



Legislative Budget and Finance Committee

A JOINT COMMITTEE OF THE PENNSYLVANIA GENERAL ASSEMBLY

Offices: Room 400 Finance Building, 613 North Street, Harrisburg

Mailing Address: P.O. Box 8737, Harrisburg, PA 17105-8737

Tel: (717) 783-1600 • Fax: (717) 787-5487 • Web: <http://lbfc.legis.state.pa.us>

OFFICERS

Chairman

SENATOR
ROBERT B. MENSCH

Vice Chairman

SENATOR
JAMES R. BREWSTER

Secretary

REPRESENTATIVE
ROBERT W. GODSHALL

Treasurer

REPRESENTATIVE
JAKE WHEATLEY

Feasibility of Establishing a Water Use Fee in Pennsylvania

SENATORS

MICHELE BROOKS
THOMAS MCGARRIGLE
CHRISTINE TARTAGLIONE
JOHN YUDICHAK

REPRESENTATIVES

STEPHEN E. BARRAR
JIM CHRISTIANA
SCOTT CONKLIN
MARGO DAVIDSON

EXECUTIVE DIRECTOR

PATRICIA A. BERGER

DEPUTY EXECUTIVE DIRECTOR

CHRISTOPHER LATTA

June 2018

Table of Contents

	<u>Page</u>
Summary	S-1
I. Introduction	1
II. Water Use and Allocation in Pennsylvania	4
III. Fee Calculations.....	42
IV. Water Use Fees in Other States	142
V. Exemptions to Water Use Permit and Use Fees	156
VI. Background	162
VII. Appendices	183
A. Legislative History	184
B. Dedicated Nonpoint Source Water Pollution Funding in Other States	187
C. Responses to This Report.....	193

Summary

In June 2017, the Officers of the Legislative Budget and Finance Committee directed staff to study potential water use fees in the Commonwealth. The study is to determine potential revenues from House Bill 20, PN 1846 of 2017; the necessary fee rates to generate annual revenues of \$500 million, \$300 million, and \$100 million; and potential revenue from each of the major watersheds of the Commonwealth. See Appendix A for information regarding House Bill 20 and prior proposed legislation.

We found:

- ***In 2015 Pennsylvania withdrew 25.8 trillion gallons of water across 11 sectors.***¹ Three of those sectors, hydroelectric power, thermoelectric power, and public water supplies accounted for 98.4 percent of total water withdrawals. Hydroelectric power, alone, accounted for 92 percent of total water withdrawals.

Excluding hydroelectric power, the three largest sectors were thermoelectric power, public water supplies, and industrial use. These three account for 92 percent of the remaining total water withdrawals.

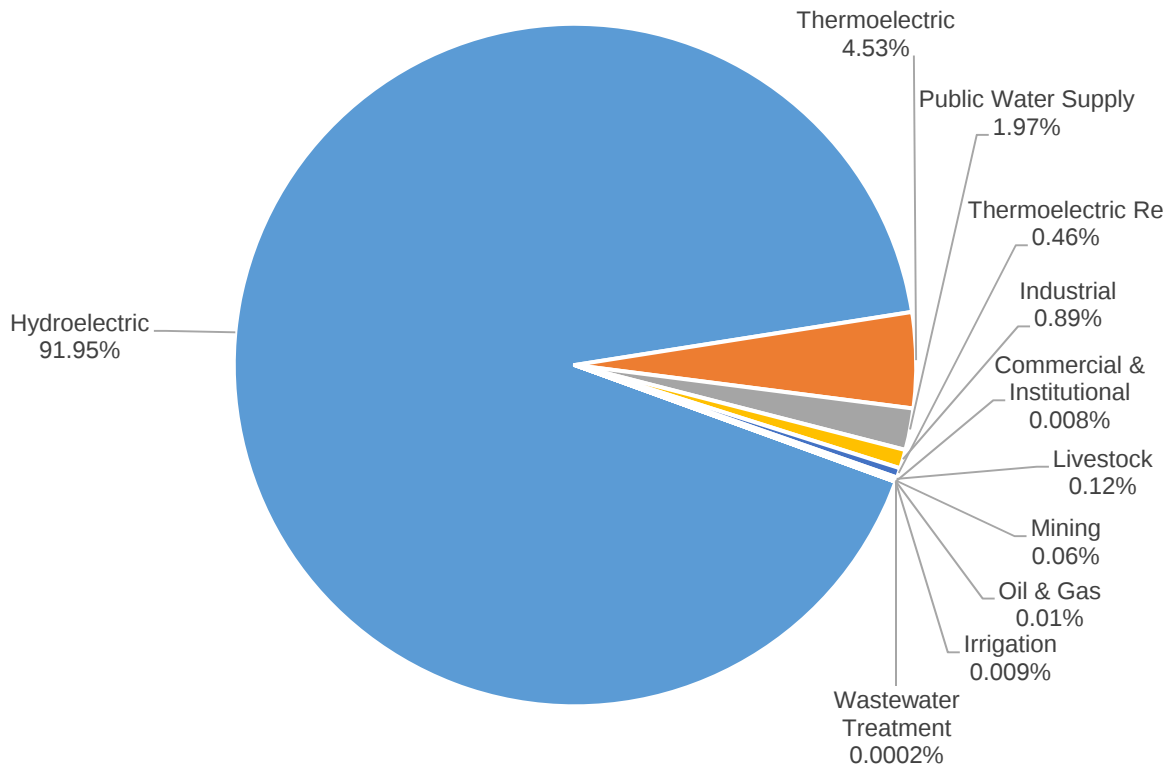
Put another way, 70,739 million gallons per day (Mgal/d) were withdrawn in 2015. Surface water withdrawals accounted for 99.5 percent of the total (70,394 Mgal/d). Total groundwater withdrawals were 345 Mgal/d.

Lancaster County withdrew 37,987 Mgal/d, more than all other counties combined with 54 percent of total withdrawals. Armstrong County accounted for 17,310 Mgal/d followed by York County at 10,477 Mgal/d. Together, these three counties accounted for 93 percent of total water withdrawals in 2015.

Excluding hydroelectric power withdrawals, three counties accounted for just over 63 percent of total water withdrawals – York, Allegheny, and Delaware Counties. York County accounted 46.4 percent of all water withdrawals excluding hydroelectric power withdrawals.

¹ We used data provided by the DEP; however, the 2015 DEP water withdrawal amounts for the Oil and Gas sector are limited to the Ohio River Basin and, therefore, our calculations do not include water withdrawal amounts for the Oil and Gas sector in the Susquehanna River Basin or the subsequent fees related to them. In 2015 the SRBC reported 1.3 billion gallons of water used for natural gas extraction (approximately 0.0005 percent of the total withdrawn that year); the impact on the fee calculations would be minimal.

Water Use in Pennsylvania by Sector in CY 2015



- ***If House Bill 20 were enacted, the proposed water fee would generate \$2.6 billion.***

House Bill 20 establishes a water resource fee on water withdrawals greater than 10,000 gallons. Exempted from the fee are agricultural, municipal, community, and non-community water systems, and not-for-profit entities. For water that is withdrawn and subsequently returned to the source, a fee of \$0.0001 per gallon is charged. For water that is withdrawn and then consumed, the fee is \$0.001 per gallon. Fees, by sector, are shown in the following table.

Pennsylvania Water Use Proposed Fees - All Sectors
(CY 2015)

Facility	Total Withdrawal	Water Used & Returned	Water Consumed	Returned Fee	Consumed Fee	Total Fees
Commercial & Institutional	2,060,622,505	1,854,560,255	206,062,251	\$ 185,456	\$ 206,062	\$ 391,518
Hydro	23,742,184,905,859	23,742,184,905,859	0	2,374,218,491	0	2,374,218,491
Industrial	229,235,808,713	206,312,227,842	22,923,580,871	20,631,223	22,923,580	43,554,804
Irrigation	2,021,004,848	202,100,485	1,818,904,363	20,210	1,818,904	1,839,114
Mining	15,734,987,931	14,161,489,138	1,573,498,793	1,416,149	1,573,499	2,989,648
Oil & Gas	2,605,522,117	2,605,522	2,602,916,595	261	2,602,917	2,603,177
Thermo Power	1,168,470,963,842	1,158,618,002,734	9,852,961,108	115,861,800	9,852,961	125,714,761
Thermo Power Re	118,137,619,592	43,638,112,529	74,499,507,063	4,363,811	74,499,507	78,863,318
Wastewater	56,769,183	56,769,183	0	5,677	0	5,677

- **We calculated fee rates to generate certain levels of revenue.**
 - In order to generate \$500 million in revenues, a fee of \$0.000018 per gallon of water withdrawn and returned and \$0.00018 per gallon of water consumed would be necessary.
 - In order to generate \$300 million in revenues, a fee of \$0.000010 per gallon of water withdrawn and returned and \$0.00010 per gallon of water consumed would be necessary.
 - In order to generate \$100 million in revenues, a fee of \$0.0000036 per gallon of water withdrawn and returned and \$0.000036 per gallon of water consumed would be necessary.

All rates assume no exemptions to the fee. As sectors are exempt, the remaining sectors' fees would have to increase in order to make up the difference (See Chapter III). The following table summarizes the fees by sector and generated revenues.

Proposed Fees Generated by Sector
(CY 2015)

Sector	Total Withdrawal	\$500 million	\$300 million	\$100 million
Commercial & Institutional	2,060,622,505	\$ 71,647	\$ 42,988	\$ 14,329
Hydroelectric	23,742,184,905,859	434,475,989	260,685,593	86,895,198
Industrial	229,681,654,732	7,985,921	4,791,553	1,597,184
Irrigation	2,331,860,812	388,319	232,992	77,664
Livestock	29,853,986,324	926,763	556,058	185,353
Mining	15,734,987,931	547,098	328,259	109,420
Oil & Gas	2,605,522,117	476,375	285,825	95,275
Public Water Supply	508,766,795,442	17,689,577	10,613,746	3,537,915
Thermoelectric	1,168,470,963,842	23,005,484	13,803,290	4,601,097
Thermoelectric - recirculated	118,137,619,592	14,431,788	8,659,073	2,886,358
Wastewater	56,769,183	1,038	623	208

- ***Facilities in the Susquehanna Watershed would generate \$336 million in fees under a scenario designed to generate \$500 million.***

Facilities in the Susquehanna Watershed would generate just under \$336 million in fees under a scenario designed to collect \$500 million in total fees. This represents 67 percent of all fees collected. Eighteen trillion gallons of water were withdrawn in CY 2015—representing 69 percent of all water withdrawals.

Fees by watershed and by scenario are summarized in the following table.

Watershed	Total Withdrawal	\$500 million	\$300 million	\$100 million
Delaware	504 billion	\$ 16,866,330	\$ 10,119,799	\$ 3,373,265
Erie	13 billion	472,466	283,480	94,493
Genesee	65 million	2,275	1,365	455
Ohio	7.3 trillion	146,556,262	87,933,758	29,311,253
Potomac	10 billion	358,759	215,254	71,752
Susquehanna	18 trillion	335,743,847	201,446,309	67,148,768

- ***Three other states impose an annual water use fee.***

Minnesota and Wisconsin both impose a water use fee on an annual basis and these fees are based on actual water usage. Minnesota charges all defined users, and Wisconsin charges only those users of water withdrawn from the Great Lakes Basin. New Jersey, as the other two states, has a water withdrawal permit requirement, however, users are charged annual fees based on their maximum monthly requested allocations. New Jersey's fees also differentiate by water source (surface water or ground water) and whether the water is for consumptive or non-consumptive use.

- ***All other states we reviewed, with the exception of West Virginia, which has no program, have exemptions to their water permitting programs.***

Some states have very few exemptions, and others have exhaustive lists of those users who do not require permits; agricultural concerns are often exempted. Pennsylvania requires permits only for public water suppliers. Other examples of exemptions include withdrawals under a stated volume threshold, personal domestic use, firefighting purposes, or those users who were grandfathered at the implementation of permitting requirements.

I. Introduction

In June 2017, the Officers of the Legislative Budget and Finance Committee (LBFC) directed LBFC staff to conduct a study of potential fees and revenues associated with the establishment of a water use fee in Pennsylvania.

Study Scope and Objectives

Specifically, our study sought:

1. To examine consumptive use and use-and-return fees assessed by other states, including any impact on the economies of those states.
2. To study the establishment and use of dedicated funding for water quality innovation and improvement by other states, with particular emphasis on allocation of the funding to confronting challenges arising from “nonpoint sources.”
3. To analyze any legislation introduced in the General Assembly that would impose a consumptive use or use-and-return fee or other vehicle to provide dedicated funding for water quality innovation and improvement.
4. To examine the practicality of a fixed-fee system or a sliding scale system, based on per-gallon withdrawal, per-gallon use, or other methodologies, for calculating a consumptive use or use-and-return fee on water.
5. To study whether a minimum threshold(s) should apply to the assessment of such a fee.
6. To examine whether the Commonwealth should consider any exemptions from the payment of the assessment of such a fee.
7. To project the potential of various fee assessments and methodologies to generate annual revenue options of \$500 million, \$300 million, and \$100 million.
8. To project potential revenue from each of the major watersheds of the Commonwealth.
9. To study different methods of collecting any such fee.

Methodology

This review focused on the establishment of a fee for both the consumptive use and the use-and-return of water for the purposes of providing a dedicated funding source for water quality innovation and improvement.

To determine the possible revenues from such a fee, we calculated the amount of water withdrawn and subsequently returned, and the water withdrawn and consumed (consumptive use). To determine the consumptive use specific to a water use category or sector, we relied on Consumptive Use Coefficients used by DEP and the United States Geological Survey. We then multiplied the water returned by the appropriate fee level and the water consumed by the appropriate fee level and added the two products. The result is the total fees that would be collected.

We used data provided by the Pennsylvania Department of Environmental Protection (DEP) for the water withdrawn and subsequently returned and the water withdrawn and consumed. The 2015 DEP water withdrawal amounts for the Oil and Gas sector, however, are limited to the Ohio River Basin and, therefore, our calculations do not include water withdrawal amounts for the Oil and Gas sector in the Susquehanna River Basin or the subsequent fees related to them. In 2015, gas operators were not required to submit water use reports to DEP for sources located in the Susquehanna River Basin, because they already reported their water use to the Susquehanna River Basin Commission (SRBC). In 2015 the SRBC reported 1.3 billion gallons of water used for natural gas extraction (approximately 0.0005 percent of the total withdrawn that year); the impact on the fee calculations would be minimal. DEP's policy has since changed with the adoption of 25 Pa Code Chapter 78a regulations, related to unconventional oil and gas development, which require all reports to be submitted to DEP since January 1, 2017.

We reviewed selected states to determine if they had water use fee programs, and to ascertain both their billing and enforcement practices. We also reviewed other states for permitting programs and water use reporting programs.

LBFC staff contacted all Pennsylvania State Agencies, and other advisory or regulatory organizations, having responsibilities for water programming, as well as stakeholders with an interest in a water use fee.

Acknowledgements

LBFC staff acknowledges the cooperation and assistance provided by Pennsylvania Departments of Environmental Protection, Agriculture, and Conservation and Natural Resources; the Susquehanna River Basin Commission; the Delaware River Basin Commission; and the Fish & Boat Commission, during the course of this review.

Important Note

This report was developed by Legislative Budget and Finance Committee staff. The release of this report should not be construed as an indication that the Committee or its individual members necessarily concur with the report's findings and recommendations.

Any questions or comments regarding the contents of this report should be directed to Patricia A. Berger, Executive Director, Legislative Budget and Finance Committee, P.O. Box 8737, Harrisburg, Pennsylvania 17105-8737.

II. Water Usage and Allocation in Pennsylvania

Pennsylvania is rich with water resources, and, as stated in the Pennsylvania Constitution, it is held in trust for the citizens of the state. (See Chapter VI for additional information regarding the Constitution.) Surface water volume is 2.5 trillion gallons and ground water volume is about 80 trillion gallons. Several state agencies have responsibilities related to protecting Pennsylvania's water resources: Department of Environmental Protection (DEP); the Fish & Boat Commission (PFBC); the Department of Conservation and Natural Resources (DCNR); and the Department of Agriculture (PDA). There are several commissions that oversee Pennsylvania's water resources as well. All of these entities are discussed in Chapter VI.

Major water sources in Pennsylvania include the Susquehanna River basin, Delaware River basin, Ohio River basin, and Potomac River basin. A significant portion of the Chesapeake Bay watershed also lies in Pennsylvania, and the Commonwealth borders Lake Erie. Maps of each of these water sources follow in Chapter VI.

Water rights and doctrine vary between the western part of the United States, where the prior appropriations doctrine is the standard, and the eastern part of the country where the riparian¹ doctrine is the norm. The prior appropriation doctrine states that water rights are determined by priority of beneficial use, which means the first person to use water or divert water for a beneficial use or purpose can acquire rights to the water. Riparian doctrine states that water belongs to the person whose land borders a body of water. Owners are permitted to make use of this water provided it does not unreasonably interfere with the reasonable use of this water by others with riparian rights.

Total Water Use²

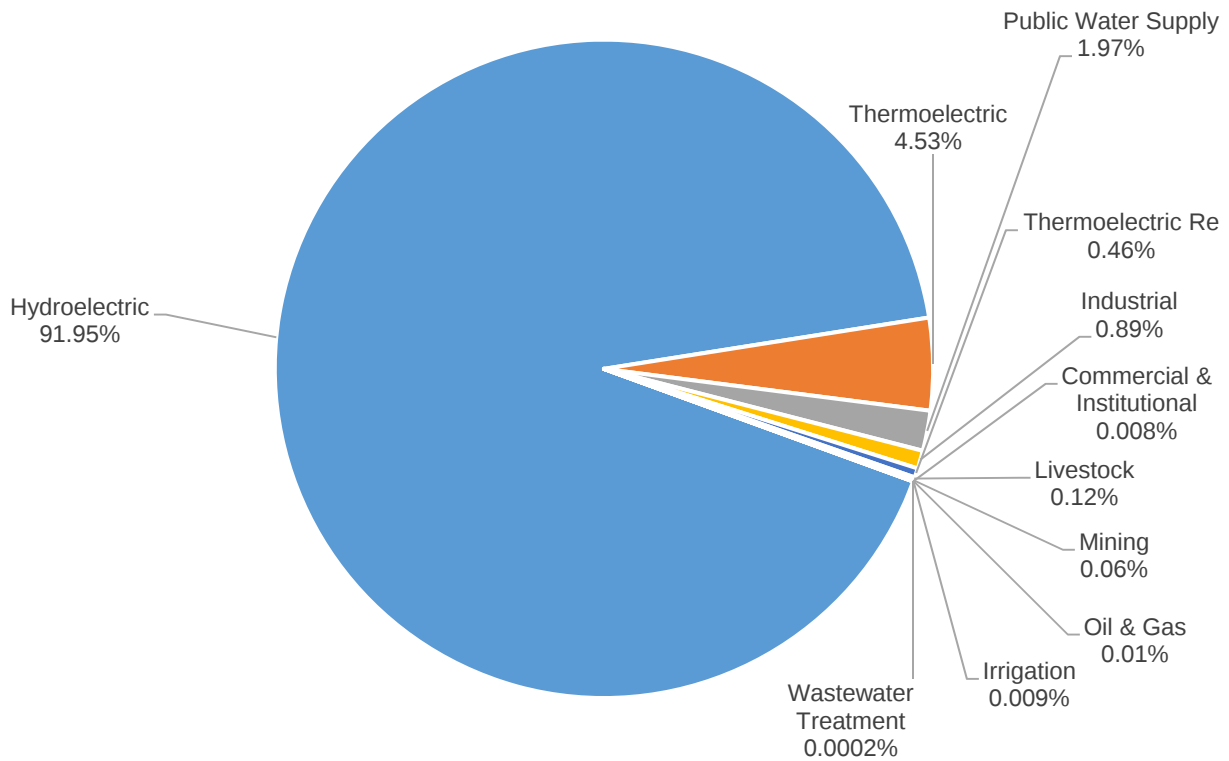
Total water withdrawals in Pennsylvania for 2015 are shown for 11 sectors of use in Exhibit 1. The three largest sectors were hydroelectric power, thermoelectric power, and public water supply, cumulatively accounting for 98.4 percent of the state total. On its own, hydroelectric power accounts for 92 percent of water withdrawals.

¹ Riparian means relating to living, or located on the bank of a natural watercourse (such as a river) or sometimes of a lake or a tidewater. *Merriam-Webster.com*. Merriam-Webster, n.d. Web. 2 Oct. 2017.

² We used data provided by the DEP; however, the 2015 DEP water withdrawal amounts for the Oil and Gas sector are limited to the Ohio River Basin and, therefore, our calculations do not include water withdrawal amounts for the Oil and Gas sector in the Susquehanna River Basin or the subsequent fees related to them. In 2015 the SRBC reported 1.3 billion gallons of water used for natural gas extraction (approximately 0.0005 percent of the total withdrawn that year); the impact on the fee calculations would be minimal.

