Waters of the Oconee River Basin: Uses, Benefits, and Flow-Related Metrics for Water Planning

Project Summary

This project focused on ways that people use and benefit from the **water resources** in the Upper Oconee Region.

Motivation for the Project

Much of the **Oconee River Basin** lies within the Upper Oconee Water Planning Region.



The existing water plan recognizes a wide range of uses and benefits of the region's waters but **lacks basin-specific information** on some of them.

What's in this Document?

This collaborative project helps fill that information gap.

- what we did to complete the project
- the uses and benefits identified as important by project participants from the basin
- how some uses and benefits depend on the amount of water in rivers or lakes
- flow metrics that indicate water availability for specific uses and benefits

The document concludes with bottom lines on how to use this information in updates of the regional water plan to support different benefits and uses of the region's waters for the long-term.

REVIEW DRAFT

This summary and other draft products from the project are available for review until June 24. See the last page of this document for links to other products and information on how to comment.





Uses and Benefits of Waterways in the Oconee River Basin: What Did the Project Involve?

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Inputs from project participants:

We invited people across the basin to tell us about the uses and benefits of the basin's rivers, streams, and lakes that they find most valuable.





48 people contributed information through interviews, meetings, surveys, and an interactive map.



... identify ways they use and benefit from the basin's water resources

share how their experiences at specific locations vary over time, such as times of low flow

Review of scientific & technical studies:



We analyzed scientific and technical studies on basin water resources.



We focused on flow-dependent uses and benefits.



We used data to create examples of how flow metrics can be used in water planning.

Project process: Information was compiled use the results are to create a reviewing and

Inputs from project 📕 Analysis of scientific and technical studies participants



range of products. Project participants and those who will commenting on different products.

Project products are for the...



Upper Oconee **Regional Water Planning Council** to update management practices in the regional water plan



Georgia Environmental **Protection Division** to use in water planning and management







What Uses and Benefits Did Project Participants Identify as Important to Them?

7 categories:

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ENVIRONMENTAL

Important habitats for diverse plants, fish, mussels, crayfish, and other organisms AQUATIC HABITATS & SPECIES ... but some habitats and species

are affected by dams, sediment, and other activities

Shoals are river segments with shallow water, rocky bottoms, and faster flow. Shoals are important for fishes, plants, and invertebrates, and have recreational and historical significance.

Oxbows, sloughs, and oxbow lakes in the southern half of the basin are important habitats and recreational resources. Many sport fishes breed in oxbow lakes.

& HISTORICAL O **EDUCATION** Sites that provide water-related educational and recreational opportunities,



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such as nature centers, designated historic sites, historic structures.

14 species in decline = of special concern for biodiversity conservation

RECREATION ON RIVERS & LAKES

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Project participants focused on recreational uses of the large rivers and lakes in the basin.

Recreational uses included motorized and non-motorized boating, fishing, swimming, wading.

> Public areas, private locations, and outfitters that provide access to the waterways are valuable.



RECREATION & HABITAT ON LANDS **ALONG RIVERS & LAKES**

Benefits from protected lands also include water quality protection, aesthetic value, and floodplain habitats.

Activities on land include hiking, picnicking, birding, wildlife observation, camping, hunting, bank fishing.

Recreation occurs on public parks, greenways, private hunting lands, state wildlife management areas, and US Forest Service lands.





Scientific and technical studies on the Oconee River Basin highlight 5 kinds of uses or benefits that are closely tied to streamflow or lake levels.

These 5 kinds of uses and benefits were also emphasized as important by project participants from the basin.

