

Paying for Watershed Management in the Beaver Lake Watershed

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SCHOOL OF GOVERNMENT
Environmental Finance Center

Acknowledgements

About the Environmental Finance Center

The Environmental Finance Center at the University of North Carolina at Chapel Hill (EFC) is part of a network of university-based centers that work on environmental issues, including water resources, solid waste management, energy, and land conservation. The EFC partners with organizations across the United States to assist communities, provide training and policy analysis services, and disseminate tools and research on a variety of environmental finance and policy topics. The EFC is dedicated to enhancing the ability of governments to provide environmental programs and services in fair, effective, and financially sustainable ways.

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Executive Summary

This report introduces a revenueshed for Beaver Lake Watershed. A revenueshed is a geographic area in which revenue is generated for an environmental service, in this case watershed management. The revenueshed combines entities in the watershed and those that benefit from receiving drinking water from the lake. The revenueshed offers a model for collaborative financial support of watershed management. The water quality revenueshed models wastewater and stormwater revenues. The water supply revenueshed models water revenues. The combination of the water quality and water supply revenuesheds make up the total revenueshed. The revenueshed tool, an interactive scenario builder for modeling watershed management revenues, includes water, wastewater, and stormwater as well as voluntary financial contributions from the Southwestern Power Administration. Find the revenueshed tool [here](#).

A summary of environmental finance mechanisms related to watershed management are also offered. These include watershed protection fees, stormwater fees, hydroelectric revenue contribution, flood control tax districts, water revenue and green bonds, and state revolving funds.

Revenueshed Concept

What is a revenueshed?

A revenueshed is a geographic area within which revenue is generated for a specific purpose. An excellent application of this concept is identifying a revenueshed for watershed management.

What are the advantages of the revenueshed analysis framework?

Jurisdictional boundaries often do not correspond with hydrologic boundaries. Local governments rarely have jurisdiction over their entire watershed. In fact, many local governments have land area in multiple watersheds and must manage competing priorities in each. Therefore, multiple jurisdictions are often responsible for financing watershed management in a single watershed. Priorities vary among municipalities, which complicates determining who should pay to maintain clean water. Local governments may also withdraw drinking water from surface waters whose watersheds are controlled by jurisdictions upstream. This results in a fundamental question:

Who is responsible for ensuring water quality for downstream users – those impacting water quality upstream or those benefiting from good water quality downstream?

The answer provided by the revenue-shed concept is, “both.”

Revenue-shed Analysis Applied to the Beaver Lake Watershed

Located in the Ozark Highlands of northwest Arkansas, Beaver Lake is a manmade lake created by the Flood Control Act of 1954, which authorized the construction of the Beaver Dam on the White River. Today, in addition to flood control benefits, Beaver Lake provides drinking water for over 500,000 Arkansas residents, as well as a water supply for industry and hydroelectric power generation. The lake is also lauded for its recreational value and is known as a fishing destination.¹

Although Beaver Lake has generally good water quality, it is affected by accelerating urbanization within the watershed as well as nutrient and sediment pollution from stormwater runoff from both urban development and agricultural uses. Several creeks and rivers in the watershed are currently listed as impaired by the EPA, including segments of War Eagle Creek, West Fork River, and the Lower White River.² The guiding document for water quality improvement is the [Beaver Lake Watershed Protection Strategy](#).

The [Beaver Watershed Alliance](#) was formed by a broad group of stakeholders in 2011 in response to the Strategy, recommending the formation of a council to “establish and support a strong partnership among those organizations which have significant authority or resources for protecting the watershed... [and] provide sustained leadership, ensure that the partnership is strong, coordinate protection practices, and allocate resources necessary to implement Strategy recommendations as needed.” Additional strategy recommendations included the implementation of the document’s outlined core best management practices, the creation of a developer and contractor lake protection certification program, an expanded education and stewardship program, and monitoring and adaptive management.³

¹ [Beaver Watershed Alliance](#), [Little Rock District of the USACE](#), [Encyclopedia of Arkansas](#)

² [Beaver Watershed Alliance](#)

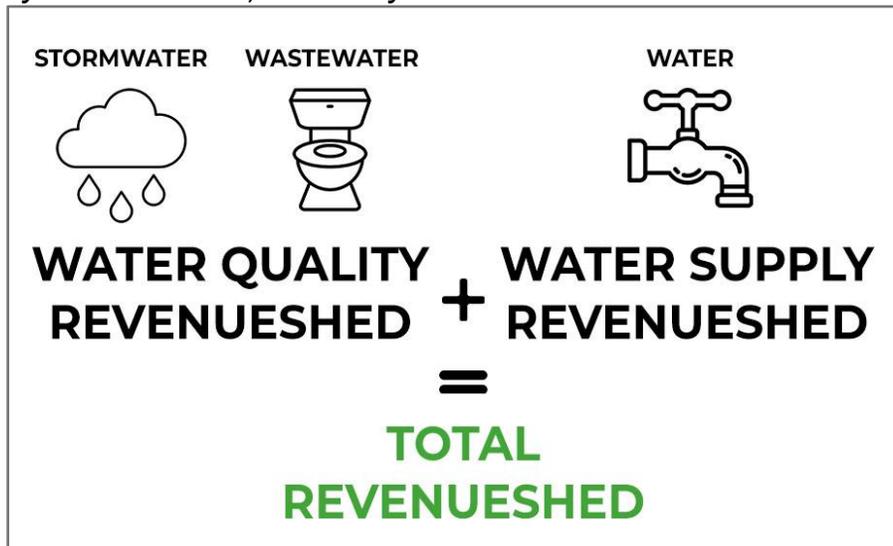
³ [Beaver Lake Watershed Protection Strategy](#)

4 | The Environmental Finance Center at the University of North Carolina at Chapel Hill

Overview of the Beaver Lake Watershed⁴

The Greater Beaver Lake Watershed includes all or parts of seven counties, 26 municipalities, 16 water utilities, nine wastewater utilities, and six Municipal Separate Stormwater Systems (MS4s). A total of 39 municipalities receive water from four wholesale water utilities through 33 water utilities that purchase Beaver Lake source water.

Jurisdictions located within the watershed or those that release their wastewater effluent into the watershed are part of the water quality revenue area because their land use decisions directly impact the water quality of Beaver Lake. Jurisdictions that source their water from Beaver Lake and thus benefit from improved water quality are part of the water supply revenue area. A jurisdiction's area may be only in the water quality revenue area, only in the water supply revenue area, or it may be in both.



A Note on Missouri

The Beaver Lake Watershed includes all or part of three counties and 15 municipalities located in Missouri. However, the majority of the municipalities have populations under 500 and none source water from Beaver Lake.⁵ As such, Missouri has been excluded from this analysis. However, future water quality efforts may include Beaver Lake stakeholders partnering with agricultural entities in Missouri to implement best management practices.

⁴ This description is brief because other sources, such as the Beaver Lake Watershed Protection Strategy, have described the watershed with very careful detail.

⁵ Population of municipalities range from 86 to 11,416, with a mean population of 1,556 and median population of just 440. Only very small portions of the two largest municipalities, Branson and Hollister, are included in the Beaver Lake Watershed. If these municipalities were excluded, the mean population would drop to 569 and the median to 415.

Components of the Beaver Lake Revenued

Drinking Water

Beaver Lake provides drinking water for over 500,000 Arkansans.⁶ Four wholesale water utilities source water directly from Beaver Lake: Beaver Water District, Benton-Washington Regional Public Water Authority, Carroll-Boone Water, and Madison County Regional Water District. These wholesalers resell to a network of 23 public water systems who sell to an additional 10 public water systems. These 33 utilities collectively make up the water supply revenued (Figure 1). Appendix A Table A outlines the purchase water structure for all the utilities in the water supply revenued.