Exhibit 1

Total Water Use by Sector
CY 2015

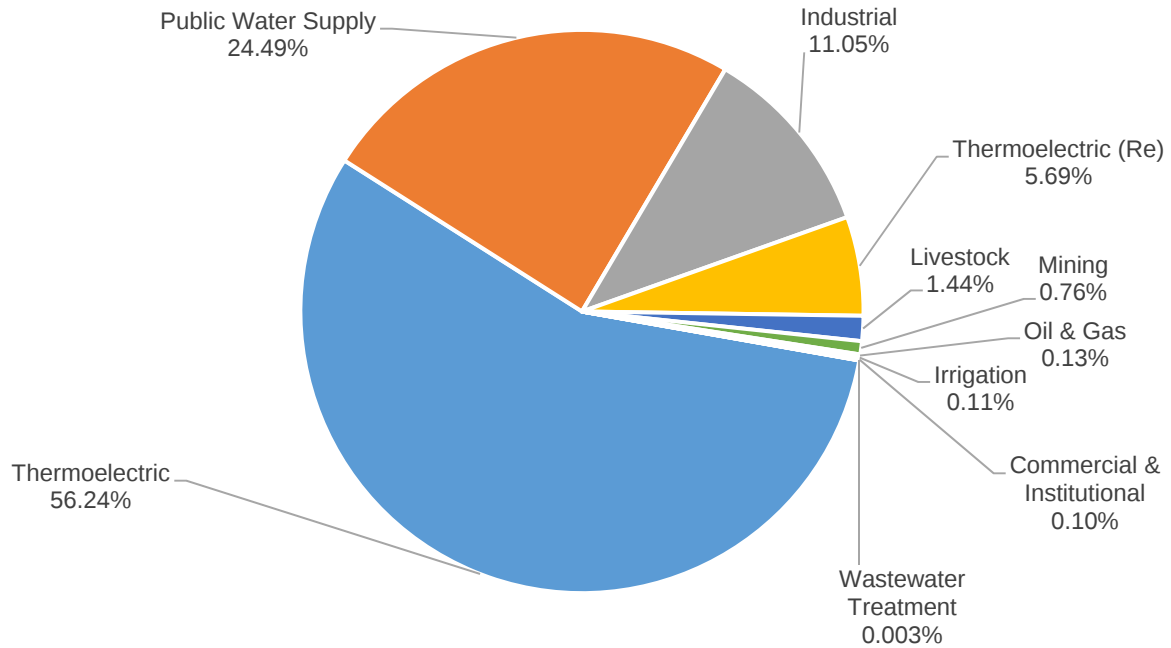


Source: Developed by LBFC staff using data provided by DEP.

Excluding hydroelectric power, the three largest categories were thermoelectric power, public water supply, and industrial use, which account for 92 percent of the remaining withdrawals (Exhibit 2).

Exhibit 2

Total Water Use by Sector – Excluding Hydroelectric Power
CY 2015



Source: Developed by LBFC staff using data provided by the DEP.

Total county populations and withdrawals by source for 2015 are shown in Table 1. Total withdrawals were 70,739 million gallons per day (Mgal/d), or 25.8 trillion gallons per year. Total surface-water withdrawals were 70,394 Mgal/d, or 99.5 percent of the total. Total groundwater withdrawals were 344.94 Mgal/d.

Table 1

Total County Populations and Withdrawals by Source
CY 2015

County	Population (in thousands)	Withdrawals		Withdrawals
		(in million gallons per day)		(in million gallons per day)
		by type		
		Groundwater	Surface water	Total ^a
Adams	102.30	5.05	10.73	15.77
Allegheny	1,230.46	2.17	544.40	546.57
Armstrong	67.05	1.00	17,308.83	17,309.78
Beaver	168.87	1.59	179.02	180.61
Bedford	48.59	3.64	9.09	12.73
Berks	415.27	15.70	20.35	36.05
Blair	125.59	2.43	12.35	14.78
Bradford	61.28	6.37	0.07	6.37
Bucks	627.37	20.82	205.93	226.74
Butler	186.82	1.56	8.13	9.69
Cambria	136.41	2.52	13.84	16.36
Cameron	4.73	0.00	0.76	0.76
Carbon	63.96	2.88	21.26	24.15
Centre	160.58	33.53	3.30	36.83
Chester	515.94	9.83	33.24	43.07
Clarion	39.50	0.38	1,029.86	1,030.24
Clearfield	80.99	1.05	119.10	120.14
Clinton	39.44	5.87	8.19	14.05
Columbia	66.67	2.95	3.78	6.73
Crawford	86.48	6.44	3.21	9.65
Cumberland	246.34	19.96	9.35	29.32
Dauphin	272.98	7.57	80.53	88.10
Delaware	563.89	0.15	396.92	397.07
Elk	30.87	0.66	21.13	21.79
Erie	278.05	7.95	33.61	41.57
Fayette	133.63	1.51	48.59	50.10
Forest	7.41	2.09	0.00	2.09
Franklin	153.64	7.14	5.83	12.98
Fulton	14.63	0.88	0.00	0.88
Greene	37.52	3.60	13.88	17.48
Huntingdon	45.67	1.83	3.10	4.93
Indiana	86.97	2.14	37.59	39.73
Jefferson	44.43	1.00	2.38	3.39
Juniata	24.74	1.42	0.54	1.96
Lackawanna	211.92	1.32	37.75	39.07
Lancaster	536.62	18.36	37,968.23	37,986.59
Lawrence	88.08	0.75	56.18	56.93
Lebanon	137.07	5.22	4.49	9.71
Lehigh	360.69	27.94	15.47	43.41
Luzerne	318.45	3.94	114.08	118.03
Lycoming	116.05	3.51	6.42	9.93
McKean	42.41	5.76	4.66	10.42
Mercer	114.23	1.84	25.74	27.58
Mifflin	46.50	0.10	6.53	6.45
Monroe	166.40	7.46	5.72	13.18

Table 1 (Continued)

County	Population (in thousands)	Withdrawals		Withdrawals
		(in million gallons per day)		(in million gallons per day)
		By type		
		Groundwater	Surface water	Total ^a
Montgomery	819.26	26.43	93.67	120.10
Montour	18.56	0.11	1.51	1.62
Northampton	300.81	9.15	24.94	34.09
Northumberland	93.25	0.46	25.25	25.71
Perry	45.69	0.96	1.03	1.99
Philadelphia	1,567.44	0.10	276.01	276.12
Pike	55.95	3.09	157.00	160.06
Potter	17.09	3.78	0.71	4.48
Schuylkill	144.59	7.07	27.27	34.34
Snyder	40.44	1.53	1.28	2.80
Somerset	75.52	4.06	20.44	24.50
Sullivan	6.33	0.07	0.00	0.07
Susquehanna	41.67	0.31	1.20	1.51
Tioga	41.88	2.02	3.39	5.41
Union	44.95	0.76	2.64	3.40
Venango	53.12	0.89	4.65	5.53
Warren	40.40	10.42	766.30	786.72
Washington	208.26	0.21	41.45	41.65
Wayne	51.20	2.37	0.00	2.37
Westmorland	357.96	2.28	23.78	26.06
Wyoming	27.80	0.63	9.29	9.92
York	442.87	8.46	10,468.73	10,477.20
TOTAL	12,802.50	344.94	70,394.48	70,739.41

^a Values may not sum to totals because of independent rounding.

Source: Developed by LBFC staff using data provided by the DEP and the United States Geological Survey.

Table 2 shows total withdrawals by sector and county, in million gallons per day. Withdrawals for thermoelectric and thermoelectric recirculated (RE) were 3,525 Mgal/d and accounted for 56.2 percent of total withdrawals when hydroelectric power is excluded. Public supply was 1,394 Mgal/d and accounted for 24.5 percent of total withdrawals. Total withdrawals for industrial use (629.28 Mgal/d) represented 11 percent of the total withdrawals.

Table 2

Total Withdrawals by County and Sector of Use in Million Gallons Per Day

County	Commercial	Hydro	Industrial	Irrigation	Live-stock	Mining	Oil & Gas	Public Supply	Thermo-electric	Waste-water	TOTAL
Adams	0.35	0	1.05	0.04	0.53	1.19	0	12.54	0.07	0	15.77
Allegheny	0.18	0	232.09	0.31	0	0	0.19	178.16	135.64	0	546.57
Armstrong	0	17,283.08	0.02	0.06	0.48	0	0.33	6.99	18.81	0	17,309.78
Beaver	0.03	0	66.46	0.19	0	0	0.15	22.12	0	0	180.61
Bedford	0.01	0	0	0.06	2.34	0.27	0	10.04	0	0	12.73
Berks	0.03	0	3.04	0.23	0.70	1.16	0	30.89	0	0	36.05
Blair	0	0	0.14	0.05	0.93	0.62	0	13.05	0	0	14.78
Bradford	0	0	3.26	0	0.04	0.01	0	3.06	0	0	6.37
Bucks	0.19	0	52.58	0.20	0.29	4.96	0	98.39	70.13	0	226.74
Butler	0.05	0	0.98	0.11	0	0	0.93	7.62	0	0	9.69
Cambria	0.12	0	0.01	0.07	1.37	0	0	14.79	0	0	16.36
Cameron	0	0	0	0	0.42	0	0	0.34	0	0	0.76
Carbon	0.58	0	0.07	0.08	0.06	0	0	23.36	0	0	24.15
Centre	0.02	0	0.02	0.09	14.78	4.42	0	17.51	0	0	36.83
Chester	0.01	0	1.53	0.56	1.16	0	0	39.80	0	0.01	43.07
Clarion	0.01	1,027.77	0	0	0.06	0	0	2.39	0	0	1,030.24
Clearfield	0	0	0	0	1.14	0	0	5.64	113.37	0	120.14
Clinton	0	0	4.50	0.02	5.57	0	0	3.96	0	0	14.05
Columbia	0	0	0.45	0.03	1.33	0	0	4.92	0	0	6.73
Crawford	0	0	0.32	0.01	3.68	0	0	5.63	0	0	9.65
Cumberland	0.04	0	0.23	0.38	12.00	3.31	0	13.36	0	0	29.32
Dauphin	0.91	0	21.36	0.31	0.74	0	0	31.48	33.30	0	88.10
Delaware	0	0	97.08	0.22	0	0	0	20.79	278.98	0	397.07
Elk	0.01	0	15.15	0	1.03	0	0.04	5.55	0	0.01	21.79
Erie	0.01	0	3.08	0.39	4.93	0	0	33.16	0	0	41.57
Fayette	0	0	0	0	0.05	0	0.41	45.83	3.80	0	50.10
Forest	0.02	0	0	0	1.66	0	0	0.41	0	0	2.09
Franklin	0.28	0	0.02	0.11	2.02	2.11	0	8.45	0	0	12.98
Fulton	0.04	0	0	0	0.47	0	0	0.37	0	0	0.88
Greene	0	0	0	0	0	4.69	1.15	7.22	4.28	0.14	17.48
Huntingdon	0	0	0	0	0.75	1.33	0	2.85	0	0	4.93
Indiana	0.03	0	0	0.07	0.37	1.55	0.02	4.09	33.61	0	39.73
Jefferson	0	0	0.01	0	1.03	0	0.08	2.26	0	0	3.39
Juniata	0	0	0.75	0.01	0.38	0	0	0.83	0	0	1.96
Lackawanna	0.24	0	0	0.09	0	0.05	0	38.70	0	0	39.07
Lancaster	0.91	37,925.22	1.83	0.43	1.64	2.01	0	54.55	0	0	37,986.59
Lawrence	0	0	0	0	0.16	0	0.73	10.02	46.02	0	56.93
Lebanon	0	0	0.56	0.03	3.02	0	0	4.46	1.64	0	9.71
Lehigh	0.09	0	5.22	0.23	1.46	1.78	0	34.62	0	0	43.41
Luzerne	0.01	0	0	0.17	0	0.40	0	23.10	94.35	0	118.03
Lycoming	0	0	0.68	0.04	0.51	0	0	8.70	0	0	9.93
McKean	0	0	2.78	0	0.09	0.02	0.78	6.75	0	0	10.42
Mercer	0	0	13.36	0	0.03	0	0.53	13.65	0	0	27.58
Mifflin	0	0	3.68	0.05	0	0.03	0	2.69	0	0	6.45
Monroe	0.61	0	0.33	0.12	0.07	0.08	0	11.96	0	0	13.18
Montgomery	0.13	0	8.77	0.72	0.16	1.24	0	67.65	41.43	0	120.10
Montour	0.09	0	0	0	0	0.00	0	1.53	0.01	0	1.62
Northampton	0.06	0	8.14	0.17	0	0.67	0	9.53	15.51	0	34.09
Northumberland	0	0	2.22	0.05	0.39	0.01	0	9.25	13.79	0	25.71
Perry	0.01	0	0	0	1.27	0	0	0.71	0	0	1.99
Philadelphia	0	0	26.58	0	0	0	0	249.54	0	0	276.12
Pike	0.01	156.96	0	0.04	0	0.01	0	3.07	0	0	160.09
Potter	0	0	0	0	3.58	0	0	0.90	0	0	4.48
Schuylkill	0	0	0.71	0.06	0.90	7.23	0	22.72	2.71	0	34.34
Snyder	0	0	0.04	0.06	0.80	0.04	0	1.86	0	0	2.80
Somerset	0	0	0.01	0.07	1.55	0.34	0	22.53	0	0	24.50
Sullivan	0	0	0	0	0	0	0	0.07	0	0	0.07
Susquehanna	0.02	0	0	0	0.11	0	0	1.38	0	0	1.51
Tioga	0	0	1.69	0.02	1.52	0	0.04	2.15	0	0	5.41
Union	0.02	0	0.22	0.03	0.12	0	0	3.01	0	0	3.40
Venango	0	0	0.22	0.02	0	0.10	0.00	4.65	0.55	0	5.53
Warren	0	774.35	8.87	0	0.38	0.01	0	3.10	0	0	786.72
Washington	0.01	0	0	0.13	0	0.21	1.60	39.71	0	0	41.65
Wayne	0	0	0	0	0	0.01	0	2.37	0	0	2.37
Westmoreland	0	0	0.21	0.03	1.83	0	0.18	23.81	0	0	26.06
Wyoming	0	0	9.29	0.01	0	0	0	0.62	0	0	9.92
York	0.52	7,879.69	29.68	0.18	1.90	3.26	0	36.66	2,525.30	0	10,477.20
TOTAL	5.65	65,047.08	629.26	6.39	81.79	43.11	7.14	1,393.88	3,524.96	0.16	70,739.41

Source: Developed by LBFC staff using data provided by DEP.

In 2015, nearly 93 percent of the total withdrawals in Pennsylvania were accounted for by three counties: Lancaster, Armstrong, and York. Excluding hydroelectric power, three counties accounted for just over 63 percent of total withdrawals: York, Allegheny, and Delaware. Lancaster County accounted for approximately 53.7 percent of the total water withdrawals for all sectors when hydroelectric power is included. Excluding hydroelectric power, York County accounted for 46.4 percent of all withdrawals for all sectors, predominantly because of thermoelectric power withdrawals.

Water withdrawals by sector and county are listed for surface-water withdrawals in Table 3, and for groundwater withdrawals in Table 4. In 2015, excluding hydroelectric power, more surface water than groundwater was withdrawn for all uses except commercial, livestock, and mining. Thermoelectric power accounted for 65.8 percent of the total surface-water withdrawals and public supply accounted for 22.2 percent.

Of the total groundwater withdrawals, public supply accounted for 59.5 percent, mostly in Montgomery, Lehigh, Bucks, and Centre Counties. Groundwater withdrawals for public supply in these four counties accounted for 35.7 percent of public supply withdrawals and 21.3 percent of all groundwater withdrawals in Pennsylvania. Public supply used more than four times more groundwater than livestock, the next largest use of groundwater in Pennsylvania.

The geographic distribution of total withdrawals in Pennsylvania is shown in Table 2 and Exhibits 3 and 4. The geographic distribution of total surface-water withdrawals is shown in Table 3 and Exhibits 5 and 6. The geographic distribution of total groundwater withdrawals by county is shown in Table 4 and Exhibits 7 and 8.

Table 3

Surface-water Withdrawals by Water-use Sector in Million Gallons Per Day CY 2015

County	Com- mercial	Hydro	Indus- trial	Irrigation	Live- stock	Mining	Oil & Gas	Public Supply	Thermo- electric	Wast e-wa- ter	TOTAL
Adams	0.22	0	0	0.02	0	0	0	10.48	0.00	0	10.73
Allegheny	0.06	0	230.22	0.31	0	0	0.19	178.16	135.44	0	544.40
Armstrong	0	17,283.08	0.02	0.02	0	0	0.33	6.56	18.81	0	17,308.83
Beaver	0.01	0	66.42	0.18	0	0	0.15	20.59	91.66	0	179.02
Bedford	0.01	0	0	0.04	0.02	0.02	0	9.00	0	0	9.09
Berks	0	0	0.87	0.12	0.68	0.02	0	18.65	0	0	20.35
Blair	0	0	0	0.03	0.93	0.01	0	11.38	0	0	12.35
Bradford	0	0	0.05	0	0	0.01	0	0	0	0	0.07
Bucks	0.06	0	52.28	0.11	0.29	0.01	0	83.04	70.13	0	205.93
Butler	0.04	0	0.79	0.09	0	0	0.91	6.29	0	0	8.13
Cambria	0.02	0	0	0.07	1.11	0	0	12.64	0	0	13.84
Cameron	0	0	0	0	0.42	0	0	0.34	0	0	0.76
Carbon	0.54	0	0	0.05	0.06	0	0	20.62	0	0	21.26
Centre	0	0	0	0.08	0.70	0	0	2.52	0	0	3.30
Chester	0	0	0.79	0.26	0.84	0	0	31.36	0	0	33.24
Clarion	0	1,027.77	0	0	0.06	0	0	2.02	0	0	1,029.86
Clearfield	0	0	0	0	1.14	0	0	4.59	113.37	0	119.10
Clinton	0	0	4.33	0.02	0.49	0	0	3.35	0	0	8.19
Columbia	0	0	0	0.01	1.33	0	0	2.44	0	0	3.78
Crawford	0	0	0	0.01	2.88	0	0	0.32	0	0	3.21
Cumberland	0	0	0	0.12	1.26	0.02	0	7.95	0	0	9.35
Dauphin	0	0	17.66	0.23	0.16	0	0	29.28	33.20	0	80.53
Delaware	0	0	97.06	0.11	0	0	0	20.77	278.98	0	396.92
Elk	0.01	0	15.15	0	0.97	0	0	5.00	0	0	21.13
Erie	0	0	3.01	0.39	1.39	0	0	28.82	0	0	33.61
Fayette	0	0	0	0	0	0	0.41	44.37	3.80	0	48.59
Forest	0	0	0	0	0	0	0	0	0	0	0.00
Franklin	0.25	0	0	0.11	1.96	0.85	0	2.66	0	0	5.83
Fulton	0	0	0	0	0	0	0	0.00	0	0	0.00
Greene	0	0	0	0	0	1.21	1.04	7.22	4.28	0.14	13.88
Huntingdon	0	0	0	0	0.62	1.05	0	1.43	0	0	3.10
Indiana	0	0	0	0.07	0.37	0	0.02	3.77	33.37	0	37.59
Jefferson	0	0	0	0	0.74	0	0.08	1.56	0	0	2.38
Juniata	0	0	0	0.01	0	0	0	0.53	0	0	0.54
Lackawanna	0.02	0	0	0.07	0	0	0	37.66	0	0	37.75
Lancaster	0.75	37,925.22	0	0.28	0.73	0	0	41.25	0	0	37,968.23
Lawrence	0	0	0	0	0.16	0	0.73	9.62	45.68	0	56.18
Lebanon	0	0	0	0	2.70	0	0	1.79	0	0	4.49
Lehigh	0	0	0.01	0.23	0.29	1.03	0	13.90	0	0	15.47
Luzerne	0	0	0	0.10	0	0.37	0	19.30	94.31	0	114.08
Lycoming	0	0	0	0.04	0.51	0	0	5.87	0	0	6.42
McKean	0	0	0.01	0	0	0.02	0	4.63	0	0	4.66
Mercer	0	0	13.32	0	0	0	0.53	11.89	0	0	25.74
Mifflin	0	0	3.68	0.05	0	0	0	2.62	0	0	6.35
Monroe	0.33	0	0.33	0.07	0.07	0	0	4.92	0	0	5.72
Montgomery	0.03	0	6.50	0.38	0	0	0	45.34	41.42	0	93.67
Montour	0	0	0	0	0	0	0	1.51	0	0	1.51
Northampton	0	0	2.46	0.04	0	0	0	6.92	15.51	0	24.94
Northumberland	0	0	2.09	0.05	0.24	0	0	9.08	13.79	0	25.25
Perry	0	0	0	0	1.03	0	0	0	0	0	1.03
Philadelphia	0	0	26.47	0	0	0	0	249.54	0	0	276.01
Pike	0	156.96	0	0.04	0	0	0	0	0	0	157.00
Potter	0	0	0	0	0.57	0	0	0.14	0	0	0.71
Schuylkill	0	0	0	0.06	0.83	6.89	0	19.49	0	0	27.27
Snyder	0	0	0	0.02	0.77	0	0	0.48	0	0	1.28
Somerset	0	0	0.01	0.07	1.43	0.050	0	18.89	0	0	20.44
Sullivan	0	0	0	0	0	0	0	0	0	0	0
Susquehanna	0	0	0	0	0.10	0	0	1.10	0	0	1.20
Tioga	0	0	1.49	0.02	1.06	0	0	0.83	0	0	3.39
Union	0	0	0	0.00	0.12	0	0	2.53	0	0	2.64
Venango	0	0	0.22	0.01	0	0.10	0	3.80	0.52	0	4.65
Warren	0	774.35	0	0	0	0	0	1.94	0	0	776.30
Washington	0.01	0	0	0.13	0	0	1.59	39.71	0	0	41.45
Wayne	0	0	0	0	0	0	0	0	0	0	0.00
Westmoreland	0	0	0.20	0.03	0	0	0.18	23.36	0	0	23.78
Wyoming	0	0	9.28	0.01	0	0	0	0	0	0	9.29
York	0.17	7,879.69	28.81	0.14	1.90	0	0	32.72	2,525.30	0	10,468.73
TOTAL	2.54	65,047.08	583.55	4.32	30.90	11.65	6.15	1,188.57	3,519.57	0.14	70,394.48

Source: Developed by LBFC staff using data provided by DEP.