WATER SUPPLY **SPECIES & RIVER & LAKE** HABITATS municipal industrial RECREATION agricultural uses maintenance of: river channel form 34 permitted surface capacity to assimilate water withdrawals historia gone sites pollutants hunting water quality environmental camping floodplain habitats fishing education wetland habitats Tallassee birdwatching aquatic habitats C422 Dam HYDROPOWER swimming Wallace generates power sold Dam paddling during peak demand Sinclair 3 operational Dam hydropower facilities supports at least: 65 fish species wastewater 11 native crayfish species *Uses shown in blue are treatment already considered in the 16 native mussel species Plant regional water plan WASTEWATER DISCHARGE 90 National Pollutant *This project adds new **Discharge Elimination** information on uses disposal of treated wastewater, relies on natural capacity System (NPDES) permits shown in orange

of waterbody to process or assimilate pollutants



Developing Metrics for Flow-Related Benefits and Uses





Water planners can look at **how often beneficial or undesirable conditions occur** <u>now</u> for different uses and how those conditions may change with increased water demand <u>in the future</u>.

Results of this technical analysis are used to update the plan's management practices.

Understanding How Flows Affect Different Water Uses

Using hydrographs to visualize flows and metrics

Flow levels vary naturally, which can positively OR negatively impact water uses and benefits.

Due to this variability, flows are not expected to always support all water uses. But, understanding how flows affect water uses can inform water planning decisions.

What are hydrographs?



- Hydrographs show the amount of water, measured in cubic feet per second (cfs), in a river over time.
- Hydrographs are useful tools to visualize flow, thresholds, and metrics for flow-related uses and benefits.

Examples on the following pages include location-specific information on hydrographs to illustrate how different uses can be affected during high and low flow years.

Evaluating thresholds using water planning metrics

Metrics derived from thresholds for specific uses are applied in the technical analysis that supports regional water planning.



What are thresholds?

Thresholds are river flow or lake levels that are expected to support a specific use or benefit.



The analysis starts by looking at metrics that indicate undesirable conditions for water supply and wastewater assimilation.



Metrics for other water uses can then be applied to evaluate how uses that are important today may change in the future.

What are metrics?

Metrics are counts that tell us how often or how long flows are above or below a specific threshold.



Management practices can then be identified to meet future needs for water supply and wastewater assimilation. Practices can also be identified to manage impacts on other uses important to people in the basin.



low flow

The following pages show examples to illustrate thresholds and metrics in a dry year and a wet year at two locations in the Oconee River Basin: the Middle Oconee River at Athens and the Oconee River at Dublin. Similar metrics have been developed at other locations. Our <u>project website</u> provides more information.

Water uses and benefits shown in examples:





Associated flow thresholds and metrics:

• Water supply Water withdrawal permits generally include a low flow protection threshold. The number of days with flow below that threshold is used as a metric. Metrics from withdrawal and wastewater permits are already used in water plan updates. • Recreation flows* Thresholds show the range of flow levels that support paddling – flows above are not safe for the average paddler and flows below make it difficult to float a kayak or canoe. Our metric is the number of days in this range.

Metrics for species and habitats identify conditions that put the long-term survival of the basin's diverse aquatic resources at risk.

river-floodplain connection

Flows for species and habitats* • River-floodplain connection

Threshold shows flows that connect the river and floodplain, allowing nutrients and species to move between different habitats and supporting trees and other species that rely on flooding. Metric is the number of days above threshold.



Flows for species and habitats*

• Spring and early summer baseflows

Threshold indicates sufficient flows for fish reproduction and survival and growth of young fishes. Metric is number of days below threshold.

• Summer and fall baseflows Low flow threshold for survival of fishes and aquatic plants and insects. Metric is number of days below threshold, when exposure of the river channel leads to significant loss of habitat and insects that are important food sources for fish.



*This project adds metrics for recreation and for species and habitats to those available for water planning. These metrics can be used with water supply and wastewater discharge metrics to evaluate the effect of changes in water demand on the uses and benefits valued by people in the basin.

Water Planning Example for the Middle Oconee River, Athens, GA Example of a LOW flow year



Low flow years can bring flows that are not always sufficient to support these water uses and benefits, particularly during multi-year droughts. If future demand leads to more time with insufficient flow, recovery after droughts may take longer.