At a Glance:

500,000+ Arkansans get drinking water from Beaver Lake.

33 Water Utilities purchase Beaver Lake water.

\$36.64 median monthly bill at **4,000** gallons.

Existing water rates throughout the state of Arkansas can be found on the [Arkansas Water and Wastewater Rates Dashboard](#), which is current as of January 1, 2021. The monthly residential water bill for 4,000 gallons of consumption ranges from \$16.15 to \$76.07. The median bill is \$36.64. See Appendix A Table B for the monthly water bill at 4,000 gallons for all the utilities that source water from Beaver Lake.

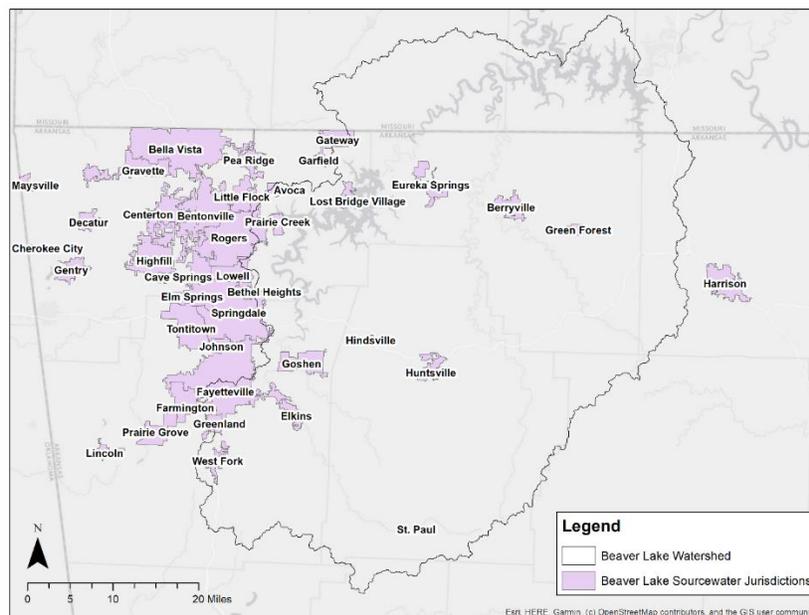


Figure 1: Water Supply Revenued for Beaver Lake

⁶ [Beaver Watershed Alliance](#)

Wastewater

According to data obtained from the Arkansas Department of Environmental Quality (ADEQ), there are 23 sewage treatment facilities of varying sizes in the watershed. Local governments that have sewage treatment facilities inside the watershed include Centerton, Fayetteville, Green Forest, Huntsville, and Lost Bridge Village. Additional sewage treatment facilities in the watershed include Holiday Island Suburban Improvement District, Ozarks RV Resort, and multiple individual home sewage treatment facilities.

At a Glance:

23 sewage treatment facilities in the watershed

\$35.87 median monthly bill at **4,000** gallons.

Existing wastewater rates throughout the state of Arkansas can be found on the [Arkansas Water and Wastewater Rates Dashboard](#) which is current as of January 1, 2021. The monthly residential wastewater bill for 4,000 gallons of consumption for the local governments with sewage treatment facilities inside the watershed ranges from \$16.85 to \$45.40. The median bill is \$35.87 (Appendix A Table C).

Stormwater

In 1987, Congress broadened the definition of polluting discharges within the Clean Water Act to include stormwater discharges from municipal separate storm sewer systems (MS4). MS4s are stormwater systems in urbanized areas that are separate from the sanitary sewer system. Arkansas MS4s are required to obtain National Pollution Discharge Elimination System (NPDES) permits from the Arkansas Department of Environmental Quality (ADEQ), which requires the MS4 municipalities to implement six minimum control measures. This is important because an NPDES permit is an unfunded mandate for stormwater management.

At a Glance:

0 stormwater utilities in the watershed

1 MS4 permittee completely in the watershed

6 MS4 permittees partially in the watershed

Just one MS4 permittee, the city of Elkins, is fully within the Beaver Lake Watershed. Several of the larger municipalities and counties, including Benton, Rogers, Lowell, Springdale, Fayetteville, and Greenland, on Beaver Lake Watershed's western edge also have MS4s.

Often, municipalities will create a stormwater utility and charge a stormwater fee to pay for stormwater management. However, there are no stormwater

utilities in the Beaver Lake Watershed. The city of Fayetteville, which is partially in the Beaver Lake Watershed, is in the process of evaluating a stormwater utility to manage and fund their stormwater program.

Revenueshed Tool

The revenueshed tool for Beaver Lake can be accessed at <https://public.tableau.com/app/profile/efcatunc/viz/BeaverLakeRevenueshed/Introduction>.

The purpose of the tool is to model scenarios in which environmental service providers in the Revenueshed raise existing fees or implement new fees to increase or create revenue for watershed management. The tool allows the user to select which of the potential stakeholders in the watershed participate in the model. The suggested steps for using the tool are:

1. Introduction tab: select the project goal by entering a cash amount and/or loan amount. For scenarios including a loan amount, select an interest rate and loan term.
2. Participants tab: select all the stakeholders that would participate in the current scenario.
3. Navigate to any combination of the water, wastewater, stormwater, and electricity tabs to raise existing water, wastewater, or electric rates or establish new stormwater utility fees.

How can the revenueshed tool be used to promote watershed protection?

Jurisdictions and other stakeholders can use the revenueshed tool to generate a discussion directly related to revenue generation for watershed management. The baseline for the tool is status quo. Any change to existing fees or implementation of new fees represents new dollars available for watershed management. The revenueshed tool also illustrates the benefits of collaboration within the watershed. The impact of jurisdictions opting out of the revenueshed can be directly modeled by changing the participants.

The revenueshed tool shows how small, incremental changes to existing fees or the addition of new fees can generate a large amount of revenue when applied across the entire revenueshed.

[Appendix B](#) highlights example scenarios using the revenueshed tool.

Watershed Management Financial Tools

While the revenueshed tool explores water and wastewater rates, stormwater fees, and voluntary contributions of revenues from hydroelectric power sales, there are additional environmental finance mechanisms through which funds can be raised for watershed management projects.

Watershed Protection Fee

A Watershed Protection Fee (WPF) is a fixed or volumetric fee included in a customer's monthly water bill. Revenue from a watershed protection fee is earmarked for watershed protection activities. A WPF can be either fixed or volumetric. A fixed fee can ensure a predictable funding stream for watershed protection even if demand, and therefore general water revenues, drop. A volumetric WPF can mean watershed protection revenues scale with demand.

Case Study: Central Arkansas Water (CAW)

In 2009, CAW implemented a WPF. The fee was initiated after long-term stakeholder involvement to develop the Watershed Management Plan. In part because CAW primarily serves retail customers, stakeholder engagement was critical to community acceptance of the WPF. The fee is based on meter size and currently ranges from \$0.90 to \$22.50 per month. The typical retail customer pays just \$0.90 per month. The WPF generates approximately \$2.2 million annually.

CAW utilizes the WPF primarily for land acquisition and the purchase of conservation easements. At present, CAW owns both of their reservoirs and approximately 13,000 acres in the drinking water watersheds. Occasionally, WPF revenue is used for grant matching, land management, and restoration activities. Since the WPF revenues are earmarked for watershed protection, CAW was able to continue watershed protection activities during the COVID-19 pandemic despite overall utility revenues falling.

Case Study: Beaver Water District

Beaver Water District (BWD) is a wholesale water provider for water systems that collectively service about 358,000 people. BWD has a volumetric WPF of \$0.04 per 1,000 gallons, which generates about \$803,000 per year for watershed protection. Figure 2 compares the WPFs for CAW and BWD.