Table 4

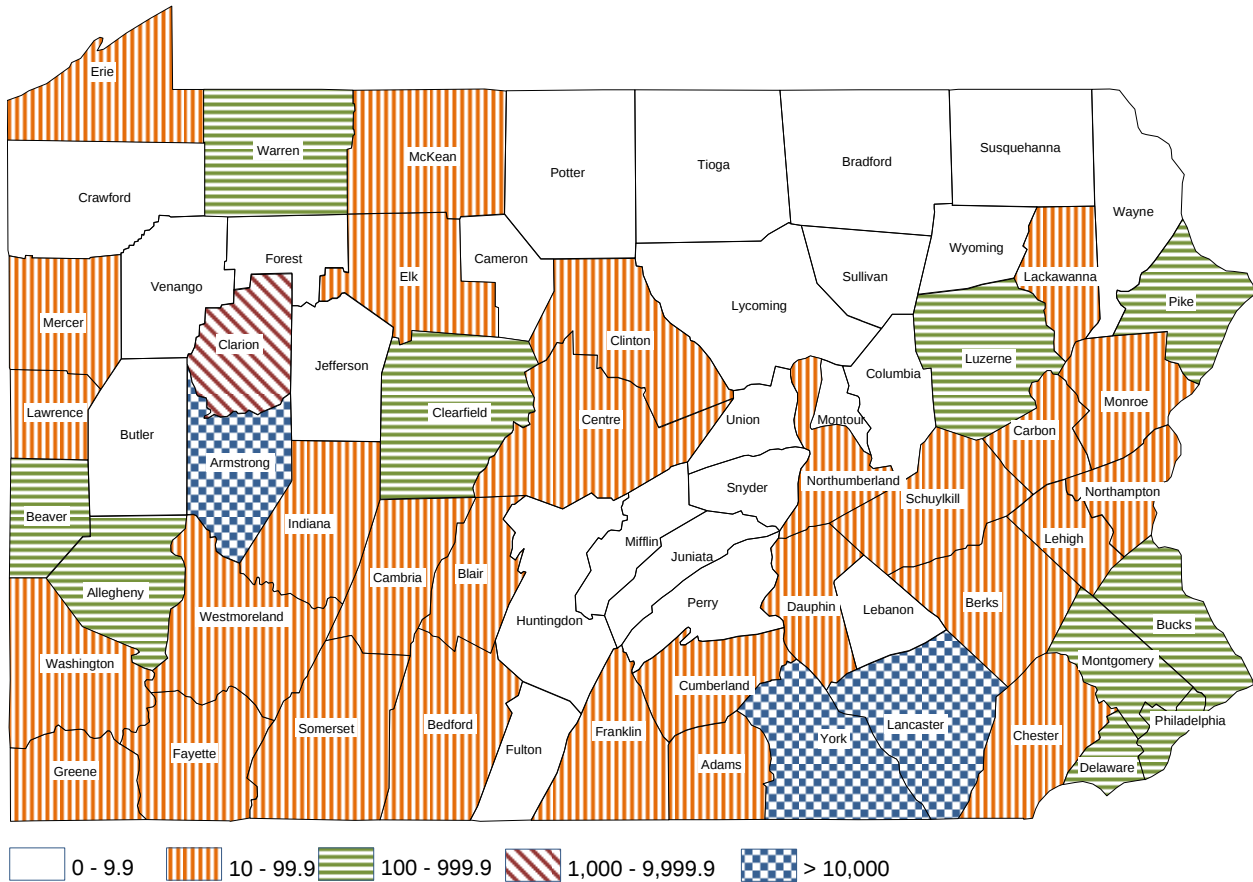
Groundwater Withdrawals by Water-use Sector, in Million Gallons Per Day CY 2015

County	Com- mercial	Hydro	Industrial	Irrigation	Live- stock	Mining	Oil & Gas	Public Supply	Thermo- electric	Wastewater	TOTAL
Adams	0.13	0	1.05	0.02	0.53	1.19	0	2.06	0.07	0	5.05
Allegheny	0.11	0	1.87	0	0	0	0	0	0.19	0	2.17
Armstrong	0	0	0	0.05	0.48	0	0	0.43	0	0	0.95
Beaver	0.01	0	0.03	0.01	0	0	0	1.53	0	0	1.59
Bedford	0	0	0	0.02	2.32	0.26	0	1.04	0	0	3.64
Berks	0.03	0	2.17	0.11	0.02	1.14	0	12.24	0	0	15.70
Blair	0	0	0.14	0.02	0	0.61	0	1.67	0	0	2.43
Bradford	0	0	3.21	0	0.04	0	0	3.06	0	0	6.31
Bucks	0.13	0	0.30	0.08	0	4.95	0	15.35	0	0	20.82
Butler	0.01	0	0.19	0.02	0	0	0.01	1.33	0	0	1.56
Cambria	0.11	0	0.01	0	0.26	0	0	2.15	0	0	2.52
Cameron	0	0	0	0	0	0	0	0	0	0	0
Carbon	0.04	0	0.07	0.04	0	0	0	2.74	0	0	2.88
Centre	0.02	0	0.02	0.01	14.08	4.42	0	14.99	0	0	33.53
Chester	0.01	0	0.75	0.31	0.32	0	0	8.44	0	0.01	9.83
Clarion	0.01	0	0	0	0	0	0	0.37	0	0	0.38
Clearfield	0	0	0	0	0	0	0	1.05	0	0	1.05
Clinton	0	0	0.17	0	5.09	0	0	0.61	0	0	5.87
Columbia	0	0	0.45	0.02	0	0	0	2.49	0	0	2.95
Crawford	0	0	0.32	0	0.80	0	0	5.31	0	0	6.44
Cumberland	0.04	0	0.23	0.26	10.74	3.29	0	5.41	0	0	19.96
Dauphin	0.91	0	3.70	0.09	0.58	0	0	2.20	0.09	0	7.57
Delaware	0	0	0.02	0.11	0	0	0	0.02	0	0	0.15
Elk	0	0	0	0	0.06	0	0.04	0.55	0	0.01	0.66
Erie	0.01	0	0.06	0	3.54	0	0	4.34	0	0	7.95
Fayette	0	0	0	0	0.05	0	0	1.45	0	0	1.51
Forest	0.02	0	0	0	1.66	0	0	0.41	0	0	2.09
Franklin	0.02	0	0.02	0	0.06	1.26	0	5.79	0	0	7.14
Fulton	0.04	0	0	0	0.47	0	0	0.37	0	0	0.88
Greene	0	0	0	0	0	3.49	0.11	0	0	0	3.60
Huntingdon	0	0	0	0	0.13	0.28	0	1.42	0	0	1.83
Indiana	0.03	0	0	0	0	1.55	0	0.32	0.25	0	2.14
Jefferson	0	0	0.01	0	0.29	0	0	0.70	0	0	1.00
Juniata	0	0	0.75	0.02	0.38	0	0	0.30	0	0	1.42
Lackawanna	0.22	0	0	0	0	0.05	0	1.03	0	0	1.32
Lancaster	0.16	0	1.83	0.15	0.92	2.01	0	13.29	0	0	18.36
Lawrence	0	0	0	0	0	0	0	0.41	0.34	0	0.75
Lebanon	0	0	0.56	0.03	0.32	0	0	2.66	1.64	0	5.22
Lehigh	0.09	0	5.21	0	1.16	0.75	0	20.72	0	0	27.94
Luzerne	0.01	0	0	0.07	0	0.03	0	3.80	0.04	0	3.94
Lycoming	0	0	0.68	0	0	0	0	2.83	0	0	3.51
McKean	0	0	2.77	0	0.09	0	0.78	2.12	0	0	5.76
Mercer	0	0	0.04	0	0.03	0	0	1.76	0	0	1.84
Mifflin	0	0	0	0	0	0.03	0	0.07	0	0	0.10
Monroe	0.28	0	0	0.05	0	0.08	0	7.04	0	0	7.46
Montgomery	0.10	0	2.27	0.34	0.16	1.24	0	22.31	0.01	0	26.43
Montour	0.09	0	0	0	0	0	0	0.02	0.01	0	0.11
Northampton	0.06	0	5.68	0.13	0	0.67	0	2.61	0	0	9.15
Northumberland	0	0	0.13	0	0.16	0	0	0.17	0	0	0.46
Perry	0.01	0	0	0	0.25	0	0	0.71	0	0	0.96
Philadelphia	0	0	0.10	0	0	0	0	0	0	0	0.10
Pike	0.01	0	0	0	0	0.01	0	3.07	0	0	3.09
Potter	0	0	0	0	3.01	0	0	0.77	0	0	3.78
Schuylkill	0	0	0.71	0	0.08	0.35	0	3.23	2.71	0	7.07
Snyder	0	0	0.04	0.03	0.03	0.04	0	1.38	0	0	1.53
Somerset	0	0	0	0	0.13	0.29	0	3.65	0	0	4.06
Sullivan	0	0	0	0	0	0	0	0.07	0	0	0.07
Susquehanna	0.02	0	0	0	0.02	0	0	0.28	0	0	0.31
Tioga	0	0	0.20	0	0.46	0	0.04	1.32	0	0	2.02
Union	0.02	0	0.22	0.03	0	0	0	0.49	0	0	0.76
Venango	0	0	0	0.01	0	0	0	0.85	0.03	0	0.89
Warren	0	0	8.87	0	0.38	0.01	0	1.16	0	0	10.42
Washington	0	0	0	0	0	0.21	0	0	0	0	0.21
Wayne	0	0	0	0	0	0.01	0	2.37	0	0	2.37
Westmoreland	0	0	0.01	0	1.83	0	0	0.45	0	0	2.28
Wyoming	0	0	0.02	0	0	0	0	0.62	0	0	0.63
York	0.35	0	0.87	0.04	0	3.26	0	3.94	0	0	8.46
TOTAL	3.11	0	45.72	2.07	50.89	31.46	0.99	205.31	5.38	0.01	344.94

Source: Developed by LBFC staff using data provided by the DEP and the United States Geological Survey.

Exhibit 3

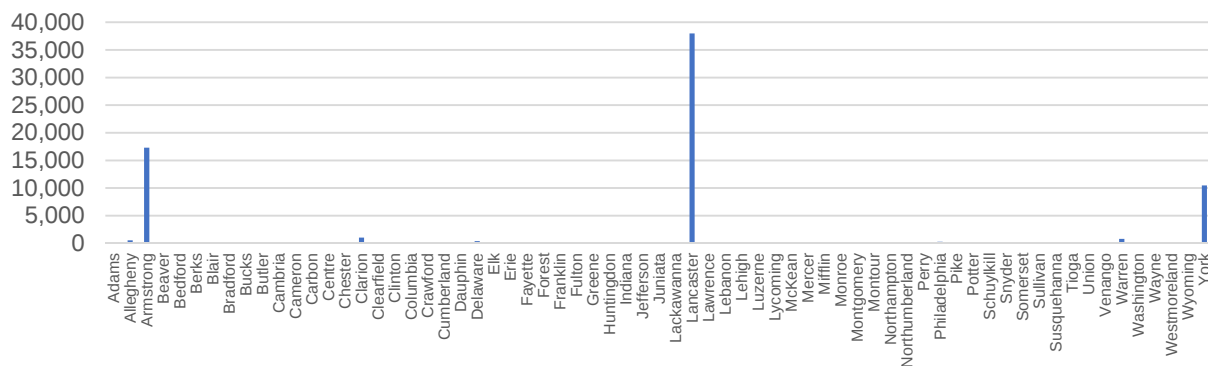
Total Water Withdrawals (Mgal/d)
(CY 2015)



Source: Developed by LBFC staff using information from DEP.

Exhibit 4

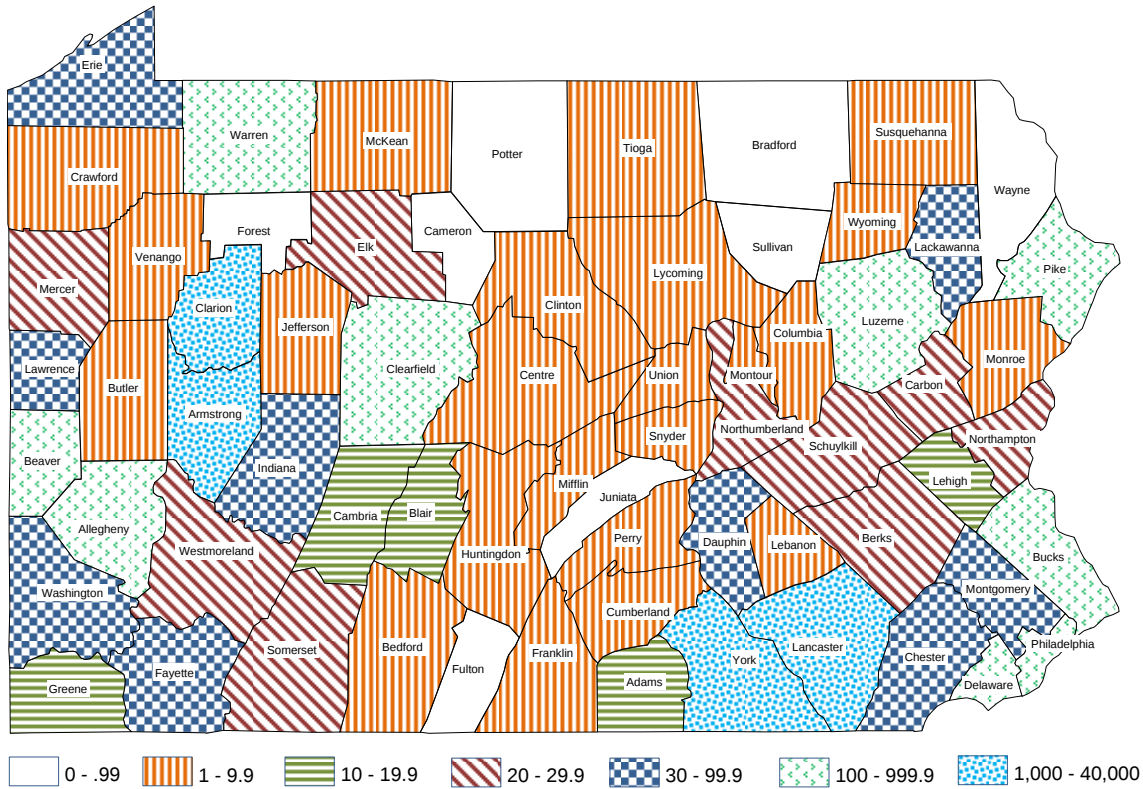
Total Water Withdrawals (Mgal/d)
(CY 2015)



Source: Developed by LBFC staff using information from DEP.

Exhibit 5

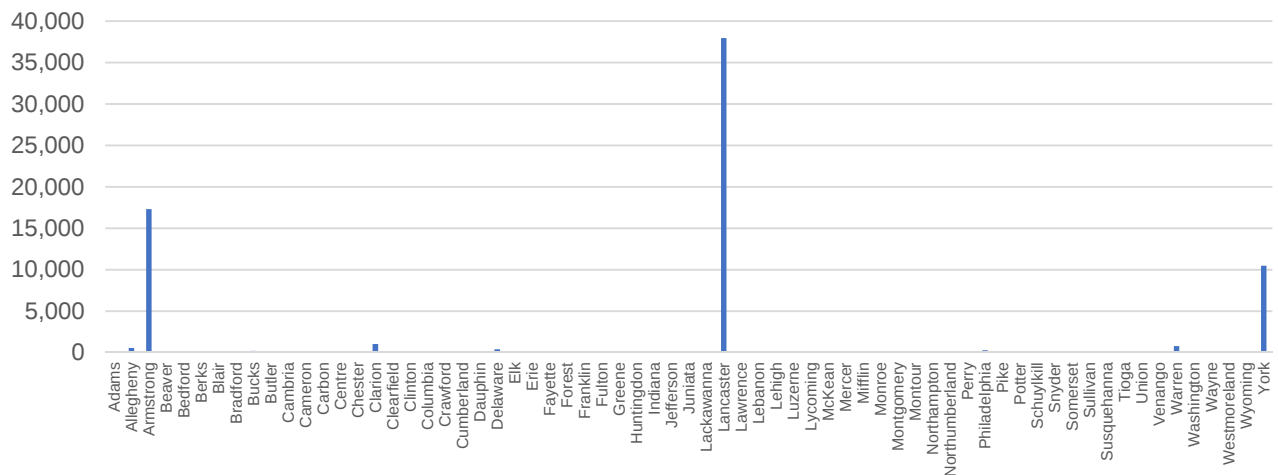
Total Surface-water Withdrawals (Mgal/d) (CY 2015)



Source: Developed by LBFC staff using information from DEP.

Exhibit 6

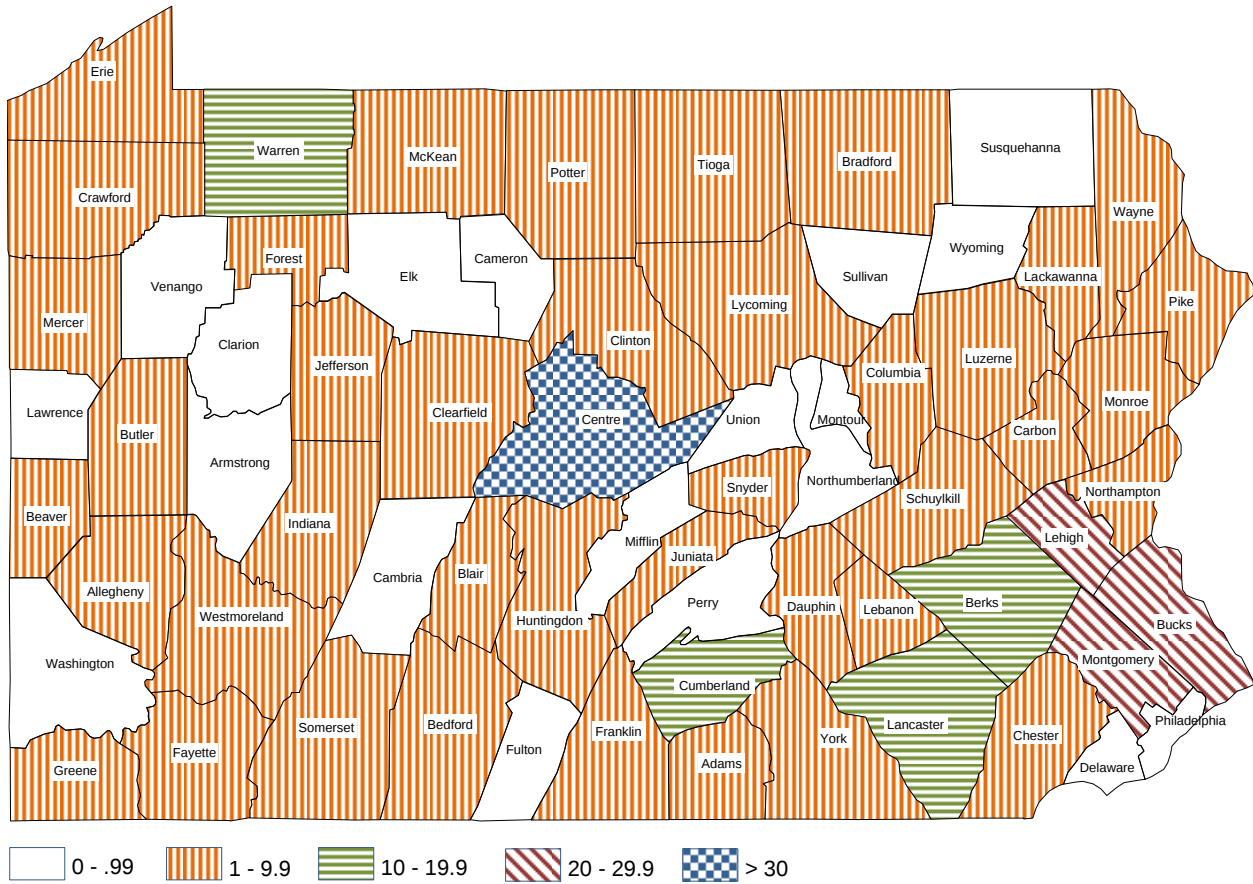
Total Surface-Water Withdrawals (Mgal/d) (CY 2015)



Source: Developed by LBFC staff using information from DEP.