Water Planning Example for the Middle Oconee River at Athens, GA

Example of a HIGH flow year

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In **high flow years**, **flows are generally sufficient** to support water supply, paddling, and aquatic habitat and species, including fish reproduction. Water planners can see how this changes with future demand and adopt management practices if needed.

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In two hydrographs from the Oconee River at Dublin, the **black** line shows the daily flow over a year. The colored lines show flow levels needed to support water supply (in purple) and river-floodplain connection (in green).



Low flow years can bring periods with **flows below the threshold for water supply withdrawal** and result in few days of connection between the river and floodplain. In high flow years, **flows are generally above** the water supply threshold and there are longer periods of river connection to the floodplain.

Bottom Lines for Water Planning

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Metrics are available for 4 types of water uses and benefits that are important to people from the basin \rightarrow and are tightly tied to streamflow or lake levels.

water supply

wastewater rive discharge re

species and habitats

Metrics are used in the technical analysis of water availability.

- Evaluate conditions under current water demand
- Then apply estimates of future demand
- If undesirable conditions for different uses are more frequent or last longer than with current demand, planners can address challenges with management practices

Management practices can address information needs, planning activities, or hands-on water management. They can be near-term or longer-term actions and they may benefit multiple uses. Metrics for water supply and wastewater assimilation are applied first to flag time periods with undesirable conditions for these uses.

• Water supply metrics indicate times with challenges in meeting water demand due to low flows.

Wastewater metrics identify times with greater risk of pollution impacts because flow is lower than needed to dilute wastewater.

New planning metrics for recreation or species and habitats show how meeting water demand can affect other uses that people value. They can be applied in the same way as water supply and wastewater metrics.

Recreation metrics identify times when low or high flows limit boating. For **species and habitats**, dry season baseflow metrics are important to longterm survival of fish, plants, and insects, which can survive the stress of *some* low flow periods. But, more frequent or longer periods of low flow puts the long-term survival of the food web at risk and may impact sport fishing.

Examples of management practices water planners could adopt:

 Coordinate drought responses among water providers that rely on the same source to address low flow impacts on water supply, boating, and flow aquatic species and habitats

day

flow, cfs

- Monitor metrics with each plan update to track decreases in recreational opportunity or risk to long-term viability of species and habitats
- Consider impacts on other uses when expanding or siting new water supply reservoirs
- Identify information needed to use metrics in next revision of the plan

Project Outcomes: This project illustrates the range of uses and benefits from the basin's water resources that people see as important and adds new basin-specific information for use by planners and basin residents thinking about water availability for the long term.

Detailed results are presented in maps that allow a user to choose what interests them:

- Specific uses and benefits
- Specific areas within the basin
- Individual points

to support the range of uses and benefits that people enjoy today.

Project products are available on the project website:

This project's draft products can be found on the project website: <u>https://h2opolicycenter.org/projects/waters-of-the-oconee-river-basin/</u>

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Water Plan 🌢

- Project Summary
- Map Participant Input on Important Uses and Benefits
- Map New Planning Metrics: Recreation; Species and Habitats
- Description of Maps and Map Layers
- Review of Scientific and Technical Literature
- Supplemental Map: Volunteer Water Quality Monitoring Sites

This summary was prepared in May 2022 by Gail Cowie, Laura Rack, and Carol Yang. Contact Gail Cowie at <u>gcowie@h2opolicycenter.org</u> for more information.

Funding:

This project provides information that water planners, water managers, and members

of the public can use to ensure that, long-term, the region's water resources continue

This project was funded by a Regional Seed Grant Implementation Grant from the Georgia Environmental Protection Division. More information on Georgia's regional water planning program can be found at <u>https://waterplanning.georgia.gov</u>.

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We welcome comments on any of the products. You can submit comments using an <u>online form</u> or by email to <u>gcowie@h2opolicycenter.org</u>.

Submit comments by June 24.