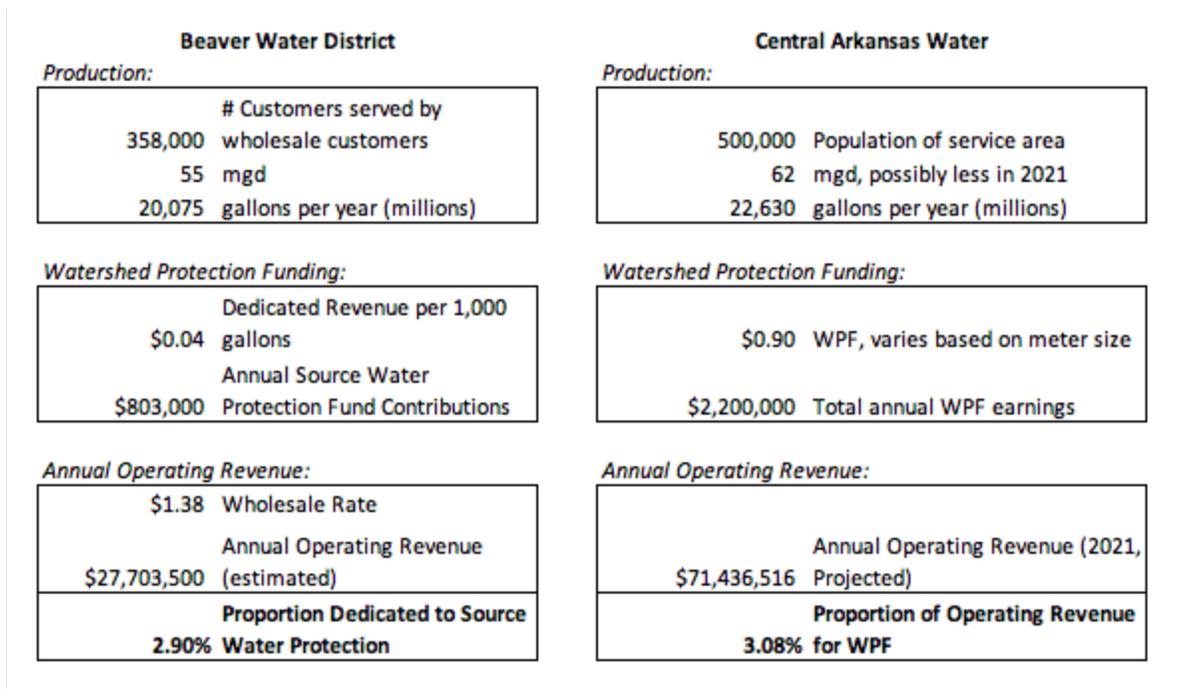


Figure 2: Comparing a volumetric WPF example to a fixed WPF example

Applicability to the Beaver Lake Watershed

Benton-Washington Regional Public Water Authority, Madison County Regional Water District, and Carroll-Boone Water District, the three smaller water wholesalers that source water from Beaver Lake, do not currently contribute toward watershed protection. Figure 3 shows the estimated contribution if they enacted the same contribution as Beaver Water District or CAW.

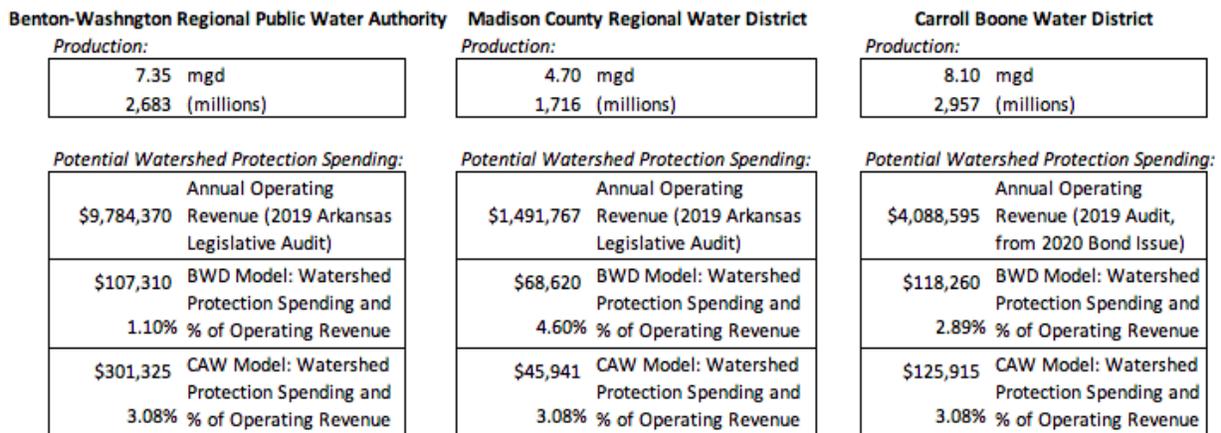


Figure 3: Modeling watershed protection revenues for the three wholesale utilities with no WPF

Should all three smaller wholesalers dedicate \$0.04 per gallon to Watershed protection, approximately \$295,000 in funds could be raised. If the three wholesalers instead dedicated an equivalent amount to CAW, 3.08% of operating revenue, nearly \$475,000 could be raised for watershed protection.

Stormwater Fee

A stormwater fee is a fee assessed based on the stormwater runoff impact of impervious surface on property. The fee may be structured as a flat fee, a fee based on the property’s class, or as a tiered fee based on impervious surface area. These fees can also be used for green infrastructure projects that mitigate stormwater runoff and improve water quality. There are currently two Arkansas cities that have established stormwater utilities and implemented stormwater fees, Hot Springs and Bryant.⁷ Within the Beaver Lake Watershed, the city of Fayetteville is in the process of establishing a stormwater utility and fee.

Case Study: Hot Springs

The city of Hot Springs was the first in Arkansas to establish a stormwater utility and implement a stormwater fee (Figure 4). The fee was created in 2006 in response to requirements within their phase II MS4 permit. The basis for the revenue generation target was projected maintenance and capital improvement project costs. Initially Hot Springs charged a flat fee based on property class. Now there is a flat fee for residential customers and a tiered structure for nonresidential properties. The city has been so successful in meeting Phase II requirements that it received special recognition from ADEQ. In fact, ADEQ sends new employees to Hot Springs for training and certification for MS4 requirements.⁸

		Cost Per Month	
		Initial	As of January 2020
Residential		\$3.00	\$4.25
Commercial	0 – 9,999	\$6.00	\$12.00
Impervious Surface in Square Feet	10,000 – 49,999	\$6.00	\$36.00
	50,000 – 99,999	\$6.00	\$90.00
	100,000 – 249,999	\$6.00	\$210.00
	250,000 - Above	\$6.00	\$450.00

Figure 4: Hot Springs Stormwater Utility Fee Structure

⁷ [Campbell](#)

⁸ Interview with Denny McPhate, Director of the Department of Public Works, and Aaron Graulau, Stormwater Manager, April 2021

When the fee was adopted, the city was sued on the premise that the fee constituted an illegal exaction, and that because the fee constituted a tax, it would require voter approval. The case ultimately reached the Arkansas Supreme Court and in 2011, the Court decided that a fee for services which bears “a reasonable relationship to the benefits conferred on those receiving the services”⁹ is fair, reasonable, and legal, setting the legal basis for stormwater fees in the state of Arkansas.

In the first ten years after it was established, the fee allowed the department to conduct extensive stormwater mapping and install a city-wide emergency siren and flood warning system. The city utilizes the stormwater utility fund for maintenance and repair of the drainage infrastructure. The department has installed 26 rain gardens throughout the downtown corridor. The fee has also helped them secure and administer grants for flood mitigation.