Exhibit 7

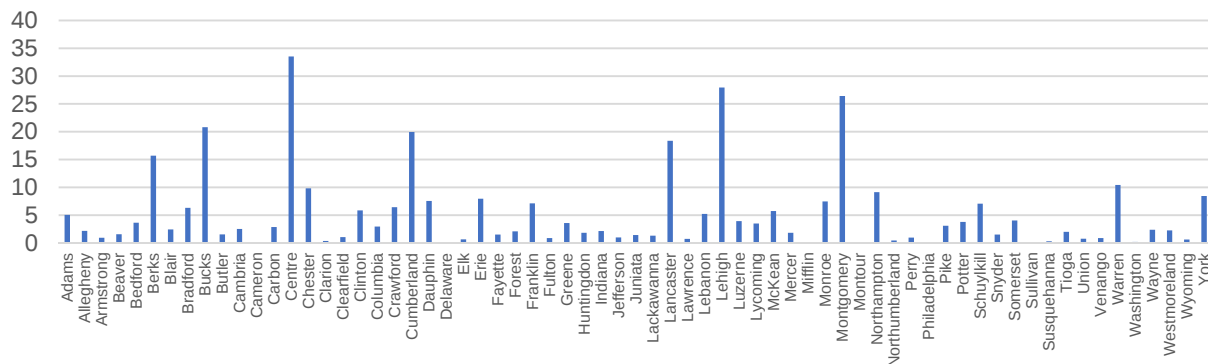
Total Groundwater Withdrawals (Mgal/d) (CY 2015)



Source: Developed by LBFC staff using information from DEP.

Exhibit 8

Total Groundwater Withdrawals (Mgal/d) (CY 2015)



Source: Developed by LBFC staff using information from DEP.

Hydroelectric Power

Hydroelectric power refers to water within a stream channel, and water removed from a stream channel and used to drive turbines that generate electric power. The sector also includes “off-stream use” for pumped-storage systems (reservoir storage) that return water to the source.

Approximately 65,047 Mgal/d (see Table 5) of water were used to supply hydroelectric power in 2015. This amount is a 90 percent increase from the amount of water used for hydroelectric power in 2005. Hydroelectric power represents nearly 92 percent of total water use.

Four counties—Lancaster, Armstrong, York, and Clarion—used more than 1,000 Mgal/d of surface water for hydroelectric power in 2015 and together accounted for over 98 percent of the total surface water withdrawals for hydroelectric power. No groundwater was withdrawn for this sector.

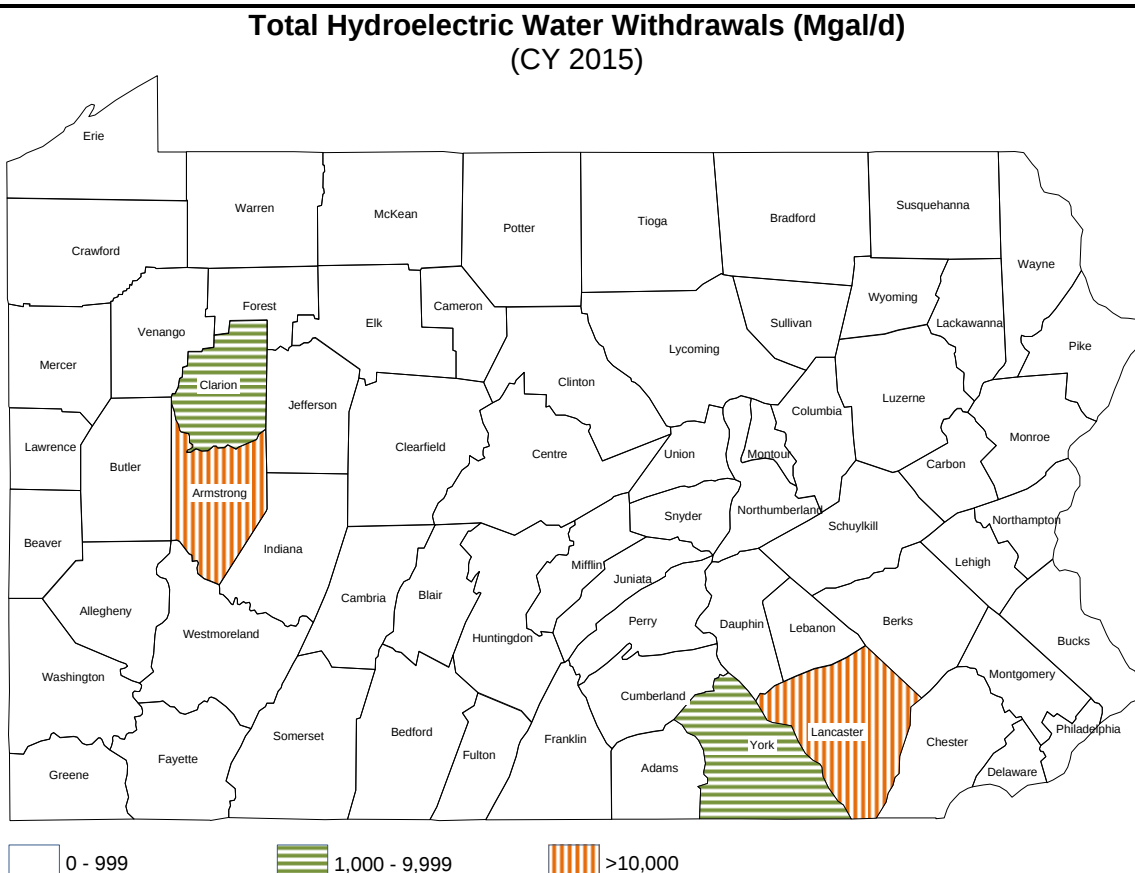
Table 5

Total Hydroelectric Water Withdrawals by Facility Type in Mgal/Day (CY 2015)				
County	Hydroelectric Dam	Hydroelectric Generating Unit	Pumped Storage Generating Unit	Total
Armstrong	0	17,283.08	0	17,283.08
Clarion	0	1,027.77	0	1,027.77
Lancaster	34,952.07	0	2,973.15	37,925.22
Pike	156.96	0	0	156.96
Warren	0	0	774.35	774.35
York	0	7,879.69	0	7,879.69
TOTAL	35,109.03	26,190.55	3,747.50	65,047.08

Source: Developed by LBFC staff using data provided by DEP.

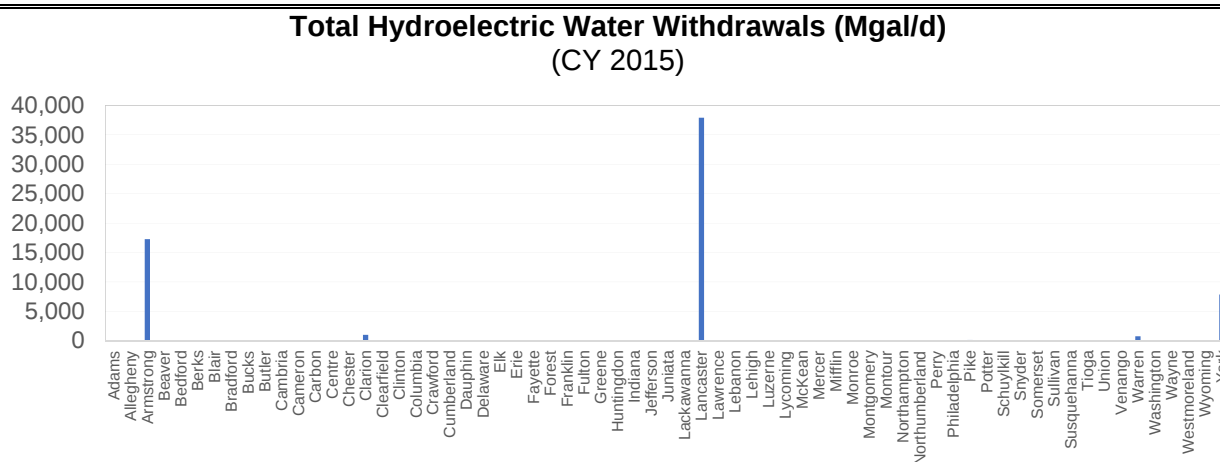
The geographic distribution of Hydroelectric Water Withdrawals in Pennsylvania is shown in Exhibits 9 and 10.

Exhibit 9



Source: Developed by LBFC staff using information from DEP.

Exhibit 10



Source: Developed by LBFC staff using information from DEP.

Thermoelectric Power

Water for thermoelectric power is used in generating electricity with steam-driven turbine generators. Water withdrawals are compiled by thermoelectric type. Thermoelectric cooling systems circulate water through heat exchangers and then return the water to the source. Recirculation cooling systems circulate water through heat exchangers, then cool the water using ponds or towers. The water is then recirculated.

Thermoelectric power withdrawals are shown by county in Table 6. Total withdrawals for thermoelectric power in 2015 were 3,524.96 Mgal/d. Surface water was the source for over 99 percent of total thermoelectric power withdrawals. Excluding water used for hydroelectric power, thermoelectric withdrawals for thermoelectric power accounted for 61.9 percent of total water withdrawals, 65.8 percent of surface water withdrawals, and 1.5 percent of groundwater withdrawals.

The geographic distribution of water withdrawals for thermoelectric power is shown in Exhibits 11 and 12. The largest total withdrawals for thermoelectric power were in York County—accounting for nearly 72 percent of surface and groundwater withdrawals.

Thermoelectric-power withdrawals by facility type are listed by county in Table 6. Nuclear generation power plants accounted for 66.5 percent of total thermoelectric withdrawals. Power plants generating electricity from fossil fuels accounted for 31.7 percent of thermoelectric withdrawals.

Table 6

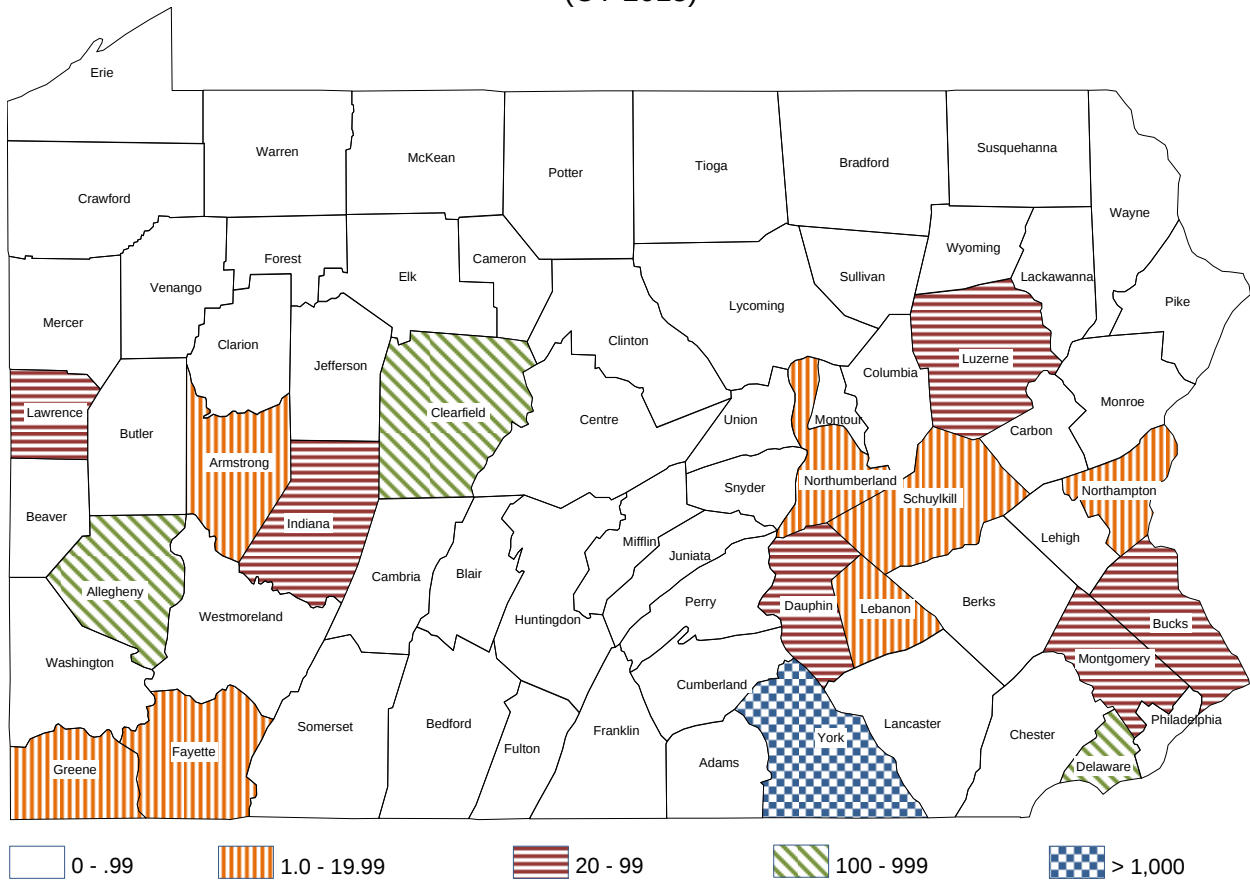
Total Thermoelectric Water Withdrawals by Facility Type in Mgal/d
(CY 2015)

County	Facility Type				Total
	Commercial Facility	Fossil Fuel Generation	Nuclear Generation	Other Generation	
Adams	0	0.07	0	0	0.07
Allegheny	0	135.64	0	0	135.64
Armstrong	0	18.81	0	0	18.81
Beaver	0	27.45	64.21	0	91.66
Bucks	0	0	11.38	58.75	70.13
Clearfield	0	113.37	0	0	113.37
Clinton	0	0	0	0	0
Dauphin	0	0	33.30	0	33.30
Delaware	0	277.87	0	1.11	278.98
Fayette	0	3.80	0	0	3.80
Greene	4.28	0	0	0	4.28
Indiana	0	33.61	0	0	33.61
Lawrence	0	46.02	0	0	46.02
Lebanon	0	1.64	0	0	1.64
Luzerne	0	39.34	55.00	0	94.34
Montgomery	0	0	41.43	0	41.43
Montour	0	0.01	0	0	0.01
Northampton	0	15.51	0	0	15.51
Northumberland	0	13.79	0	0	13.79
Schuylkill	0	2.71	0	0	2.71
Venango	0	0.55	0	0	0.55
York	0	387.57	2,137.73	0	2,525.30
TOTAL	4.28	1,117.76	2,343.05	59.86	3,524.96

Source: Developed by LBFC staff using data provided by DEP.

Exhibit 11

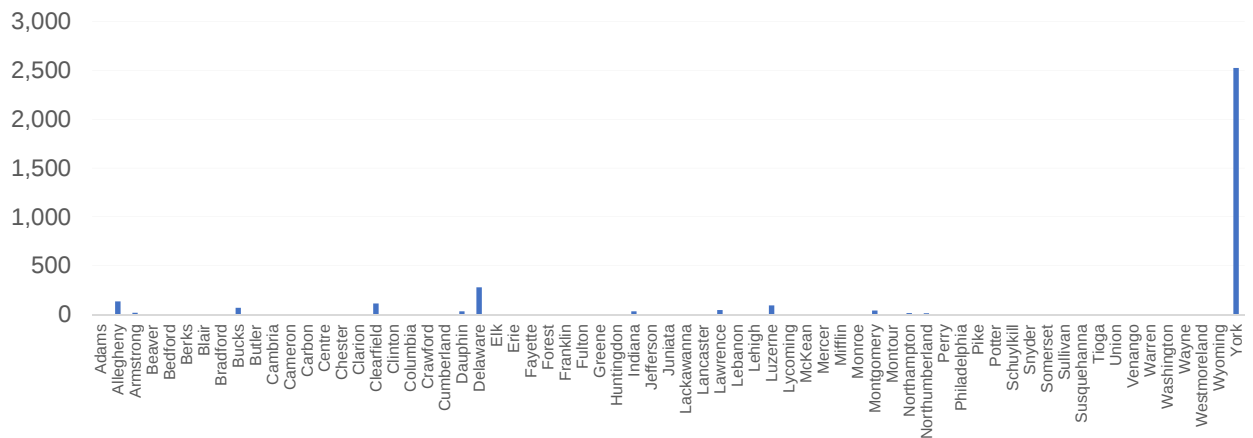
Total Thermoelectric Water Withdrawals (Mgal/d) (CY 2015)



Source: Developed by LBFC staff using information from DEP.

Exhibit 12

Total Thermoelectric Water Withdrawals (Mgal/d) (CY 2015)



Source: Developed by LBFC staff using information from DEP.

Public Supply

Public Supply is defined as water distributed to the public through a physically connected system of treatment, storage, and distribution facilities serving a group of largely residential customers that may also serve industrial, commercial, and other institutional operators. Mobile home parks and homeowner associations as well as institutions both civilian and military that are self-supplied community water systems are also included.

Approximately 1,393.9 Mgal/d (see Table 7) of water were withdrawn for public supply in 2015. Public supply represents about 2 percent of total water withdrawals, 25 percent of all withdrawals excluding hydroelectric power, and 64 percent excluding hydroelectric and thermoelectric power.

An estimated 9.3 million Pennsylvanians relied on public supply water for their household use in 2015, which represents about 73 percent of the total population of Pennsylvania. About 31 percent of all public supply withdrawals were in the two counties with the largest populations, Philadelphia and Allegheny. Eighty-five percent of water withdrawn for public supply in 2015 was from surface sources, such as lakes and streams; the other 15 percent was from groundwater.

The geographic distribution of water withdrawals for public supply is shown in Exhibits 13 and 14. Philadelphia, Allegheny, Bucks, Montgomery, and Lancaster each withdrew more than 50 Mgal/d of water for public supply in 2015, and together accounted for 47 percent of the total water withdrawals for public supply. Seventy-one percent of public supply withdrawals are delivered to municipal governments or water authorities. Estimates for apartment, co-op, authority, institutional,³ mobile home park, municipal, and investor owned facility deliveries are shown in Table 7.

³ Institutional includes deliveries to schools, hospitals, prisons, military installations, and parks.

Table 7

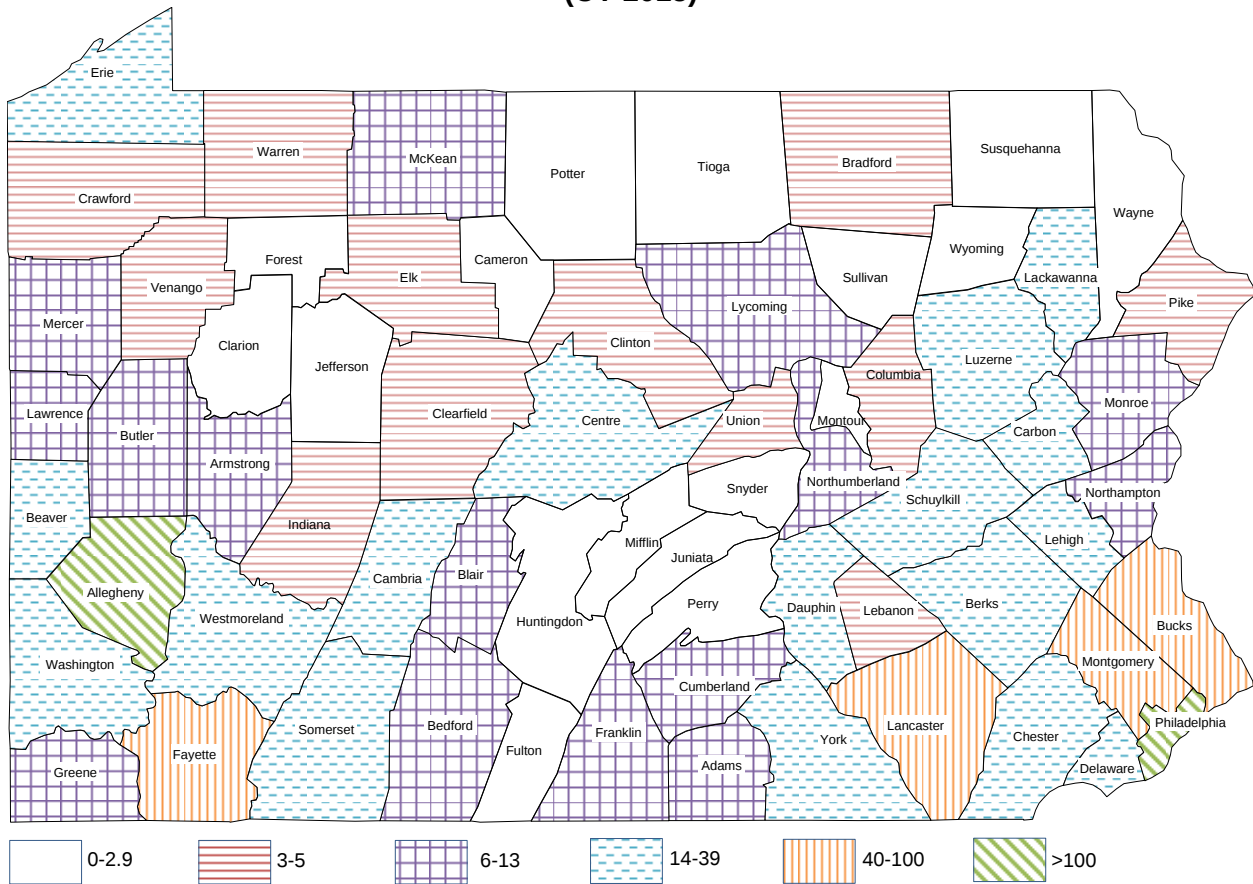
Total Public Water Withdrawals by Facility Type in Mgal/Day (CY 2015)

