 canal into Old Tampa Bay. The lake is a significant recreational and economic asset that

supports surrounding residential communities, parks, boating, fishing, and tourism throughout northern Pinellas County. It is rated one of the top 10 bass fishing lakes in the state of Florida.



Rising sea levels have reduced the hydraulic head available for gravity discharge from Lake Tarpon during high tide and storm surge events, increasing operational constraints during recent storms. There is no outflow capability until S-551 tailwater recedes. Hurricane Idalia (2023) and Hurricane Debby (2024) both brought in high storm surge along with high amounts of rainfall over the basin. The structure was overtopped by the tidal storm surge during Hurricane Idalia, causing reverse flow conditions in C-351 canal. During both storm events, the high tidal storm surge forced the structure gates to remain closed for prolonged periods (>24 hours), during which time the District was unable to pass floodwater from the upstream basin, as the project is designed to do.

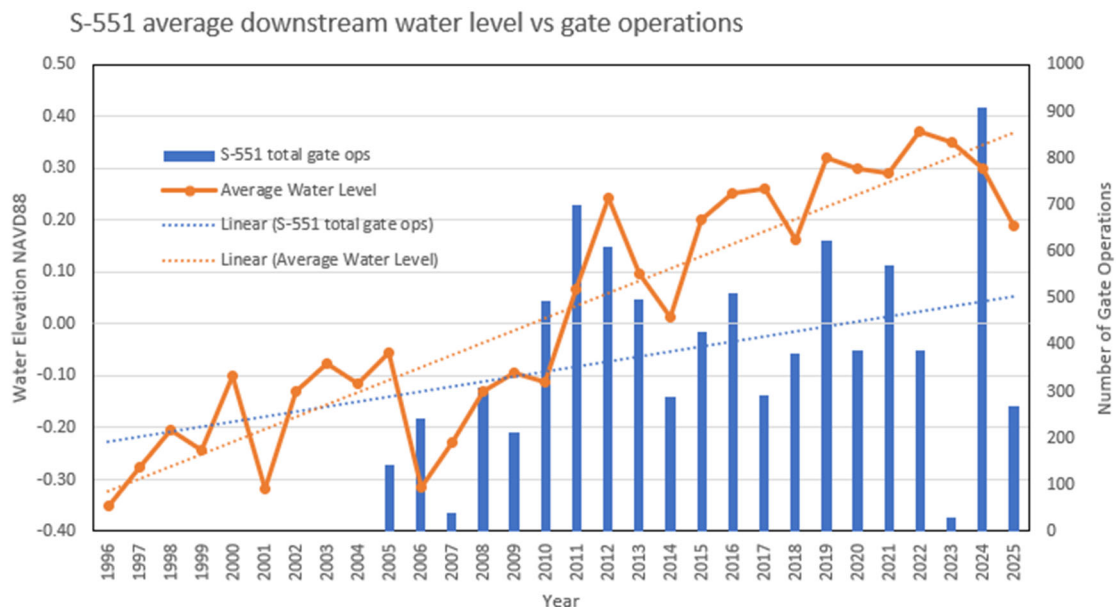
Since assuming operational responsibility for S-551, the District has successfully maintained the structure to continue providing its authorized flood risk management and freshwater protection functions. However, changing hydrologic conditions, including sea level rise, increasing tidal elevations, and more frequent coastal storm impacts, have introduced operational challenges that were not anticipated when the project was originally designed.



Tidal storm surge overtopping the S-551 structure during Hurricane Idalia in 2023

The District currently faces challenges with operating S-551 due to reduced conveyance capacity during high tide and storm surge events. During high tides near new and full moon, the tide cycle creates negative head difference conditions that necessitate the closure of S-551 structure gates to prevent saltwater intrusion into Lake Tarpon. These conditions create a situation where the District must operate the gates multiple times a day to manage water levels and potential saltwater intrusion in Lake Tarpon.

The data presented in the figure below illustrates the increasing challenge posed by rising sea levels, even under normal conditions, as evidenced by the observed increases in average tailwater stage and gate operations over time.



Projected sea level rise is expected to further increase these operational challenges over the coming decades. As mean sea levels continue to rise, higher baseline water elevations in Old Tampa Bay will reduce the hydraulic head available for gravity discharge

from Lake Tarpon, resulting in more frequent and longer-duration gate closures to prevent saltwater intrusion. Future storm surge events will occur on top of higher sea levels, increasing the likelihood of overtopping, reverse flow conditions, and prolonged periods when floodwater cannot be released from the watershed. These changing physical conditions directly affect the structure's ability to achieve its authorized purposes of flood risk management and saltwater protection, underscoring the need for a comprehensive USACE Section 216 feasibility study to evaluate long-term adaptation alternatives. As these conditions worsen, the ability to manage lake levels during major storm events will become increasingly constrained, increasing the potential for flooding to surrounding homes, businesses, transportation corridors, parks, and other public infrastructure while also affecting public safety and emergency response.

Over the past few decades, the District has made modifications to the structure needed to maintain the level of service. In September 2024, the District completed a Section 216 Assessment with the USACE on S-551. A Section 216 Assessment authorizes the USACE to review completed projects due to the significantly changed physical or economic conditions. The assessment concluded that significantly changed physical conditions warranted additional evaluation under Section 216 and recommended proceeding with a comprehensive feasibility study.

The proposed feasibility study would evaluate future operational demands on S-551 under anticipated sea level rise and changing watershed conditions. The study would include hydraulic and hydrologic analyses, alternatives evaluation, and recommendations for long-term adaptation strategies to maintain the project's authorized flood risk management and freshwater protection purposes.

The District has identified approximately \$1.5 million in matching funds to support the feasibility study. Federal participation would allow the District and USACE to jointly evaluate long-term alternatives for maintaining flood risk management and freshwater protection under changing hydrologic conditions. By securing Federal funding, a feasibility study, including an alternatives analysis, can be conducted to provide the technical basis for future investment decisions by evaluating practical, cost-effective adaptation strategies to maintain flood risk management benefits for the residents of Pinellas County, reduce future flood risk to homes, businesses, critical infrastructure, and public facilities, and protect Lake Tarpon as a vital freshwater resource by preventing saltwater intrusion.