Applicability to the Beaver Lake Watershed

Stormwater fees are a highly effective but little utilized funding mechanism in Arkansas. Because the implementation of a new fee can be politically challenging, the Beaver Watershed Alliance could consider working with municipalities in the watershed on stakeholder engagement and education about stormwater utilities.

The city of Fayetteville is currently considering a tiered stormwater fee based on impervious surface area.

Voluntary Contributions from Hydroelectric Revenue

The Beaver Dam is owned and operated by the US Army Corps of Engineers and hydropower produced by the dam is marketed by the Southwestern Power Administration, a federal power marketing administration.

Case Study: Bonneville Power Administration

The Bonneville Power Administration (BPA) is unique in that the Northwest Power Act of 1980 requires financial contributions toward environmental protection, mitigation, and enhancement to repair environmental damage created by hydroelectric dam construction and operation. Additionally, the

⁹ [Supreme Court of Arkansas](#)

Endangered Species Act requires BPA take measures to protect federally endangered species impacted by their dams.

Though BPA's required annual watershed protection spending is not predetermined or fixed by law, through the Columbia River Fish and Wildlife Program, BPA currently has agreements with partners through 2027 that include commitments for nearly \$630 million of funding for fish and wildlife projects.¹⁰ Total contributions since 1980 exceed \$3 billion.¹¹ From 2014-2018, the program improved 309,281 acres of habitat through stream restoration, the removal of invasive species and new planting, and the restoration of wetlands, floodplains, and other habitats, and protected an additional 387 miles of riparian habitat through land acquisition and land leasing.¹² A complete list of projects and a myriad of additional information can be found on the [Program website](#).

BPA has elected to work with partners to implement projects required by the Act. Partners include land conservancies, tribes, and state agencies. BPA provides long-term funding assurances to these partners, who negotiate for land acquisition and conservation easements, and implement restoration and protection projects.

Applicability to the Beaver Lake Watershed

Though there are international examples of hydropower companies voluntarily entering into agreements to provide funds for watershed protection activities,¹³ hydropower generator investments in watershed protection and mitigation in the United States are limited and are made in response to regulation. There is no clear regulatory driver that would require the Southwestern Power Administration to spend electricity rate revenue on watershed protection. However, it is possible that they would enter into a voluntary agreement to contribute toward watershed protection and environmental mitigation. A question is how much they could reasonably be asked to contribute.

¹⁰ [BPA Annual Report 2020](#)

¹¹ [Northwest Power and Conservation Council \(2014, Columbia River Basin Fish and Wildlife Program\)](#)

¹² [Northwest Power and Conservation Council \(2020 Addendum to the 2014, Columbia River Basin Fish and Wildlife Program\)](#)

¹³ [Postel & Thompson](#) - In Ecuador, one hydroelectric company agreed to provide annual contributions to a Watershed Trust Fund, and in Costa Rica, a hydroelectric producer agreed to pay a conservation organization to implement conservation contracts with private landowners in the upper watershed to protect dry-season water flow, and subsequently, electricity generation.

Revenue data is available for the last five years, showing that BPA contributed 8.7 percent of operating revenue to environmental projects. Recognizing that Beaver Dam is one of 24 dam projects in the SWPA service area, environmental contributions from SWPA for watershed management in the Beaver Lake Watershed would be approximately \$520,000 per year.¹⁴ This number should be viewed as an optimistic estimate.

Improvement Districts

An improvement district is a political subdivision formed to provide specific infrastructure or services to property owners within the district. There are many different types of improvement districts and rules surrounding their formation, with power authorized by state or local government. In many cases, improvement districts have the ability to levy a special tax or assessment on property owners within the district, issue bonds, seek grants and other funding sources, and enter into contracts.

Arkansas has codified several types of improvement districts with the authority to levy and collect taxes and issue bonds,¹⁵ including watershed improvement districts. Watershed improvement districts may be formed for the purpose of the construction, operation, and maintenance of works of improvement for the purposes of preventing erosion, floodwater, and sediment damages and for the conservation, development, utilization, and disposal of water.¹⁶

Watershed improvement may also be completed by the local conservation districts, which have the ability to levy taxes on lands benefitted by an improvement project.¹⁷

Case Study: Departee Creek Watershed Improvement District

The Departee Creek Watershed Improvement District was formed in 1992 to restore Departee Creek and construct a 188-acre upstream lake for flood control. In 2020, the district received \$2.5 million in federal construction funding and \$250,000 for technical services for flood control and water quality

¹⁴ Based on the proportion of hydroelectric revenue generated by Beaver Dam to SWPA's entire portfolio of dams.

¹⁵ ACA §14-86-103, ACA §14-86-701, and ACA §14-86-702

¹⁶ ACA §14-117-201

¹⁷ ACA §14-125, §14-125-707 details tax levies

improvements in the watershed. The project is planned to be completed in 2022.¹⁸

Case Study: Big Creek Watershed District

The Big Creek Watershed District was formed in 1962 to construct and maintain more than 20 dams in the Big Creek drainage area. The Big Creek Watershed District utilizes a flat tax for ongoing funding and also taps into federal funds. For example, in 2016, the district earned \$23,650 from their tax, which was largely used for maintenance, and received \$156,000 from the USDA for dam site assessments.¹⁹

Applicability to the Beaver Lake Watershed

Many federal and state funding sources require matching funds. Watershed improvement districts provide a mechanism to generate matching funds for watershed improvement grants. Moreover, existing conservation districts in the watershed can implement and fund watershed improvement projects through special assessments. Both the conservation districts and Beaver Watershed Alliance can work with interested landowners to form watershed improvement districts to address localized stormwater challenges. Community support is critical to the success of any watershed improvement district.

Green Bonds

Green bonds are a newer variation of the traditional revenue bond that emerged in 2007. Proceeds from green bonds are earmarked for specific projects that have positive environmental or climate effects. Voluntary adherence with Green Bond Principles (Appendix A Table D) and the increased use of bond certifiers like Climate Bond Certification have increased the transparency associated with green bonds and legitimized them in the capital markets.

Green bonds can be issued by governmental units, corporations, financial institutions, and agencies, and can be secured by project-related revenue or by the full balance sheet of the issuer. Green bonds carry additional transactional costs. For example, issuers must track, monitor, and report on the use of proceeds. Although a 'green premium' (or lower cost of capital for the bond

¹⁸ [White River Now](#)

¹⁹ [Big Creek Watershed District](#)

issuer) is often talked about anecdotally, this is not necessarily true.²⁰ Green bonds can fund a wide range of environmental projects, communicate the issuer’s commitment to environmental responsibility, and help to coalition-build on environmental issues facing the issuer.

Traditional water revenue bonds and green bonds are compared and contrasted in Figure 5.

	Water Revenue Bond	Green Bond
Description	Municipal revenue bond secured by utility revenue	Proceeds earmarked for environmental projects, secured by full balance sheet of issuer or by a specified revenue stream
Variants	There are frameworks, but probably not specific rules. Demand dictates supply.	Use of Proceeds Revenue Bond, Project Bond, Securitization Bond, Covered Bond
Defining Characteristics	Bond is secured by utility revenue rather than the full balance sheet	Earmarked for specific environmental projects, reporting
Key Advantages	Traditional, multiple examples in Arkansas	Fits the traditional bond model Co-benefits Potentially lower coupon rate than traditional utility revenue bond - not definite
Key Disadvantages	Green infrastructure must be bundled to fit existing demand	Moderate transaction and reporting costs
Relevant Green Infrastructure Project Types	Land acquisition	Wide range of green infrastructure projects

Figure 5: Water Revenue and Green Bond Key Features

Case Study: Central Arkansas Water

In November 2020, CAW issued a \$31.825 million green bond, which was certified under the Climate Bond Initiative’s water infrastructure criteria. The bond finances a combination of green and gray infrastructure projects, with 35 percent of bond proceeds earmarked for green infrastructure, land acquisition, and the refunding of a past bond. A comparison of CAW’s green bond and the contemporaneous water revenue bond, which included property acquisition as a use of proceeds, is detailed in Table E in Appendix A.