County	Facility Type							Total
	Apartments	Co-Ops	Authorities	Institutional	Mobile Home Parks	Municipal	Investor Owned	
Adams	0	0	2.99	0.06	0.19	9.08	0.21	12.54
Allegheny	0	0	135.24	0	0	8.06	34.86	178.16
Armstrong	0	0	2.95	0.02	0	0.53	3.49	6.99
Beaver	0	0	20.07	0.00	0.06	1.98	0	22.12
Bedford	0	0.33	1.86	0	0.04	0.21	7.60	10.04
Berks	0.03	0.10	23.64	0.10	0.42	3.33	3.28	30.89
Blair	0.01	0.08	12.91	0.00	0.03	0	0.02	13.05
Bradford	0	0	1.73	0.05	0.06	0.02	1.21	3.06
Bucks	0	0	72.32	0.20	0.19	4.08	21.60	98.39
Butler	0.08	0.01	0.77	0.04	0.26	0.30	6.16	7.62
Cambria	0	0	14.43	0.15	0	0.21	0	14.79
Cameron	0	0	0.01	0	0	0	0.33	0.34
Carbon	0	0.23	22.28	0.03	0.10	0.66	0.07	23.36
Centre	0	0.79	10.94	2.78	0.04	0.44	2.52	17.51
Chester	0.06	0.01	16.54	0.30	0.42	1.03	21.43	39.80
Clarion	0	0.03	0.09	0	0	0.51	1.77	2.39
Clearfield	0	0.15	2.81	0.04	0	2.19	0.44	5.64
Clinton	0	0.07	3.07	0	0	0.49	0.33	3.96
Columbia	0	0	0.24	0.02	0.10	0.17	4.39	4.92
Crawford	0.02	0.16	3.74	0	0.11	1.52	0.07	5.63
Cumberland	0	0.03	7.62	0.75	0.19	0	4.77	13.36
Dauphin	0	0.01	13.38	0.01	0.21	0.10	17.77	31.48
Delaware	0	0	0	0	0	0	20.78	20.79
Elk	0	0.01	5.03	0	0	0.49	0.02	5.55
Erie	0	0.06	4.60	0	0.14	28.26	0.10	33.16
Fayette	0	0.10	42.08	0.01	0	0.86	2.77	45.83
Forest	0	0	0	0	0	0.07	0.35	0.41
Franklin	0	0.07	7.97	0.08	0.07	0.25	0.01	8.45
Fulton	0	0	0.35	0	0	0	0.02	0.37
Greene	0	0.49	6.72	0	0	0	0	7.22
Huntingdon	0	0	1.19	0.33	0.01	1.31	0	2.85
Indiana	0	0	1.58	0.01	0	0.02	2.47	4.09
Jefferson	0	0	1.30	0	0	0	0.96	2.26
Juniata	0.02	0	0.76	0.01	0	0	0.03	0.83
Lackawanna	0	0.03	0	0.06	0.10	0	38.50	38.70
Lancaster	0.01	0.05	25.00	0.44	0.31	26.43	2.31	54.55
Lawrence	0.03	0	0	0	0.09	0.28	9.62	10.02
Lebanon	0	0.03	3.16	0.01	0.13	0.16	0.97	4.46
Lehigh	0	0	31.73	0.08	0.24	2.46	0.12	34.62
Luzerne	0.01	0.02	5.12	0.53	0.18	0	17.24	23.10
Lycoming	0	0.04	7.51	0.19	0.16	0.75	0.05	8.70
McKean	0	0.13	5.93	0	0	0.28	0.40	6.75
Mercer	0	0.14	0.85	0.05	0.13	1.32	11.16	13.65
Mifflin	0.01	0	2.67	0	0.01	0.01	0	2.69
Monroe	0.02	0.72	4.47	0.32	0.11	1.63	4.69	11.96
Montgomery	0.02	0.02	7.30	1.06	0.06	4.82	54.37	67.65
Montour	0	0	1.51	0	0.02	0	0	1.53
Northampton	0.01	0.02	8.13	0	0.25	0.01	1.12	9.53
Northumberland	0	0	1.48	0	0.01	0	7.76	9.25
Perry	0.04	0	0.31	0.03	0.10	0.22	0	0.71
Philadelphia	0	0	0	0	0	249.54	0	249.54
Pike	0	0.88	0.43	0.17	0.08	0	1.51	3.07
Potter	0	0	0.60	0.03	0	0.28	0	0.90
Schuylkill	0	0.07	19.38	0	0.06	2.78	0.43	22.72
Snyder	0	0	1.19	0.10	0.04	0.25	0.28	1.86
Somerset	0	0.04	21.99	0	0.10	0.27	0.13	22.53
Sullivan	0	0	0	0.02	0	0.05	0	0.07
Susquehanna	0	0.02	0.14	0.01	0.02	0	1.19	1.38
Tioga	0	0.01	1.73	0.09	0.03	0.30	0	2.15
Union	0	0.01	0.07	0	0.03	0.43	2.48	3.01
Venango	0	0.01	2.54	0.16	0.02	1.76	0.16	4.65
Warren	0	0.03	0.66	0.14	0.01	0.44	1.81	3.10
Washington	0	0	5.65	0	0	0	34.06	39.71
Wayne	0.01	0.88	0	0.02	0.07	0	1.39	2.37
Westmoreland	0.02	0	23.68	0.08	0.03	0	0	23.81
Wyoming	0	0.02	0.29	0	0.04	0.06	0.19	0.62
York	0.02	0	5.32	0	0.29	1.47	29.56	36.66
TOTAL	0.42	5.90	630.07	8.62	5.35	362.16	381.36	1,393.88

Source: Developed by LBFC staff using data provided by DEP.

Exhibit 13

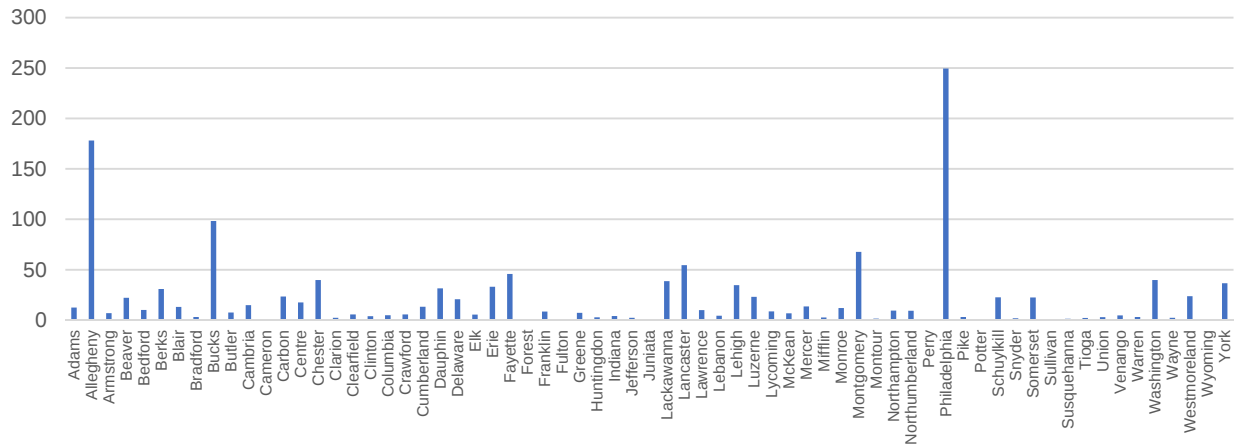
**Public Supply (Mgal/d)
(CY 2015)**



Source: Developed by LBFC staff using information from DEP.

Exhibit 14

**Total Public Supply Water Withdrawals (Mgal/d)
(CY 2015)**



Source: Developed by LBFC staff using information from DEP.

Industrial

Industrial withdrawals provide water for the manufacture of metals, chemicals, paper, food and beverages, and other products. The purpose of the water can be for fabrication, processing, washing, diluting, cooling, or transporting a product—as well as incorporating water into a product.

Water for industrial withdrawals is listed by county in Table 8. For 2015, withdrawals were 629.3 Mgal/day. This equals nearly 11 percent of total withdrawals excluding hydroelectric power, and about 29 percent of total withdrawals excluding hydroelectric and thermoelectric withdrawals. Surface water was the source for 93 percent of total industrial withdrawals.

The geographic distribution of total withdrawals for industrial use is shown in Exhibits 15 and 16. Allegheny, Beaver, and Delaware Counties accounted for 63 percent of total industrial withdrawals. Manufacturing facilities accounted for the largest withdrawals and were 623 Mgal/day or 99 percent of the total industrial water withdrawals.

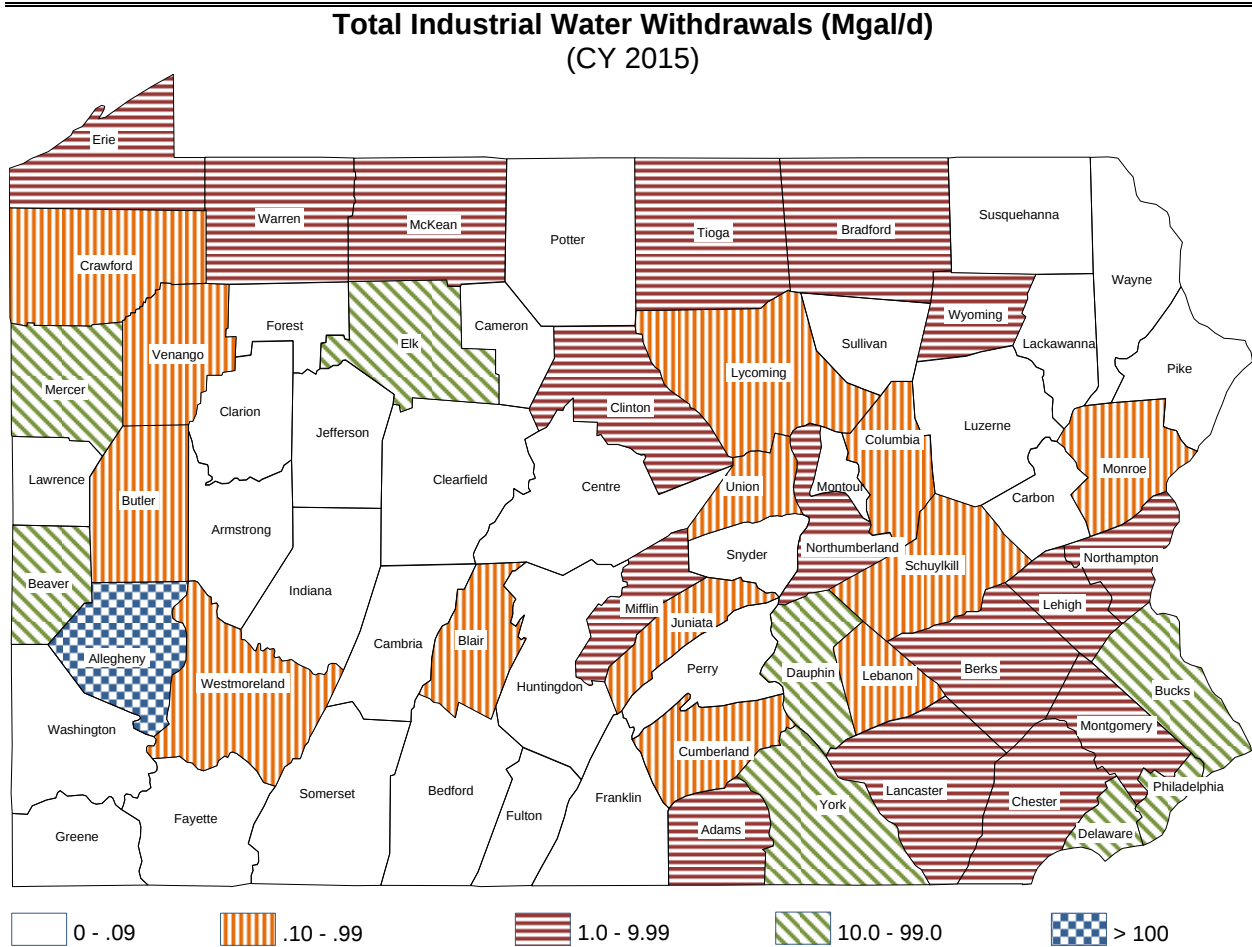
Table 8

**Total Industrial Water Withdrawals by Facility Type in Mgal/Day
(CY 2015)**

County	Facility Type							Total
	Bottled Water Plant	Manufacturing Facility	Military	Other Electric Generating	Natural Gas Pipeline	Quarry	Unidentified Facility Type	
Adams	0	1.05	0	0	0	0	0	1.05
Allegheny	0	231.88	0	0	0	0	0.21	232.09
Armstrong	0	0.02	0	0	0	0	0	0.02
Beaver	0	66.46	0	0	0	0	0	66.46
Berks	0.09	2.95	0	0	0	0	0	3.04
Blair	0	0.14	0	0	0	0	0	0.14
Bradford	0	3.26	0	0	0	0	0	3.26
Bucks	0	52.58	0	0	0	0	0	52.58
Butler	0	0.98	0	0	0	0	0	0.98
Cambria	0	0.01	0	0	0	0	0	0.01
Carbon	0	0.07	0	0	0	0	0	0.07
Centre	0	0.02	0	0	0	0	0	0.02
Chester	0.06	1.14	0	0	0	0.34	0	1.53
Clinton	0	4.49	0	0	0.01	0	0	4.50
Columbia	0	0.45	0	0	0	0	0	0.45
Crawford	0.04	0.29	0	0	0	0	0	0.32
Cumberland	0	0.23	0	0	0	0	0	0.23
Dauphin	0	21.36	0	0	0	0	0	21.36
Delaware	0	97.08	0	0	0	0	0	97.08
Elk	0	15.15	0	0	0	0	0	15.15
Erie	0	3.04	0	0.01	0	0	0.02	3.08
Franklin	0	0.02	0	0	0	0	0	0.02
Jefferson	0	0.01	0	0	0	0	0	0.01
Juniata	0	0.75	0	0	0	0	0	0.75
Lancaster	0.01	1.81	0	0	0	0	0	1.83
Lebanon	0.12	0.44	0	0	0	0	0	0.56
Lehigh	0.31	4.88	0	0	0	0	0.03	5.22
Lycoming	0	0.68	0	0	0	0	0	0.68
McKean	0	2.78	0	0	0	0	0	2.78
Mercer	0	13.35	0	0	0	0	0.02	13.36
Mifflin	0	3.68	0	0	0	0	0	3.68
Monroe	0	0.33	0	0	0	0	0	0.33
Montgomery	0	8.77	0	0	0	0	0	8.77
Northampton	0.41	7.72	0	0	0	0	0	8.14
Northumberland	0	2.22	0	0	0	0	0	2.22
Philadelphia	0	25.35	0	0	0	0	1.22	26.58
Schuylkill	0.17	0.33	0	0	0	0	0.21	0.71
Snyder	0	0.04	0	0	0	0	0	0.04
Somerset	0	0.01	0	0	0	0	0	0.01
Tioga	0	1.59	0.01	0	0	0	0.09	1.69
Union	0	0.22	0	0	0	0	0	0.22
Venango	0	0.22	0	0	0	0	0	0.22
Warren	0	8.87	0	0	0	0	0	8.87
Westmoreland	0	0.21	0	0	0	0	0	0.21
Wyoming	0	9.29	0	0	0	0	0	9.29
York	0	29.68	0	0	0	0	0	29.68
TOTAL	1.21	625.87	0.01	0.01	0.01	0.34	1.81	629.26

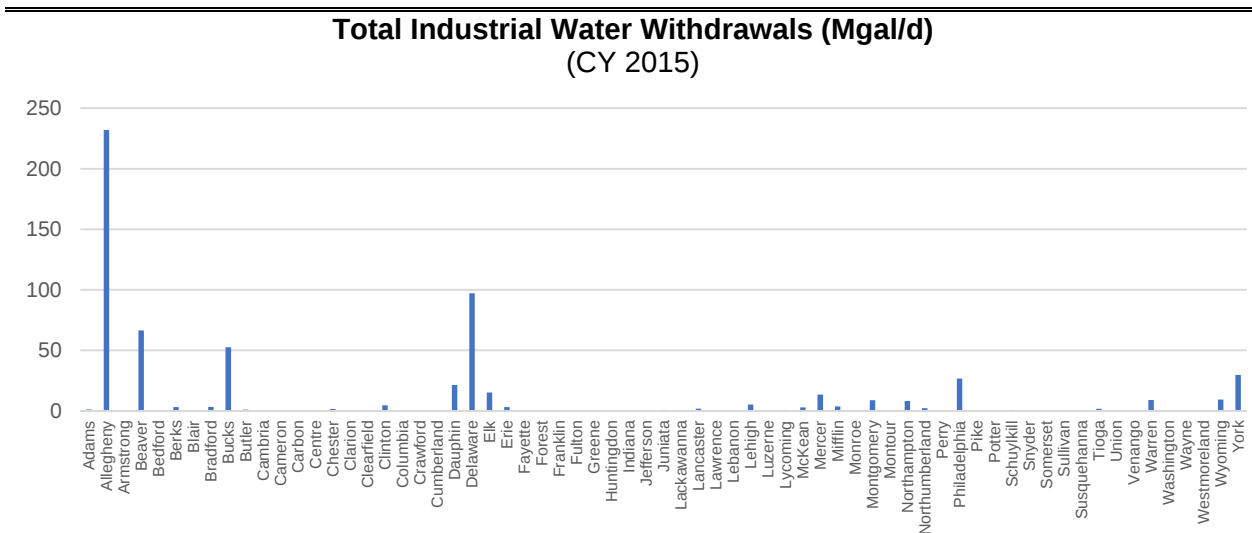
Source: Developed by LBFC staff using data provided by DEP.

Exhibit 15



Source: Developed by LBFC staff using information from DEP.

Exhibit 16



Source: Developed by LBFC staff using information from DEP.

Livestock

Livestock water is water used by animals such as cows, horses, cattle, sheep, goats, hogs, and poultry, and also includes water used in fish hatchery operations. Other uses may include cooling of facilities for the animals and products, dairy sanitation and wash down facilities, and animal waste-disposal systems. The sector excludes on-farm domestic use, land and garden watering, and irrigation.

Livestock withdrawals for 2015 are listed by county and sector in Table 9. During 2015, withdrawals for livestock use were 81.8 Mgal/d. Livestock withdrawals were about 0.12 percent of total withdrawals for all sectors; 1.4 percent of total withdrawals for all sectors excluding hydroelectric power; and 3.8 percent of total withdrawals for all sectors excluding hydroelectric and thermoelectric power. Groundwater was the source for 62.2 percent of total livestock withdrawals.

The geographic distribution of total livestock withdrawals is shown in Exhibits 17 and 18. Centre, Clinton, and Cumberland Counties each used more than 5 Mgal/d for livestock and together accounted for 40 percent of total livestock withdrawals in 2015. Center, Clinton, and Cumberland Counties each used more than 5.0 Mgal/d of groundwater for livestock and accounted for 9 percent of groundwater withdrawals for this use. Crawford, Franklin, and Lebanon Counties each used more than 1.9 Mgal/d of surface water for livestock, and accounted for 0.01 percent of surface-water withdrawals for livestock.

Aquaculture livestock withdrawal estimates for 2015 were 78.81 Mgal/d, accounting for over 96 percent of total livestock water withdrawals.