²⁰ [Liaw](#)

CAW decided to go forward with a green bond rather than a water revenue bond to expand the number and types of entities that would be interested in purchasing the debt and to influence local corporations to get involved with watershed protection. “Capital markets responded enthusiastically” to the bond and CAW received bids from several banks, ultimately selling the bond to Morgan Stanley.²¹ Morgan Stanley has become an active partner, offering low-interest bridge loans to CAW should they need them for property acquisition and grant-matching.

CAW’s green bond is the first certified green bond that will be used to acquire forests for watershed protection. Becoming Climate Bond Certified means that the bond meets water infrastructure criteria established by the Climate Bonds Initiative. As part of the certification, CAW will be required to follow transparent reporting guidelines. Though the cost of reporting and tracking will be higher than a traditional bond, CAW’s cost of capital (the interest rate on the green bond plus any costs associated with the bond) is roughly equivalent to a traditional water revenue bond.

Applicability to the Beaver Lake Watershed

The utilities that source water from Beaver Lake may be able to look to green bonds to raise capital to couple traditional infrastructure improvements with source water protection.

State Revolving Fund

Both the Drinking Water State Revolving Fund (DWSRF) and Clean Water State Revolving Funds (CWSRF) can fund watershed management projects. The DWSRF can fund source water protection projects, while the CWSRF can fund wastewater and stormwater projects. States have a mandate to invest a certain amount of SRF dollars in green energy, efficiency, and green infrastructure projects ([Green Finance Reserve](#)).

The biggest challenge for funding green infrastructure through the SRF is identifying a viable repayment stream for the loan. Absent stormwater utility fees, local governments do not have a repayment mechanism to pay for stand-alone green infrastructure projects through the SRF. To address this challenge, other states have utilized creative financing strategies including:

- Sponsorship Financing, which pairs a traditional wastewater project with a nontraditional one, usually a nonpoint source project. The borrowing entity receives a loan with a reduced interest rate as

²¹ [Marsters, Anderson, & Gartner](#)

compensation for also undertaking (sponsoring) a nontraditional project, allowing the borrowing entity to take on a watershed restoration or protection project without placing repayment responsibility on that nontraditional project. The principal amount is increased to fund the nontraditional project, but the total payment (principal + interest + fees) is held constant by reducing the interest rate.

- Special assessments
- Revenues related to the funded project, such as revenues generated by sustainable timber harvesting on land acquired and restored with SRF funds

Case study: Arkansas State Revolving Fund

The Arkansas Department of Agriculture Natural Resources Commission (ANRC) manages the SRF. ANRC updates an intended use plan (IUP) annually, which dictates how the state will use the funding capitalization grant to support its programs. The current Arkansas Safe Drinking Water Fund IUP prioritizes projects that address the most serious human health risks and small systems that are the most in need.

The Safe Drinking Water set-asides are managed by the Department of Health. Though the statutes would allow the Department of Health to set up a separate set-aside for source water protection, they have not done this. Arkansas' Clean Water Fund is managed by ANRC, and the IUP prioritizes place and impact on water quality and/or public health rather than a specific project type. The IUP is in the process of being amended for FY2022 such that nonpoint source projects will be included on the project priority list. However, until the ANRC is approached for a nonpoint source or stormwater project, they will not be able to assess the effectiveness of any IUP amendments.

Additional projects that ANRC administers:

- The Agriculture Water Quality Loan Program (AgWQLP) is a nonpoint source linked deposit program targeted toward agricultural landowners as part of the CWSRF. AgWQLP provides a source of low-interest financing for conservation practices that reduce nonpoint source pollution, such as the construction of ponds or land-leveling projects.²²
- A septic tank pilot project which finances the repair or replacement of failing septic tanks. The project uses the CWSRF to fund 10-year, zero interest loans of up to \$30,000 to homeowners with failing septic

²² [Arkansas Department of Agriculture](#)

systems. The program will also offer grants for up to 90 percent of the loan amount, depending on the income of the participating household. The program is currently in three sub-watersheds in Arkansas and may expand to others if the pilot is successful.

Applicability to the Beaver Lake Watershed

ANRC anticipates that they will have the ability to fully fund all eligible project applications in the near future. Funds for nonpoint source projects are waiting to be tapped. The Beaver Watershed Alliance could play an important role in working with municipalities and utilities to encourage the use of SRF for these types of projects and could even serve as an implementation partner in a sponsorship-style project funded through the SRF. The Alliance may also be able to support the septic tank pilot project by educating property owners on the benefit of using the program to replace their failing septic systems.

Conclusion

The intention of this report is to support the Beaver Watershed Alliance in expanding who pays for watershed management and increasing the overall amount of revenue available for watershed management in the Beaver Lake Watershed. The revenue-shed concept will help the Alliance cultivate accountability and promote collaboration across all the users of the lake.

In support of the report objectives, the [revenue-shed tool](#) will allow the Alliance to communicate the collective impact of everyone in the revenue-shed paying just a little bit more for a cleaner lake.

Appendix A: Tables

Table A: Water utility framework in the Beaver Lake water supply revenueshed

Wholesaler	Drinking Water Utility	Secondary Utilities (purchase from drinking water utility)	Municipalities in Service Area	Also in the watershed?	
Beaver Water District	City of Bentonville	Bella Vista POA	Bentonville	No	
		Old Bella Vista POA	Bella Vista	No	
		Cave Springs Water Works	Cave Springs	No	
		Oak Hills Suburban Improvement District	Oak Hills SID	No	
	City of Fayetteville			Fayetteville, Goshen, Johnson, Greenland, Farmington	Partially
			Elkins Waterworks	Elkins	Yes
			West Fork Waterworks	West Fork	Yes
	Rogers Water Utilities	BCWD #4	Rogers, Prairie Creek	Partially	
		BCWD #1	Unincorporated	Yes	
	Springdale Water Utilities			Avoca, Little Flock	Partially
			Springdale, Lowell, Elm Springs, Bethel Heights, Johnson	Partially	
		Tontitown Waterworks	Tontitown	No	
Benton-Washington Regional Public Water Authority	BCWD #1		Avoca, Little Flock	Partially	
	Bella Vista POA		Bella Vista	No	
	Centerton Utilities	Highfill Water Department	Centerton	No	
			Highfill	No	
	Decatur Waterworks		Decatur	No	
	Garfield Waterworks		Garfield	Partially	
	Gateway Public Water Authority		Gateway	Partially	
	Gentry Waterworks		Gentry, Cherokee City	No	
	Gravette Waterworks		Gravette, Maysville	No	
	Lincoln Waterworks		Lincoln	No	
	Lost Bridge Village Water-Sewer District		Lost Bridge Village	Yes	
	Pea Ridge Waterworks		Pea Ridge	No	
	Prairie Grove Waterworks		Prairie Grove	No	
Washington County Water Authority		Tontitown, Greenland, Elm Springs, Farmington, Prairie Grove	Partially		
Carroll-Boone Water	Berryville Waterworks		Berryville	Yes	
	Eureka Springs Waterworks		Eureka Springs	Yes	
	Green Forest Waterworks		Green Forest	Yes	
	Harrison Waterworks		Harrison	No	
Madison County Regional Water District	Huntsville Water Works		Huntsville	Yes	
	Madison County Water Facilities Board		Hindsville	Yes	
		BCWD #5	Unincorporated	Yes	
	Mount Olive Water Association	St. Paul	Yes		

Table B: Monthly water bills at 4,000 gallons for water utilities in the water supply revenuehed

Utility	Monthly Water Bill at 4,000 Gallons
BCWD #1	\$53.05
BCWD #4	\$56.09
BCWD #5	\$76.07
Bella Vista POA	\$46.23
Bentonville	\$22.03
Berryville	\$19.60
Cave Springs	\$51.00
Centerton Utilities	\$35.45
Decatur Waterworks	\$23.10
Elkins Waterworks	\$29.20
Eureka Springs	\$20.68
Fayetteville	\$21.41
Garfield Waterworks	\$41.35
Gateway Public Water Authority	\$39.80
Gentry	\$30.16
Gravette Waterworks	\$50.10
Green Forest	\$25.23
Harrison	\$23.96
Highfill Water Department	\$42.06
Huntsville	\$24.43
Lincoln Waterworks	\$60.52
Lost Bridge Village	\$45.40
Madison County	\$47.45
Mount Olive WA	\$49.00
Old Bella Vista POA	\$61.00
Pea Ridge	\$36.71
Prairie Grove	\$31.16
Rogers Water Utilities	\$16.15
Springdale Water Utilities	\$18.98
Tontitown Waterworks	\$38.56
Washington County	\$55.97
West Fork Waterworks	\$31.55

Table C: Monthly wastewater bills at 4,000 gallons for utilities in the water quality revenuehed

Utility	Monthly Wastewater Bill at 4,000 Gallons
Centerton Utilities	\$40.73
Fayetteville	\$35.87
Green Forest	\$16.85
Holiday Island SID	\$33.38
Huntsville	\$22.37
Lost Bridge Village	\$45.40

Table D: Green Bond Principals

The International Capital Market Association’s Green Bond Principles

1. **Use of Proceeds:** The cornerstone of a Green Bond is the utilization of the proceeds of the bond for Green Projects, which should be appropriately described in the legal documentation for the security.
2. **Process for Project Evaluation and Selection:** The issuer of a Green Bond should clearly communicate to investors: the environmental sustainability objectives, the process by which the issuer determines how the projects fit within the eligible Green Projects categories, the related eligibility criteria, including, if applicable, exclusion criteria or any other process applied to identify and manage potentially material environmental and social risks associated with the projects.
3. **Management of Proceeds:** The net proceeds of the Green Bond, or an amount equal to these net proceeds, should be credited to a sub-account, moved to a sub-portfolio or otherwise tracked by the issuer in an appropriate manner, and attested to by the issuer in a formal internal process linked to the issuer’s lending and investment operations for Green Projects.
4. **Reporting:** Issuers should make, and keep, readily available up to date information on the use of proceeds to be renewed annually until full allocation, and on a timely basis in case of material developments. The annual report should include a list of the projects to which Green Bond proceeds have been allocated, as well as a brief description of the projects and the amounts allocated, and their expected impact.

Source: [Green Bond Principals, Voluntary Process Guidelines for Issuing Green Bonds](#)

Table E: CAW 2018 Water Revenue Bond and 2020 Green Bond Features

	Water Revenue Bond	Green Bond
Example Bond	CAW 2020B Capital Improvement and Refunding Water Revenue Bonds	CAW 2020C Green Bonds
Coupon Rate	5%-2.125% depending on time to maturity, 8-21 years	5%-2.125%, depending on time to maturity 8-22 years
Secured By	Stabilized Net Revenues of the Water System	Stabilized Net Revenues of the Water System
Projects	Acquisition, construction, installation, relocation or replacement of water distribution and transmission pipes; improvements to water pumping and treatment facilities; the acquisition, construction, renovation, or redevelopment of administrative building, source facilities, and other properties; and for such other purpose as may be deemed appropriate by the Issuer from time to time; to finance the refunding of a 2015 Water Revenue Bond; fund a debt service reserve; pay the cost of issuing the bonds.	Acquisition, construction, installation, relocation, or replacement of water distribution and transmission pipes and related appurtenances; improvements to water pumping and treatment facilities; the acquisition of and improvements to real property and conservation easement(s); the acquisition and installation of or improvement to various water pumping, processing, production, and distribution equipment; the acquisition, construction, renovation, or improvement to source facilities; for such other purposes as may be deemed appropriate by the Issuer from time to time. “Projects that are within the scope of the water improvements criteria established by the Climate Bonds Initiative.”

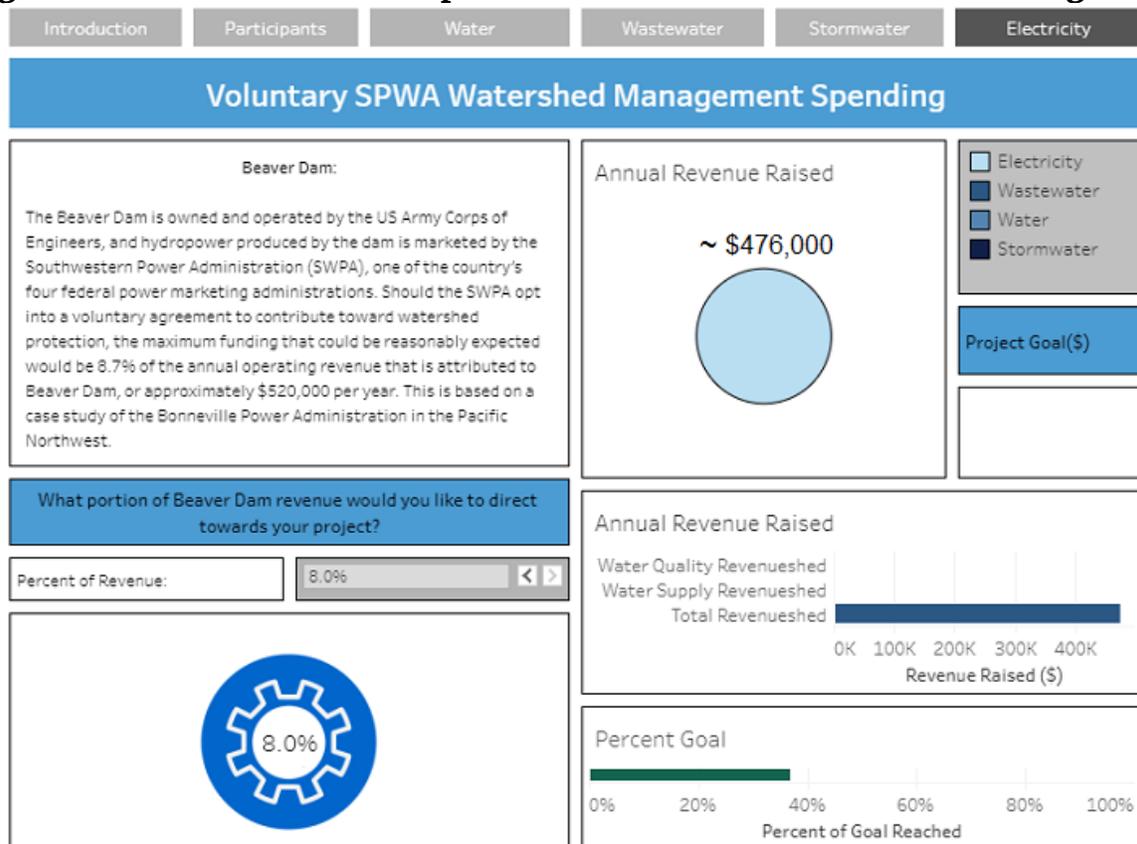
Appendix B: Revenueshed Scenario Examples

The following three examples show how the tool can be used to demonstrate of small, incremental changes to different rates and contributions throughout the revenueshed. These examples are selected using an arbitrary annual revenue generation goal of \$1 million. This is meant to be illustrative of tool functionality and is not meant to serve as a recommendation.