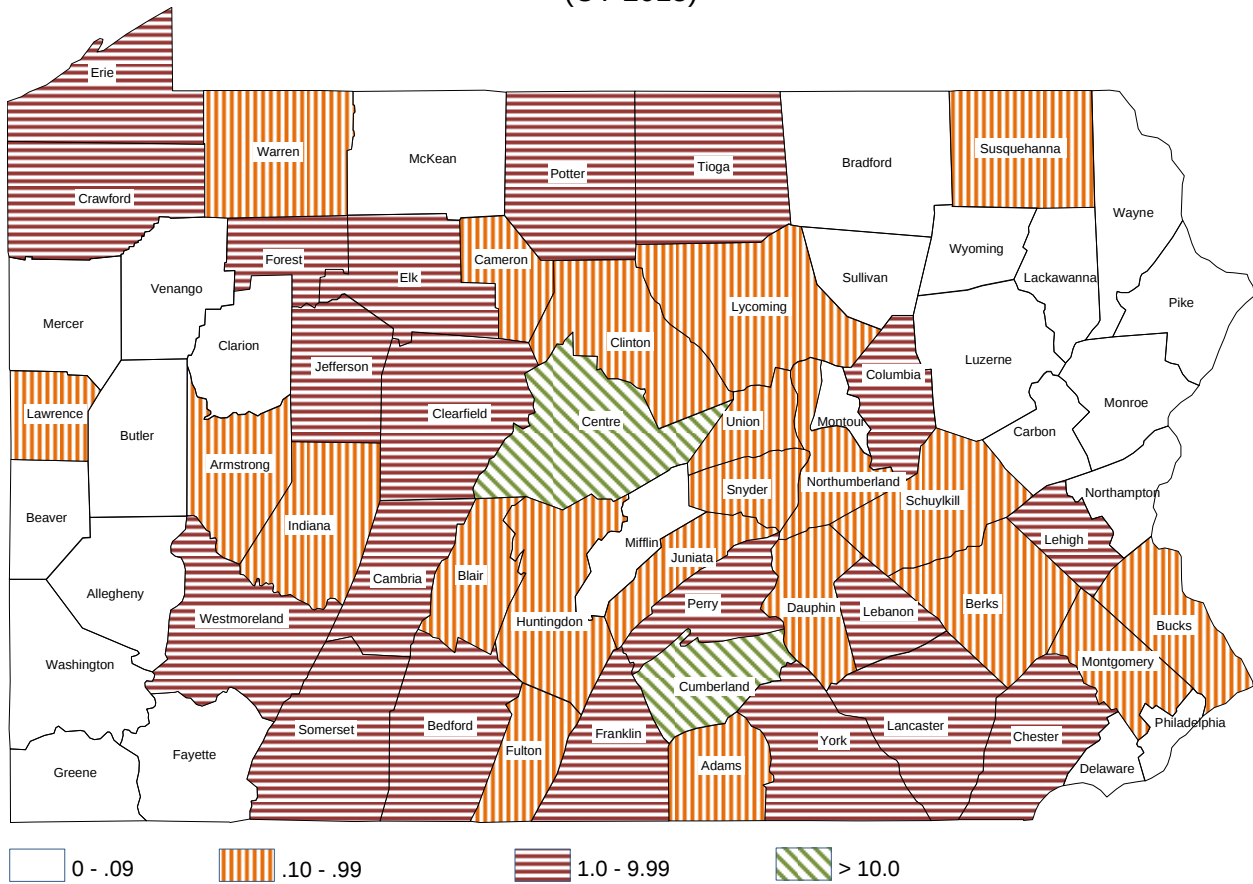
Table 9

Total Livestock Water Withdrawals by Facility Type in Mgal/Day (CY 2015)					
County	Facility Type				Total
	Aquaculture	Dairy Farm	Livestock Farm	Unidentified	
Adams	0.17	0.11	0.25	0	0.53
Armstrong	0.48	0	0	0	0.48
Bedford	2.34	0	0.04	0	2.34
Berks	0.70	0	0	0	0.70
Blair	0.93	0	0	0	0.93
Bradford	0	0	0	0	0.04
Bucks	0.29	0	0	0	0.29
Cambria	1.37	0	0	0	1.37
Cameron	0.42	0	0	0	0.42
Carbon	0.06	0	0	0	0.06
Centre	14.78	0	0	0	14.78
Chester	1.12	0.03	0	0	1.16
Clarion	0.06	0	0	0	0.06
Clearfield	1.14	0	0	0	1.14
Clinton	5.57	0	0	0	5.57
Columbia	1.33	0	0	0	1.33
Crawford	3.64	0	0.05	0	3.68
Cumberland	11.98	0	0	0.02	12.00
Dauphin	0.74	0	0	0	0.74
Elk	1.03	0	0	0	1.03
Erie	4.93	0	0	0	4.93
Fayette	0.05	0	0	0	0.05
Forest	1.66	0	0	0	1.66
Franklin	1.96	0	0.06	0	2.02
Fulton	0.45	0	0	0.02	0.47
Huntingdon	0.62	0.13	0	0	0.75
Indiana	0.37	0	0	0	0.37
Jefferson	1.03	0	0	0	1.03
Juniata	0.37	0	0.01	0	0.38
Lancaster	1.41	0.04	0.19	0	1.64
Lawrence	0.16	0	0	0	0.16
Lebanon	2.98	0.04	0	0	3.02
Lehigh	1.46	0	0	0	1.46
Lycoming	0.51	0	0	0	0.51
McKean	0.09	0	0	0	0.09
Mercer	0.03	0	0	0	0.03
Monroe	0.07	0	0	0	0.07
Montgomery	0.16	0	0	0	0.16
Northumberland	0.39	0	0	0	0.39
Perry	1.23	0.01	0.02	0.01	1.27
Potter	3.58	0	0	0	3.58
Schuylkill	0.82	0	0.08	0.01	0.90
Snyder	0.77	0	0.03	0	0.80
Somerset	1.55	0	0	0	1.55
Susquehanna	0.11	0	0	0	0.11
Tioga	1.49	0	0.03	0	1.52
Union	0.12	0	0	0	0.12
Warren	0.38	0	0	0	0.38
Westmoreland	0	0	1.83	0	1.83
York	1.90	0	0	0	1.90
TOTAL	78.81	0.36	2.57	0.06	81.79

Source: Developed by LBFC staff using data provided by DEP.

Exhibit 17

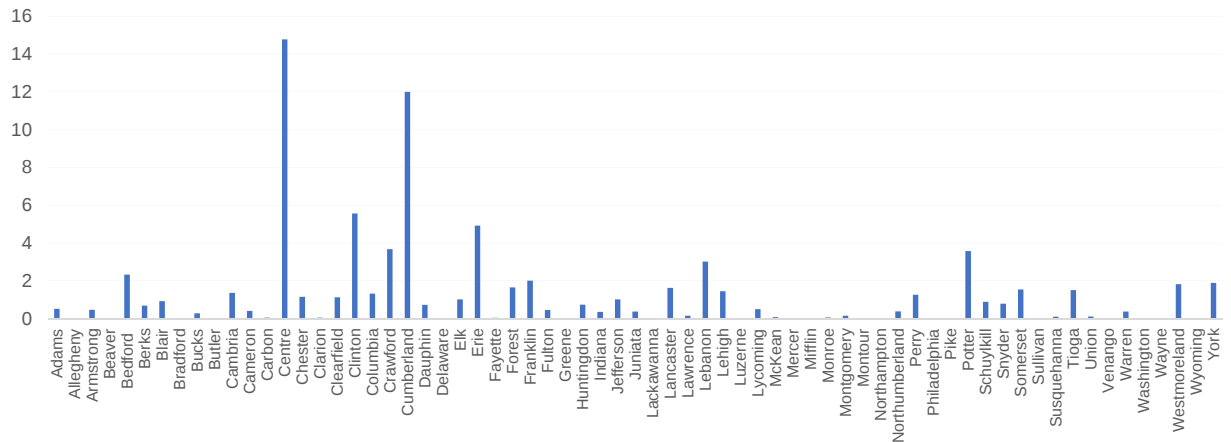
**Total Livestock Water Withdrawals (Mgal/d)
(CY 2015)**



Source: Developed by LBFC staff using information from DEP.

Exhibit 18

**Total Livestock Water Withdrawals (Mgal/d)
(CY 2015)**



Source: Developed by LBFC staff using information from DEP.

Mining

Mining water use is water used for the extraction or washing of minerals such as coal, iron, sand, and gravel. Withdrawals for dewatering quarries or other types of mines are also included in this sector.

Mining withdrawals for 2015 are listed by county and sector in Table 10. During 2015, 43 Mgal/d were withdrawn. Mining withdrawals were about 0.06 percent of total withdrawals, about 0.8 percent of total withdrawals for all sectors excluding hydroelectric power, and 2 percent of total withdrawals excluding hydroelectric and thermoelectric power. Groundwater was the source for 73 percent of total withdrawals for mining.

The geographic distribution of mining water withdrawals is shown in Exhibits 19 and 20. Bucks and Schuylkill Counties accounted for 28 percent of the total withdrawals for mining.

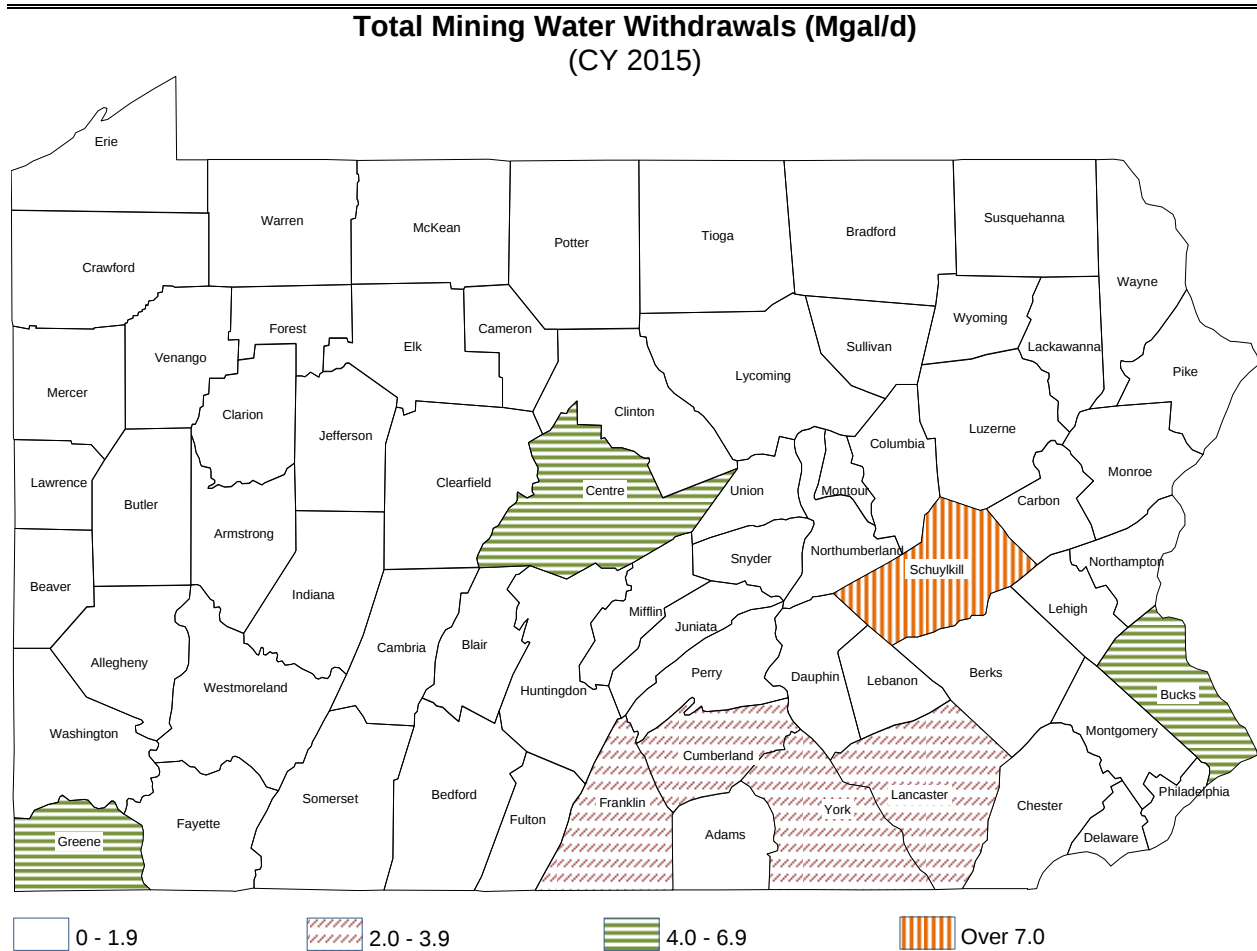
Table 10

Total Mining Water Withdrawals by Facility Type in Mgal/Day (CY 2015)

County	Facility Type									Total
	AMD Treatment	Coal Prep Plant	Deep Mine	Mineral Mill	Mineral Use Facility	Quarry	Sand & Gravel Wash	Surface Mine	Unidentified	
Adams	0	0	0	0	0	1.19	0	0	0	1.19
Bedford	0	0	0	0	0	0.27	0.01	0	0	0.27
Berks	0	0	0	0	0	1.15	0	0	0.02	1.16
Blair	0	0	0	0	0	0.62	0	0	0	0.62
Bradford	0	0	0	0	0	0	0	0	0	0.01
Bucks	0	0	0	0	0	4.65	0.31	0	0	4.96
Centre	0	0	4.30	0	0	0.12	0	0	0	4.42
Cumberland	0	0	0	0	0	3.31	0	0	0	3.31
Franklin	0	0	0	0	0	0.16	1.95	0	0	2.11
Greene	0	0.95	3.63	0	0.11	0	0	0	0	4.69
Huntingdon	0	0	0	0	0	1.33	0	0	0	1.33
Indiana	0	0	1.55	0	0	0	0	0	0	1.55
Lackawanna	0	0	0	0	0	0.05	0	0	0	0.05
Lancaster	0	0.01	0	0.34	0	1.20	0	0	0.46	2.01
Lehigh	0	0	0	0	0	1.78	0	0	0	1.78
Luzerne	0	0.37	0	0	0	0	0	0	0.03	0.40
McKean	0	0	0	0	0	0	0	0	0.02	0.02
Mifflin	0	0	0	0	0	0.03	0	0	0	0.03
Monroe	0	0	0	0	0	0.08	0	0	0	0.08
Montgomery	0	0	0	0	0	1.24	0	0	0	1.24
Montour	0	0	0	0	0	0	0	0	0	0.00
Northampton	0	0	0	0	0	0.67	0	0	0	0.67
Northumberland	0	0	0	0.01	0	0	0	0	0	0.01
Pike	0	0	0	0	0	0.01	0	0	0	0.01
Schuylkill	6.89	0.11	0	0	0.02	0	0	0.22	0	7.23
Snyder	0	0	0	0.04	0	0	0	0	0	0.04
Somerset	0	0	0	0	0	0.34	0	0	0	0.34
Venango	0	0	0	0	0	0	0	0.10	0	0.10
Warren	0	0	0	0	0	0	0	0.01	0	0.01
Washington	0	0	0	0	0.21	0	0	0	0	0.21
Wayne	0	0	0	0	0	0	0	0.01	0	0.01
York	0	0	0	1.56	0	1.70	0	0	0	3.26
TOTAL	6.89	1.44	9.48	1.95	0.34	19.88	2.27	0.33	0.53	43.11

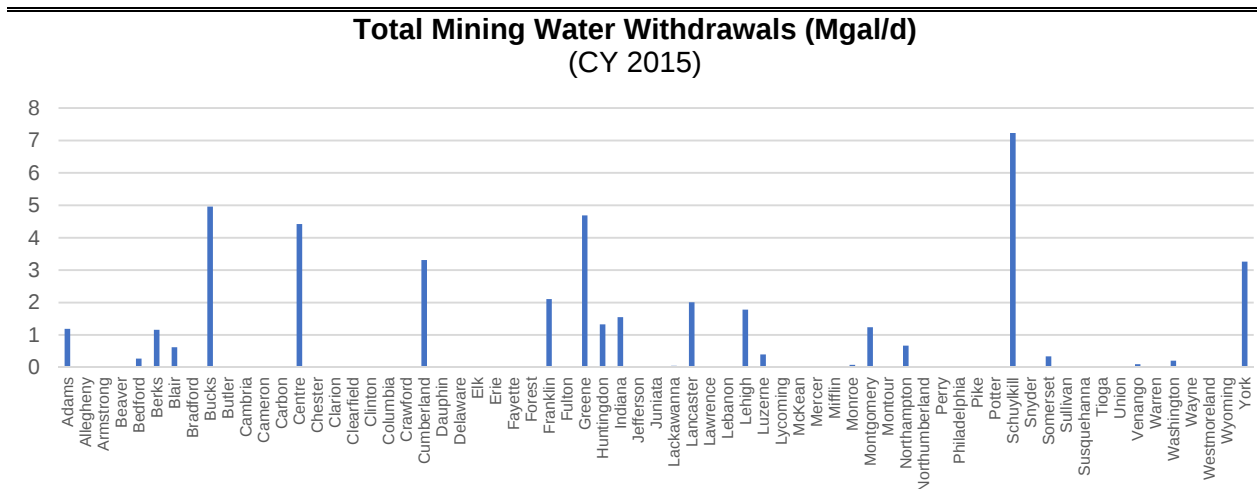
Source: Developed by LBFC staff using data provided by DEP.

Exhibit 19



Source: Developed by LBFC staff using information from DEP.

Exhibit 20



Source: Developed by LBFC staff using information from DEP.

Oil & Gas

Oil & gas water use is water used for unconventional oil and gas exploration, such as hydraulic fracturing. Water used for conventional oil and gas exploration is also included in this sector.

Oil and gas withdrawals during 2015 are listed by county and sector in Table 11. During 2015, 7.0 Mgal/d were withdrawn. The majority of withdrawals, 6.46 Mgal/d, were by unconventional well developers and operators.

The geographic distribution of total withdrawals is shown in Exhibits 21 and 22. Greene and Washington Counties accounted for 39 percent of the total withdrawals for oil and gas.

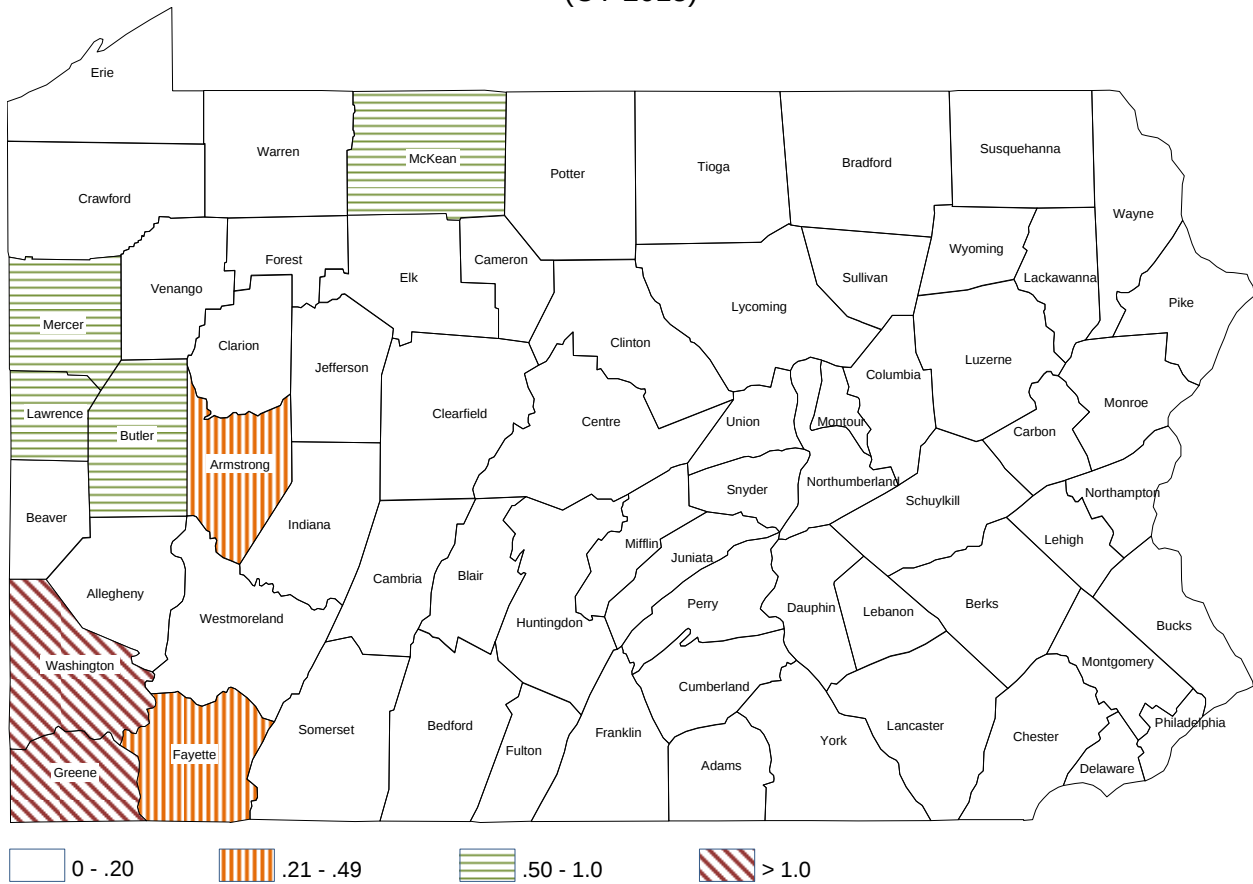
Table 11

Total Oil & Gas Water Withdrawals by Facility Type Mgal/Day (CY 2015)			
County	Facility Type		Total
	Sales to Unconventional Well Developers and Operators	Unconventional Well Developers and Operators	
Allegheny	0	0.19	0.19
Armstrong	0	0.33	0.33
Beaver	0	0.15	0.15
Butler	0.06	0.86	0.93
Elk	0	0.04	0.04
Fayette	0	0.41	0.41
Greene	0	1.15	1.15
Indiana	0	0.02	0.02
Jefferson	0	0.08	0.08
Lawrence	0.05	0.68	0.73
McKean	0	0.78	0.78
Mercer	0	0.53	0.53
Tioga	0.04	0	0.04
Washington	0.35	1.25	1.60
Westmoreland	0.18	0	0.18
TOTAL	0.68	6.46	7.14

Source: Developed by LBFC staff using data provided by DEP.

Exhibit 21

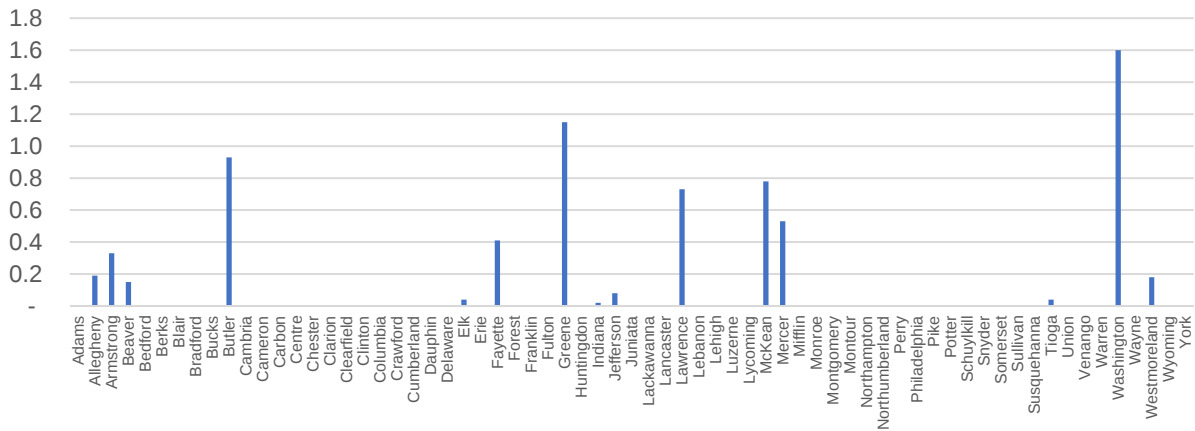
**Total Oil & Gas Water Withdrawals (Mgal/d)
(CY 2015)**



Source: Developed by LBFC staff using information from DEP.

Exhibit 22

**Total Oil & Gas Water Withdrawals (Mgal/d)
(CY 2015)**



Source: Developed by LBFC staff using information from DEP.

Irrigation

Irrigation water use includes water artificially applied on lands to sustain the growth of crops and pastures or in the maintenance of recreational lands, such as parks and golf courses. Irrigation also includes water used for frost protection, application of chemicals, weed control, field preparation, crop cooling, harvesting, dust suppression, and leaching salts from the root zone. Irrigation estimates include self-supplied withdrawals and deliveries from irrigation companies or districts, co-operatives, or government entities.

Irrigation withdrawals by county and facility type are listed in Table 12. For 2015, total irrigation withdrawals were 6 Mgal/d, which accounted for 0.01 percent of total water withdrawals, 0.11 percent of withdrawals for all sectors excluding hydroelectric power, and 0.29 percent of withdrawals for all sectors excluding hydroelectric and thermoelectric power. Withdrawals from surface-water sources were 4 Mgal/d, which accounted for 68 percent of the total irrigation withdrawals.

Irrigation for golf courses were 5 Mgal/d and accounted for 86 percent of all irrigation withdrawals. Golf course irrigation withdrawals from surface-water sources were 4 Mgal/d, which accounted for 69 percent of the golf course irrigation withdrawals.

The geographic distribution of total withdrawals for irrigation is shown in Exhibits 23 and 24. The majority of total Pennsylvania irrigation withdrawals (52.11 percent) were in Montgomery, Chester, Lancaster, Erie, Cumberland, Allegheny, Dauphin, and Berks Counties. Surface water was the primary source of water in Allegheny, Chester, Erie, Lehigh, and Montgomery Counties.

Table 12

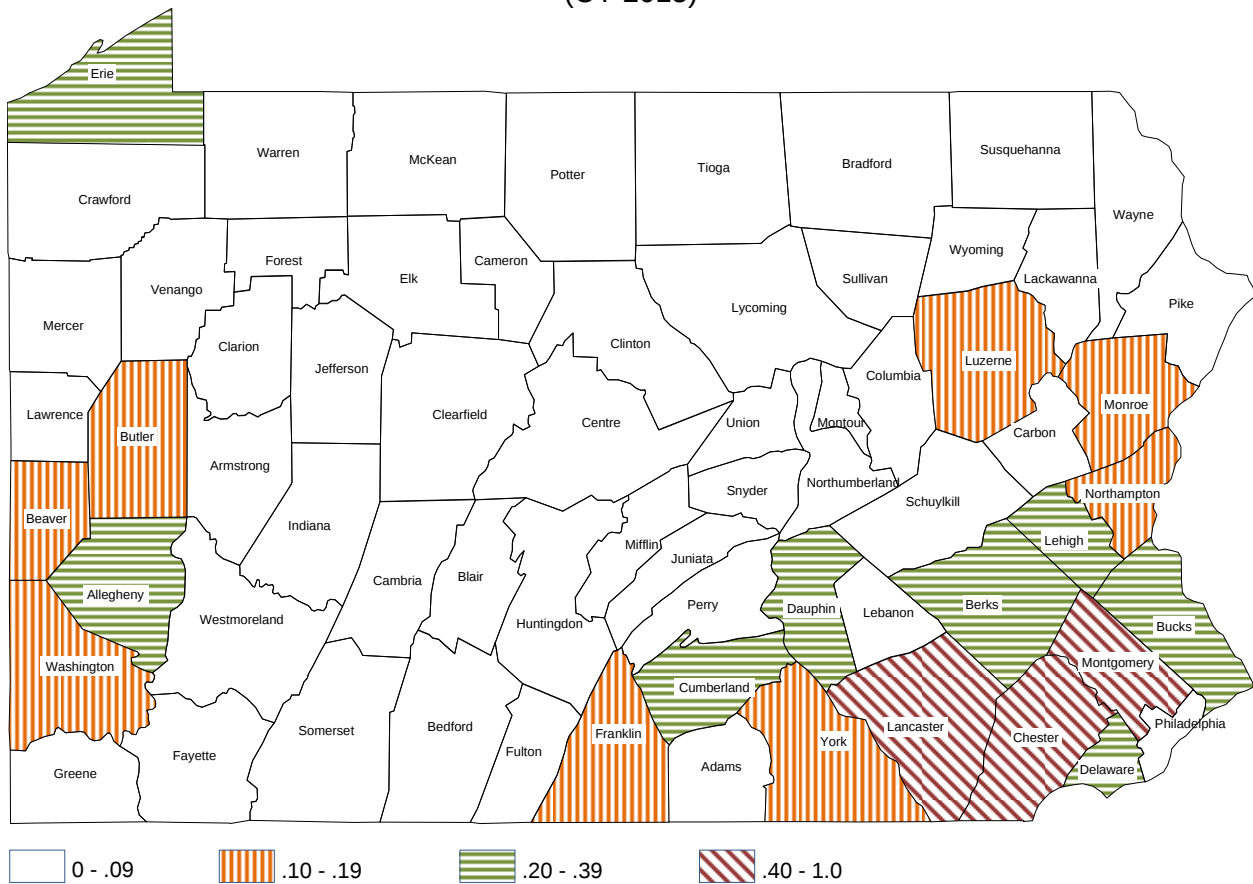
Total Irrigation Water Withdrawals by Facility Type in Mgal/Day (CY 2015)

County	Facility Type							Total
	Commercial	Golf Course	Institutional Education	Nursery	Orchard	Truck Farm	Unidentified	
Adams	0	0.03	0	0	0.02	0	0	0.04
Allegheny	0	0.31	0	0	0	0	0	0.31
Armstrong	0	0.06	0	0	0	0	0	0.06
Beaver	0	0.19	0	0	0	0	0	0.19
Bedford	0	0.06	0	0	0	0	0	0.06
Berks	0	0.23	0	0	0	0	0	0.23
Blair	0	0.04	0	0	0	0.01	0	0.05
Bucks	0	0.20	0	0	0	0	0	0.20
Butler	0	0.11	0	0	0	0	0	0.11
Cambria	0	0.07	0	0	0	0	0	0.07
Carbon	0	0.08	0	0	0	0	0	0.08
Centre	0	0.06	0	0	0	0.02	0	0.09
Chester	0	0.43	0	0	0	0.13	0	0.56
Clinton	0	0.02	0	0	0	0	0	0.02
Columbia	0	0.02	0	0.01	0	0	0	0.03
Crawford	0	0	0	0	0	0.01	0	0.01
Cumberland	0.01	0.17	0	0	0	0.19	0	0.38
Dauphin	0.01	0.29	0	0	0	0	0.01	0.31
Delaware	0	0.22	0	0	0	0	0	0.22
Erie	0	0.14	0	0.18	0	0.07	0	0.39
Franklin	0	0.11	0	0	0	0	0	0.11
Indiana	0	0.07	0	0	0	0	0	0.07
Juniata	0	0.01	0	0	0	0	0	0.01
Lackawanna	0	0.09	0	0	0	0	0	0.09
Lancaster	0	0.35	0	0	0	0.08	0	0.43
Lebanon	0	0.03	0	0	0	0	0	0.03
Lehigh	0	0.23	0	0	0	0	0	0.23
Luzerne	0	0.17	0	0	0	0	0	0.17
Lycoming	0	0.04	0	0	0	0.01	0	0.04
Mifflin	0	0.05	0	0	0	0	0	0.05
Monroe	0	0.12	0	0	0	0	0	0.12
Montgomery	0	0.72	0	0	0	0	0	0.72
Northampton	0	0.17	0	0	0	0	0	0.17
Northumberland	0	0	0	0	0	0.05	0	0.05
Pike	0	0.04	0	0	0	0	0	0.04
Schuylkill	0	0	0	0	0	0.06	0	0.06
Snyder	0	0.05	0	0	0	0	0	0.05
Somerset	0	0.07	0	0	0	0	0	0.07
Tioga	0	0.02	0	0	0	0	0	0.02
Union	0	0.03	0	0	0	0	0	0.03
Venango	0	0.02	0	0	0	0	0	0.02
Washington	0	0.13	0	0	0	0	0	0.13
Westmoreland	0	0.03	0	0	0	0	0	0.03
Wyoming	0	0.01	0	0	0	0	0	0.01
York	0	0.17	0	0	0	0	0.01	0.18
TOTAL	0.03	5.49	0	0.19	0.02	0.65	0.02	6.39

Source: Developed by LBFC staff using data provided by DEP.

Exhibit 23

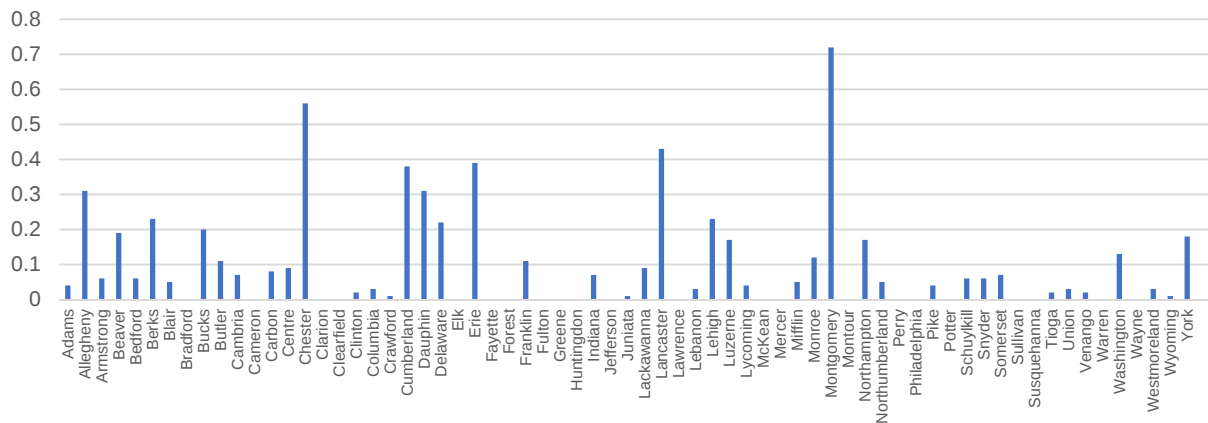
**Total Irrigation Water Withdrawals (Mgal/d)
(CY 2015)**



Source: Developed by LBFC staff using information from DEP.

Exhibit 24

**Total Irrigation Water Withdrawals (Mgal/d)
(CY 2015)**



Source: Developed by LBFC staff using information from DEP.

Commercial & Institutional

Commercial and institutional water use includes water used by motels, hotels, restaurants, office buildings, and institutions, both civilian and military, which would not otherwise be considered public water supplies. The sector also includes amusement and recreational water uses such as snowmaking and water slides.

Commercial and institutional withdrawals by county and type are listed in Table 13. For 2015, total commercial withdrawals were 6 Mgal/d, which accounted for 0.01 percent of total withdrawals, 0.10 percent of total withdrawals for all categories excluding hydroelectric power, and 0.26 percent of total withdrawals for all sectors excluding hydroelectric and thermoelectric power.

Withdrawals for commercial facilities were 1.57 Mgal/d, accounting for 28 percent of all commercial withdrawals. Of commercial facilities withdrawals, 0.04 mgal/d (2.5 percent) were from surface water sources and 1.53 mgal/d (97.5 percent) were from groundwater sources.

Ski resorts withdrew 1.53 Mgal/d and accounted for 27 percent of all commercial withdrawals. Ski resort withdrawals from surface-water sources were 1.5 Mgal/d, which accounted for 96 percent of the ski resort commercial withdrawals.

The geographic distribution of total commercial and institutional withdrawals is shown in Exhibits 25 and 26. The majority of total Pennsylvania commercial withdrawals (53 percent) were in Carbon, Dauphin, Lancaster, and Monroe Counties.

Table 13

Total Commercial & Institutional Water Withdrawals by Facility Type in Mgal/Day (CY 2015)

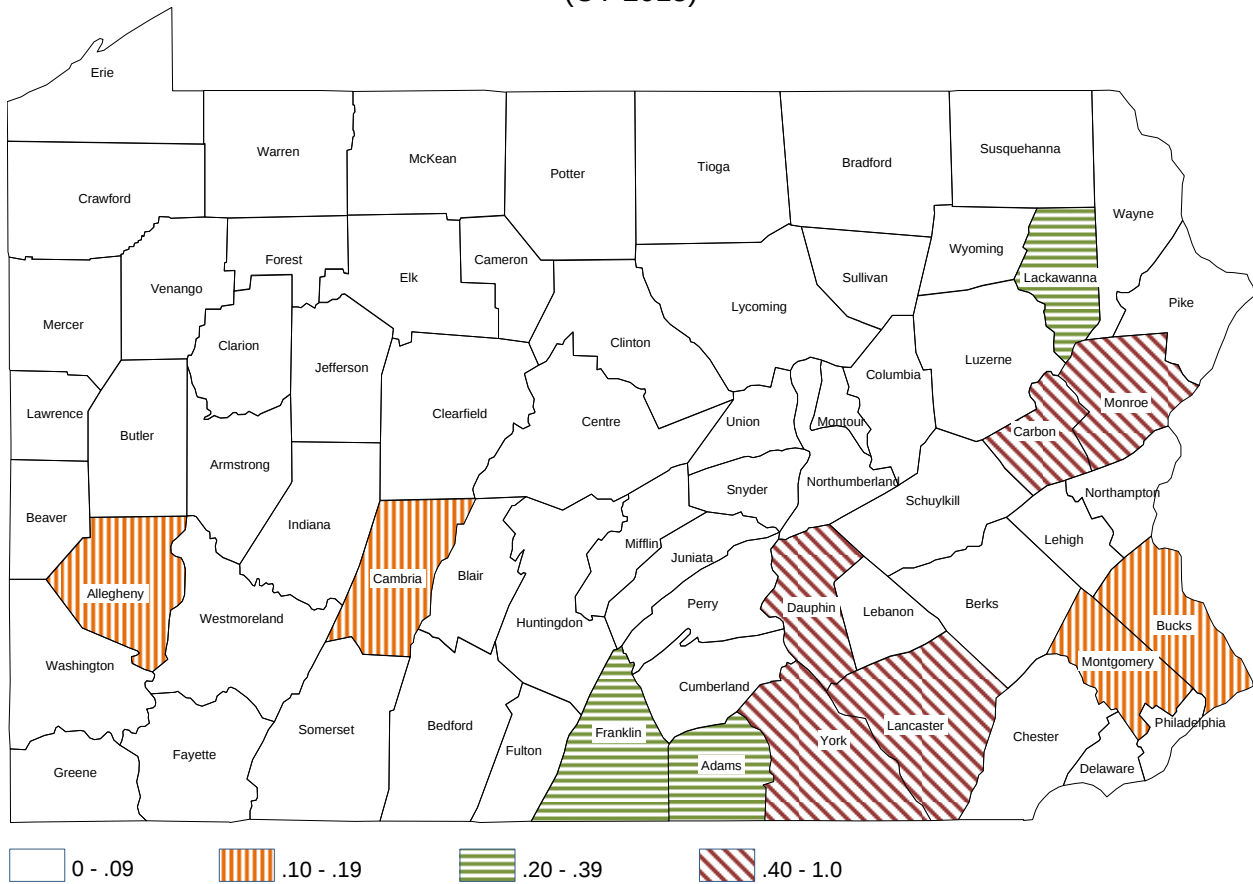
Facility Type

County	Commercial Facility	Golf Course	Institutional - Education	Institutional - Health	Institutional - Recreation	Nuclear Electric Generating Unit	Ski Resort	Unidentified	Total
Adams	0.01	0	0	0	0	0	0.22	0.12	0.35
Allegheny	0.10	0	0	0	0	0	0	0.08	0.18
Beaver	0	0	0	0	0.01	0	0	0.01	0.03
Bedford	0	0	0	0	0.01	0	0	0	0.01
Berks	0.03	0	0	0	0	0	0	0	0.03
Bucks	0.03	0	0	0.06	0	0	0	0.10	0.19
Butler	0.01	0	0	0	0.04	0	0	0	0.05
Cambria	0	0	0.11	0	0.02	0	0	0	0.12
Carbon	0	0.05	0	0	0	0	0.52	0.01	0.58
Centre	0	0	0	0	0.02	0	0	0	0.02
Chester	0.01	0	0	0	0	0	0	0	0.01
Clarion	0	0	0	0	0.01	0	0	0	0.01
Cumberland	0.01	0	0	0	0	0	0	0.02	0.04
Dauphin	0.91	0	0	0	0	0	0	0	0.91
Elk	0	0	0	0	0	0	0	0.01	0.01
Erie	0	0	0.01	0	0	0	0	0	0.01
Forest	0	0	0	0.01	0.01	0	0	0	0.02
Franklin	0.01	0	0	0	0	0	0.26	0	0.28
Fulton	0.02	0	0	0	0.02	0	0	0	0.04
Indiana	0	0	0.03	0	0	0	0	0	0.03
Lackawanna	0.07	0	0	0	0	0	0	0.17	0.24
Lancaster	0.05	0	0	0	0	0	0	0.87	0.91
Lehigh	0.04	0	0	0	0	0	0	0.06	0.09
Luzerne	0	0	0.01	0	0	0	0	0	0.01
Monroe	0.25	0	0	0	0.01	0	0.35	0.01	0.61
Montgomery	0	0	0	0	0	0.02	0.03	0.08	0.13
Montour	0	0	0	0.09	0	0	0	0	0.09
Northampton	0	0	0	0	0	0	0	0.06	0.06
Perry	0	0	0	0	0	0	0	0.01	0.01
Pike	0.01	0	0	0	0	0	0	0	0.01
Susquehanna	0	0	0	0	0	0	0	0.02	0.02
Union	0	0	0	0.02	0	0	0	0	0.02
Washington	0	0	0	0	0	0	0	0.01	0.01
York	0.02	0	0	0	0	0	0.15	0.35	0.52
TOTAL	1.57	0.05	0.15	0.18	0.15	0.02	1.53	1.99	5.65

Source: Developed by LBFC staff using data provided by DEP.

Exhibit 25

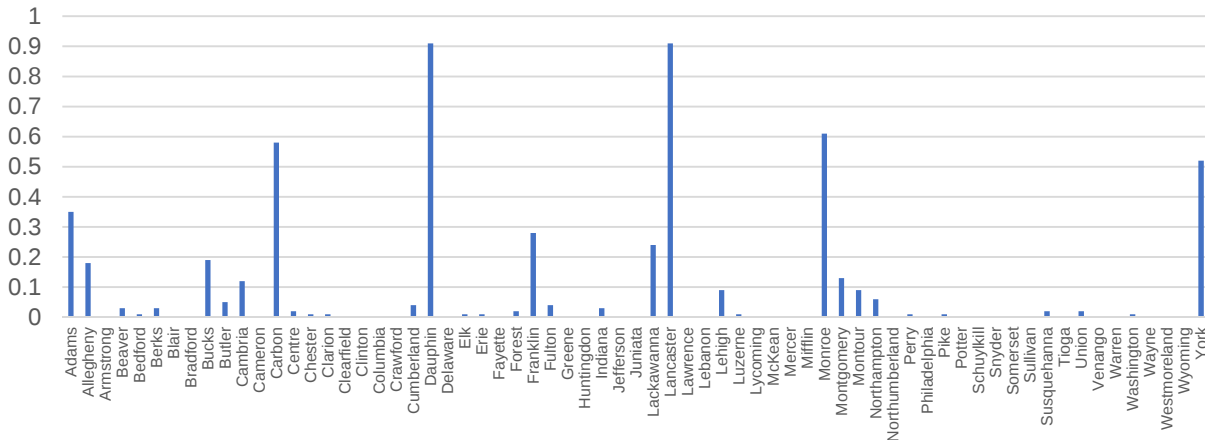
Total Commercial & Institutional Water Withdrawals (Mgal/d)
(CY 2015)



Source: Developed by LBFC staff using information from DEP.