Example 1: Establishing a voluntary contribution for watershed management for SWPA

If the Southern Power Administration (SWPA) contributed eight percent of their annual operating revenue from the Beaver Dam hydropower production to watershed protection, the total revenue generated would be approximately \$476,000 annually.

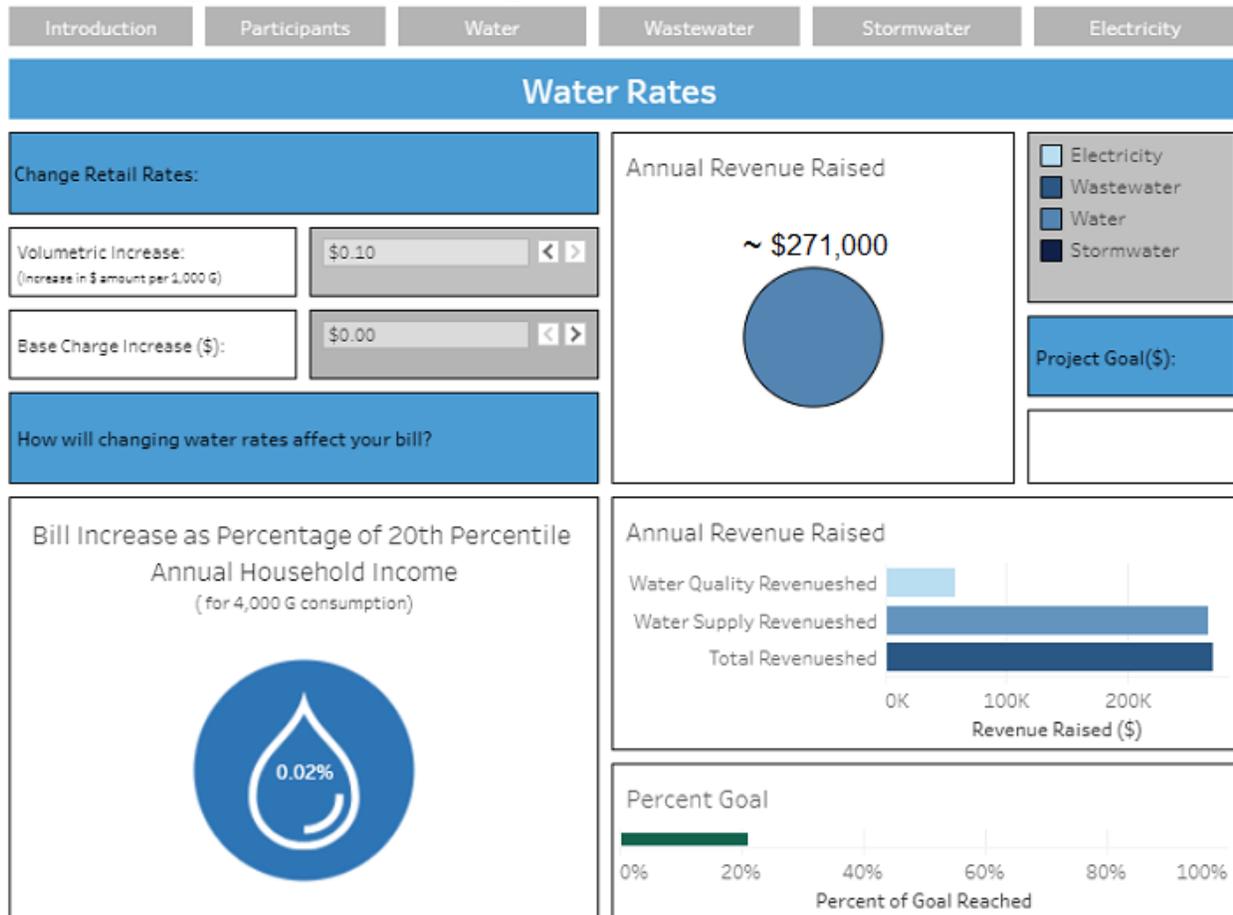
Figure A: SWPA contributes 8 percent of revenues to watershed management



Example 2: Increasing volumetric water prices within the water supply watershed

Raising the volumetric water rate by \$0.10 per 1,000 gallons generates approximately \$271,00 in revenue (Figure B). This bill increase represents about 0.02% of the 20th percentile annual household income for 4,000 gallons of consumption for the Beaver Lake rejuvenished.

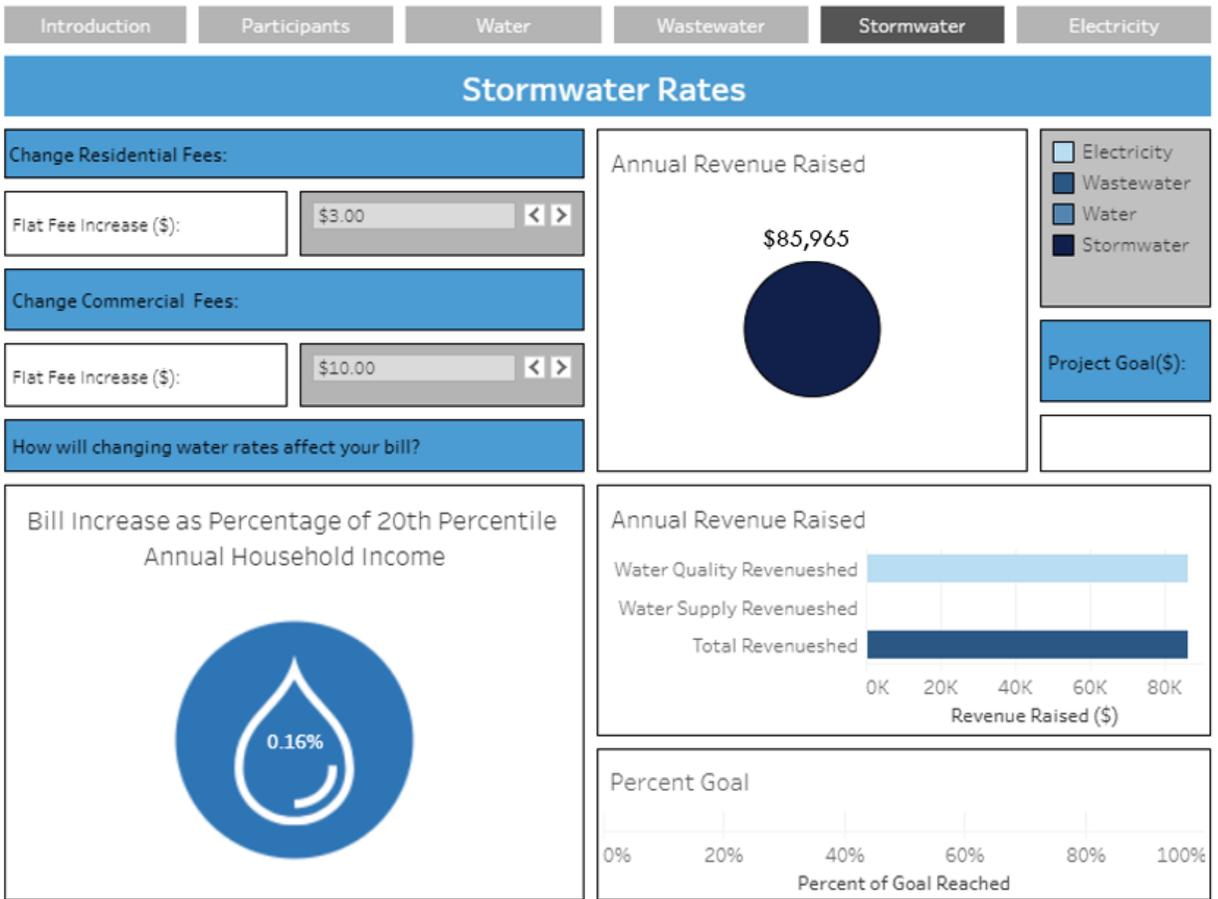
Figure B: Manipulating water rates in the rejuvenished tool



Example 3: Implementing a stormwater fee

A stormwater fee of \$3.00 per residential parcel and \$10.00 per commercial generates approximately \$86,000 in revenue (Figure C).

Figure C: Manipulating stormwater rates in the revenuehed tool



Works Cited

- ABC12 News. (2021, March 2). Four Lakes Task Force discuss dam restoration plans with community. Retrieved May 12, 2021, from <https://www.abc12.com/video/2021/03/03/four-lakes-task-force-discuss-dam-restoration-plans-with-community/>
- ABC12 News Team. (2020, January 6). Four Lakes Task Force signs purchase agreement for embattled dams. ABC12 News. Retrieved May 13, 2021, from <https://www.abc12.com/content/news/Four-Lakes-Task-Force-signs-purchase-agreement-for-embattled-dams-566752211.html>
- Bonneville Power Administration. (2021). *Annual Report 2020*. Bonneville Power Administration. Retrieved May 13, 2021, from <https://www.bpa.gov/Finance/FinancialInformation/AnnualReports/Documents/AR2020.pdf>
- Bonneville Power Administration. (n.d.). Fish & Wildlife. Retrieved May 13, 2021, from <https://www.bpa.gov/efw/FishWildlife/Pages/default.aspx>
- CBFish. (n.d.). Columbia Basin Fish & Wildlife Program - Projects. Retrieved May 13, 2021, from <https://www.cbfish.org/Project.mvc/Index/All>
- City of Sammamish. (n.d.). Beaver Lake Management District Advisory Board. Retrieved May 13, 2021a, from <https://www.sammamish.us/government/commissions-boards/beaver-lake-management-district-advisory-board/>
- City of Sammamish. (n.d.). Resolution No. R2000-57. Retrieved May 10, 2021b, from <http://mrsc.org/getmedia/69bbb040-edfc-434c-bf11-06b1ab49ef25/s35r2000-57.aspx>
- Department of Energy. (n.d.). Power Marketing Administrations. Retrieved May 13, 2021, from <https://www.energy.gov/ea/power-marketing-administrations>
- Four Lakes Task Force. (2020, June 15). Update on special assessment district. Retrieved May 13, 2021, from <https://www.four-lakes-taskforce-mi.com/updates/update-on-special-assessment-district>
- Four Lakes Task Force. (n.d.). Special Assessment District. Retrieved May 13, 2021, from <https://www.four-lakes-taskforce-mi.com/special-assessment-district.html>
- Jacuzzibusguy. (n.d.). Four Lakes Special Assessment District, Detailed Explanation. *YouTube*. Retrieved May 13, 2021, from https://www.youtube.com/watch?v=sLIjLLeI3qg&ab_channel=jacuzzibusguy
- Kanerva, C., & Vinton, K. (2020, December 14). Sanford Homeowners Concerned About FLTF Estimated Tax Assessment Plan. *9 & 10 News*. Retrieved May 13, 2021, from <https://www.9and10news.com/2020/12/14/sanford-homeowners-concerned-about-fltf-estimated-tax-assessment-plan/>
- McDonald, M. (2020, July 29). Four Lakes Task Force provides an update. *Record & Clarion*. Retrieved May 13, 2021, from https://www.gladwinmi.com/news_advisories/four-lakes-task-force-provides-an-update/article_735d4c64-d116-11ea-9b6c-179eeaf19b57.html
- Michigan Legislature. (n.d.). NATURAL RESOURCES AND ENVIRONMENTAL PROTECTION ACT (EXCERPT), Act 451 of 1994, Part 307, INLAND LAKE LEVELS. Retrieved May 13, 2021, from [http://www.legislature.mi.gov/\(S\(b5ekyleemgfdsgpmxmez3t\)\)/mileg.aspx?page=getobject&objectname=mcl-451-1994-iii-1-inland-waters-307&utm_source=newsletter&utm_medium=email&utm_campaign=special_news_flash_special_assessment_district&utm_term=2020-10-09](http://www.legislature.mi.gov/(S(b5ekyleemgfdsgpmxmez3t))/mileg.aspx?page=getobject&objectname=mcl-451-1994-iii-1-inland-waters-307&utm_source=newsletter&utm_medium=email&utm_campaign=special_news_flash_special_assessment_district&utm_term=2020-10-09)
- Modern Realty. (n.d.). Recent News & Happenings. Retrieved May 13, 2021, from <https://buyorsellwithsonya.com/latest-news>
- MRSC. (n.d.). Lake and Beach Management Districts. Retrieved May 13, 2021, from <http://mrsc.org/Home/Explore-Topics/Governance/Forms-of-Government-and-Organization/Special-Purpose-Districts-in-Washington/Lake-and-Beach-Management-Districts.aspx>

Northwest Power and Conservation Council. (2014). *Columbia River Basin Fish and Wildlife Program (2014)*. Northwest Power and Conservation Council. Retrieved May 13, 2021, from <https://www.nwccouncil.org/sites/default/files/2014-12.pdf>

Northwest Power and Conservation Council. (2020). *2020 Addendum to the 2014 Columbia River Basin Fish and Wildlife Program*. Northwest Power and Conservation Council. Retrieved May 13, 2021, from <https://www.nwccouncil.org/sites/default/files/2020-9.pdf>

Northwest Power and Conservation Council. (n.d.). Power Act: Summary. Retrieved May 13, 2021a, from <https://www.nwccouncil.org/reports/poweract/summary>

Northwest Power and Conservation Council. (n.d.). Northwest Power Act. Retrieved May 13, 2021b, from <https://www.nwccouncil.org/reports/northwest-power-act>

Oregonlaws.org. (n.d.). ORS 496.350 - Willamette River Basin Bonneville Power Administration Stewardship Fund - 2020 Oregon Revised Statutes. Retrieved May 13, 2021, from <https://www.oregonlaws.org/ors/496.350>

Postel, S. L., & Thompson, Jr., B. H. (2005). Watershed protection: Capturing the benefits of nature's water supply services. *Natural resources forum*, 29, 98-108. Retrieved May 13, 2021, from <https://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.459.6538&rep=rep1&type=pdf>

Prahalad, P., Clagett, M., & Hoagland, N. (2007). Beyond Water Quality: Can the Clean Water Act Be Used to Reduce the Quantity of Stormwater Runoff? *The Urban Lawyer*, 39(1), 85-109. Retrieved May 12, 2021, from <http://www.jstor.org/stable/23800895>

PROCEDURES FOR STABILIZING INLAND LAKE LEVELS. (n.d.). Retrieved May 13, 2021, from https://www.michigan.gov/documents/deq/wrd-dams-legal-lake-levels_558345_7.pdf

Resolution No. R2001-73. (n.d.). Retrieved May 13, 2021, from <http://mrsc.org/getmedia/c032c00f-1281-473d-8f37-3a7ac8034f38/s35r2001-73.aspx>

Southwestern Power Administration. (2019). *2018 Annual Report*. Southwestern Power Administration. Retrieved May 13, 2021, from https://www.swpa.gov/PDFs/ARs/SWPA_FY2018_annual_report.pdf



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