Exhibit 26

Total Commercial & Institutional Water Withdrawals (Mgal/d)
(CY 2015)



Source: Developed by LBFC staff using information from DEP.

Wastewater

Wastewater use includes water used at wastewater and treatment collection facilities.

Wastewater withdrawals by county are listed in Table 14. For 2015, total wastewater withdrawals were 0.16 Mgal/d, which accounted for 0.0002 percent of total water withdrawals, 0.0027 percent of withdrawals for all sectors excluding hydroelectric power, and 0.007 percent of withdrawals for all sectors excluding hydroelectric and thermoelectric power. Withdrawals from surface-water sources were 0.14 Mgal/d, which accounted for 93 percent of the total wastewater withdrawals. Groundwater withdrawals for 2015 were 0.01 Mgal/d.

The geographic distribution of total withdrawals for wastewater is shown in Exhibits 27 and 28. All Pennsylvania withdrawals for wastewater were in three counties, Greene, Chester, and Elk. Greene County accounted for 93 percent of total wastewater withdrawals.

Table 14

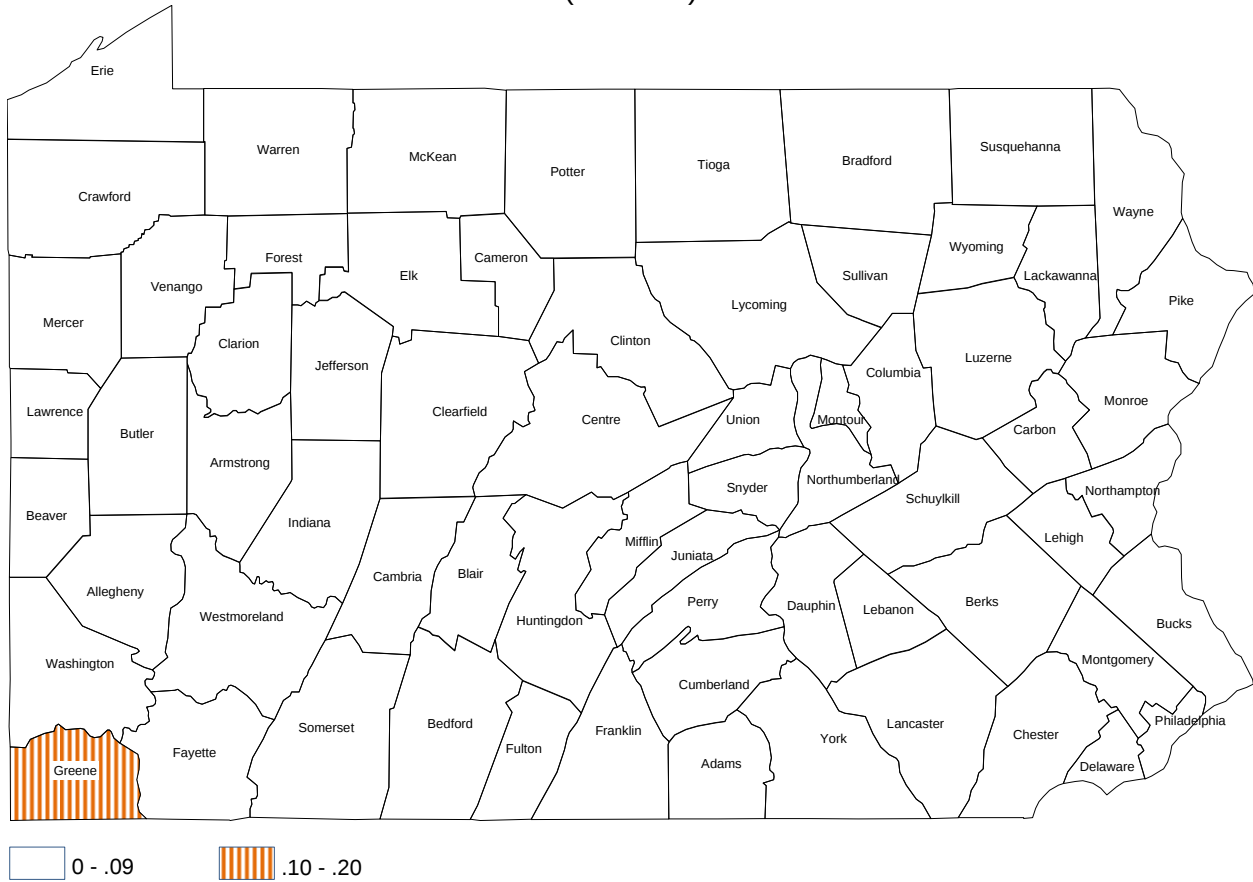
Total Wastewater Withdrawals by County in Mgal/Day
(CY 2015)

County	Wastewater
Greene	0.14
Chester	0.01
Elk	0.01
Total	0.16

Source: Developed by LBFC staff using data provided by the Pennsylvania Department of Environmental Protection.

Exhibit 27

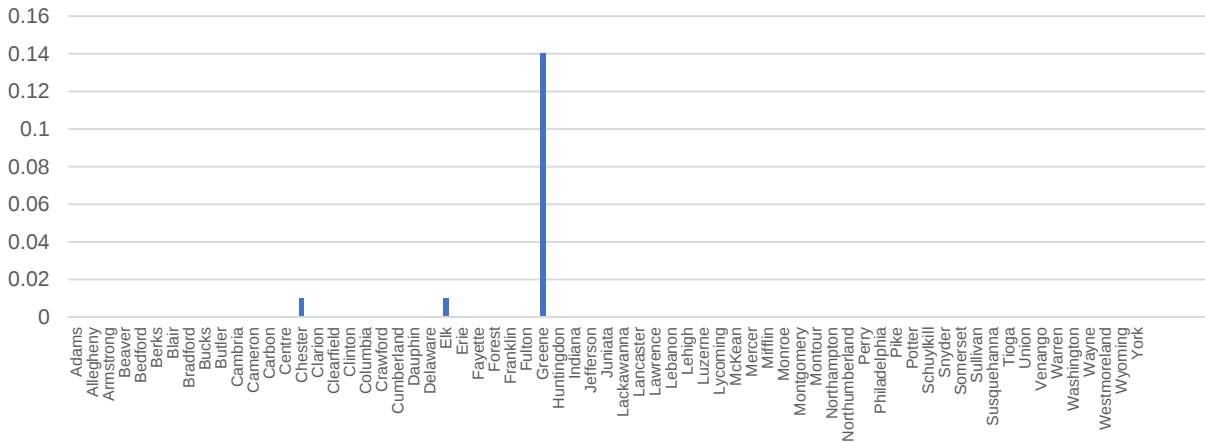
Total Wastewater Withdrawals (Mgal/d)
(CY 2015)



Source: Developed by LBFC staff using information from DEP.

Exhibit 28

Total Wastewater Withdrawals (Mgal/d)
(CY 2015)



Source: Developed by LBFC staff using information from DEP.

III. Fee Calculations

For this study, we sought to determine three things. The first was to calculate the amount of fee revenue the Commonwealth could expect to realize if House Bill 20 were to be enacted. The second was to determine what fee rates would be necessary to achieve \$500 million, \$300 million, and \$100 million in revenue. Finally, we calculated how the fee rates would change if various sectors were exempted in the \$500 million, \$300 million, and \$100 million scenarios.

A. House Bill 20, would yield \$2.6 billion in fee revenue for water related programs and activities and general government operations.¹

House Bill 20 establishes a water resource fee on water withdrawals greater than 10,000 gallons. Exempted from the fee are agricultural, municipal purposes, community water systems, non-community water systems, and not-for-profit entities. For water that is withdrawn and subsequently returned to the source, a fee of \$0.0001 per gallon is charged. For water that is withdrawn and then consumed, the fee is \$0.001 per gallon.

Neither “agriculture” nor “municipal” purposes are defined in the bill. Therefore, the definitions found in Section 3102 of Act 220 of 2002 were used in this report:

Agriculture – Normal farming practices or innovative techniques used in the production and preparation for market of any crop or commodity included within the definition of “crops, livestock and livestock products” in section 3 of the act of June 30, 1981 (P.L. 128, No. 43), known as the Agricultural Area Security Law.²

Municipality – Any county, city, borough, town, township or home rule municipality or any agency or authority created by any one or more of the foregoing.

¹ We used data provided by the DEP; however, the 2015 DEP water withdrawal amounts for the Oil and Gas sector are limited to the Ohio River Basin and, therefore, our calculations do not include water withdrawal amounts for the Oil and Gas sector in the Susquehanna River Basin or the subsequent fees related to them. In 2015 the SRBC reported 1.3 billion gallons of water used for natural gas extraction (approximately 0.0005 percent of the total withdrawn that year); the impact on the fee calculations would be minimal.

² “Crops, livestock and livestock products.” Include but are not limited to:

- (1) Field crops, including corn, wheat, oats, rye, barley, hay, potatoes and dry beans.
- (2) Fruits, including apples, peaches, grapes, cherries and berries.
- (3) Vegetables, including tomatoes, snap beans, cabbage, carrots, beets, onions and mushrooms.
- (4) Horticultural specialties, including nursery stock ornamental shrubs, ornamental trees and flowers.
- (5) Livestock and livestock products, including cattle, sheep, hogs, goats, horses, poultry, furbearing animals, milk, eggs and furs.
- (6) Timber, wood and other wood products derived from trees.
- (7) Aquatic plants and animals and their byproducts.

Methodology Used to Calculate Fees

To determine the fees that would be collected if House Bill 20 became law, we first needed to calculate the amount of water withdrawn and subsequently returned and the water withdrawn and consumed (consumptive use).

Consumptive use of water, defined in Act 220 as:

...the loss of water from a groundwater or surface water source through a manmade conveyance system, including such water that is purveyed through a public water supply system, due to transpiration by vegetation, incorporation into products during their manufacture, evaporation, diversion out of a basin or any other process to the extent that the water withdrawn is not returned to the waters of a basin. Deep well injection shall not be considered a return of waters to a basin.

To determine the consumptive use specific to a water use category or sector, we relied on Consumptive Use Coefficients used by DEP and the United States Geological Survey. The following equation was used to calculate consumptive use:

Total Water Withdrawn	X	Consumptive Use Coefficient	=	Consumptive Use
--------------------------	---	-----------------------------------	---	--------------------

At this point, it is necessary to determine the amount of water that is withdrawn and returned. That answer is arrived at by simply subtracting the Consumptive Use from the Total Water Withdrawn using the following equation:

Total Water Withdrawn	-	Consumptive Use	=	Water With- drawn and Re- turned
--------------------------	---	--------------------	---	--

For example, a manufacturing facility that withdraws 100,000,000 gallons annually would consume 10,000,000 gallons per year and return 90,000,000 gallons per year. The two equations would be as follows:

Total Water Withdrawn	X	Consumptive Use Coefficient	=	Water Consumed
100,000,000	X	0.1	=	10,000,000

Total Water Withdrawn	-	Consumptive Use	=	Water With- drawn and Returned
100,000,000	-	10,000,000	=	90,000,000

The coefficients used are shown in Table 15.

Table 15

Water Use Coefficients

Water Use Category	Facility Designation	Consumptive Use Coefficient
Livestock	Livestock Farm	0.8
Livestock	Unidentified Facility Type	0.8
Livestock	Dairy Farm	0.8
Livestock	Truck Farm	0.8
Livestock	Aquaculture	0.05
Commercial & Institutional	Unidentified Facility Type	0.1
Commercial & Institutional	Commercial Facility	0.1
Commercial & Institutional	Institutional Health	0.1
Commercial & Institutional	Institutional Education	0.1
Commercial & Institutional	Golf Course	0.1
Commercial & Institutional	Ski Resort	0.1
Commercial & Institutional	Institutional Military	0.1
Commercial & Institutional	Institutional Health	0.1
Commercial & Institutional	Institutional Education	0.1
Commercial & Institutional	Institutional Recreational	0.1
Domestic	Apartments	0.1
Industrial	Unidentified Facility Type	0.1
Industrial	Military	0.1
Industrial	Pipeline Transportation of Natural Gas	0.1
Industrial	Quarry	0.1
Industrial	Manufacture Facility	0.1
Industrial	Bottled Water Plant	0.1
Irrigation	Unidentified Facility Type	0.9
Irrigation	Dairy Farm	0.9
Irrigation	Orchard	0.9
Irrigation	Truck Farm	0.9
Irrigation	Nursery	0.9
Irrigation	Commercial Facility	0.9
Irrigation	Golf Course	0.9
Mining	Unidentified Facility Type	0.1
Mining	Quarry	0.1
Mining	Manufacture Facility	0.1
Mining	Deep Mine	0.1
Mining	Surface Mine	0.1
Mining	Coal Preparation Plant	0.1
Mining	Sand And Gravel Wash	0.1
Mining	Mineral Use Facility	0.1
Mining	AMD Reclamation	0.1
Mining	Mineral Mill	0.1
Fossil Fueled Power	Fossil Fuel Electric Generating Unit	0.04
Hydroelectric Power	Hydroelectric Generating Unit	0
Hydroelectric Power	Pumped Storage Generating Unit	0
Wastewater Collection and Treatment	Unidentified Facility Type	0
Wastewater Collection and Treatment	AMD Treatment	0
Wastewater Collection and Treatment	Sewage Treatment Plant	0
Wastewater Collection and Treatment	Instream Discharge	0
Public Water Supply		0.1
Public Water Supply	Unidentified Facility Type	0.1

Table 15 (Continued)

Water Use Category	Facility Designation	Consumptive Use Coefficient
Public Water Supply	Commercial Facility	0.1
Public Water Supply	Sewage Treatment Plant	0.1
Public Water Supply	Authority	0.1
Public Water Supply	Auth Leases Back To Mun	0.1
Public Water Supply	Municipal	0.1
Public Water Supply	Private Investor Owned	0.1
Public Water Supply	Association - Co-Op	0.1
Public Water Supply	Mobile Home Park	0.1
Public Water Supply	Authority - (Purchases)	0.1
Public Water Supply	Auth Leases Bk To Mun(Pu)	0.1
Public Water Supply	Municipal - (Purchases)	0.1
Public Water Supply	Institutional Military	0.1
Public Water Supply	Institutional Health	0.1
Public Water Supply	Institutional Education	0.1
Public Water Supply	Institutional Correctional	0.1
Public Water Supply	Institutional Recreational	0.1
Public Water Supply	Priv Investr Owned-(Pu)	0.1
Public Water Supply	Association (Purchases)	0.1
Public Water Supply	Apartments	0.1
Oil & Gas	Unconventional Well Dev and Opr	0.999
Oil & Gas	Conventional Well Dev and Opr	0.999
Oil & Gas	Water Sales to Unconventional Gas Oprs	0.999
Thermoelectric Power-Once Thru Cooling	Unidentified Facility Type	0.01
Thermoelectric Power-Once Thru Cooling	Fossil Fuel Electric Generating Unit	0.005
Thermoelectric Power-Once Thru Cooling	Nuclear Electric Generating Unit	0.01
Thermoelectric Power-Recirc Cooling	Unidentified Facility Type	0.73
Thermoelectric Power-Recirc Cooling	Fossil Fuel Electric Generating Unit	0.79
Thermoelectric Power-Recirc Cooling	Nuclear Electric Generating Unit	0.54

Source: Developed by LBFC staff using information provided by DEP and the United States Geological Survey.

To determine the water use fees generated by House Bill 20, we multiplied the water withdrawn and subsequently returned by \$0.0001 and the water consumed by \$0.001 using the following equations:

Water Withdrawn and Returned	X	\$0.0001	=	Water Withdrawn and Returned Fee
------------------------------------	---	----------	---	--

Water Consumed	X	\$0.001	=	Water Consumed Fee
-------------------	---	---------	---	-----------------------

To continue with our previous example, a manufacturing facility that withdraws 100,000,000 gallons annually would pay a Water Withdrawn and Returned fee of \$9,000 per year and a Water Consumed fee of \$10,000 per year using the following equations:

Water Withdrawn and Returned	X	\$0.0001	=	Water Withdrawn and Returned Fee
90,000,000	X	\$0.0001	=	\$9,000

Water Consumed	X	\$0.001	=	Water Consumed Fee
10,000,000	X	\$0.001	=	\$10,000

The total fees paid by the manufacturing facility in this example would be \$19,000.

All Sectors

Total fees paid by all sectors not excluded in House Bill 20 would be \$2.6 billion if the legislation were enacted. This number is based on 25.4 trillion gallons of water used in 2015. Of that 25.3 trillion gallons were withdrawn and returned while 128 billion were consumed. The hydroelectric sector would pay the vast majority of the proposed fee at just over 90 percent. The three power generating sectors, hydroelectric, thermoelectric, and thermoelectric recirculated (thermoelectric Re), would pay just over 98 percent of the fees proposed in House Bill 20. The fees are shown in Table 16 and Exhibit 29.

Table 16

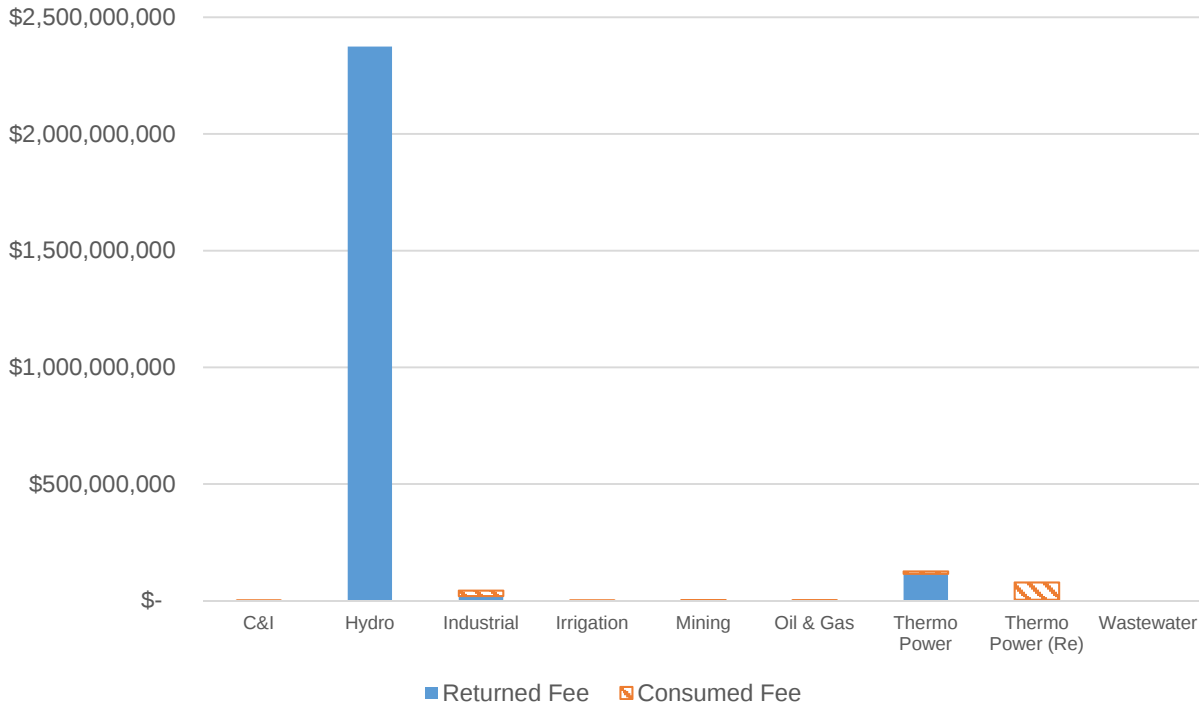
All Sector Fees CY 2015

Facility	Total Withdrawal	Water Used & Returned	Water Consumed	Returned Fee	Consumed Fee	Total Fees
Commercial & Institutional	2,060,622,505	1,854,560,255	206,062,251	\$ 185,456	\$ 206,062	\$ 391,518
Hydro	23,742,184,905,859	23,742,184,905,859	0	2,374,218,491	0	2,374,218,491
Industrial	229,235,808,713	206,312,227,842	22,923,580,871	20,631,223	22,923,580	43,554,804
Irrigation	2,021,004,848	202,100,485	1,818,904,363	20,210	1,818,904	1,839,114
Mining	15,734,987,931	14,161,489,138	1,573,498,793	1,416,149	1,573,499	2,989,648
Oil & Gas	2,605,522,117	2,605,522	2,602,916,595	261	2,602,917	2,603,177
Thermo Power	1,168,470,963,842	1,158,618,002,734	9,852,961,108	115,861,800	9,852,961	125,714,761
Thermo Power Re	118,137,619,592	43,638,112,529	74,499,507,063	4,363,811	74,499,507	78,863,318
Wastewater	56,769,183	56,769,183	0	5,677	0	5,677

Source: Developed by LBFC staff using data provided by DEP.

Exhibit 29

All Sector Fees



Source: Developed by LBFC staff using data provided by DEP.

The Commercial & Institutional Sector

The Commercial & Institutional sector would pay \$381,024 in fees under House Bill 20. In 2015, these entities withdrew 2.0 billion gallons of water. Three entities—unidentified facilities, ski resorts, and commercial facilities—accounted for 92.6 percent of the fees. The fees are shown in Table 17 and Exhibit 30.

Table 17

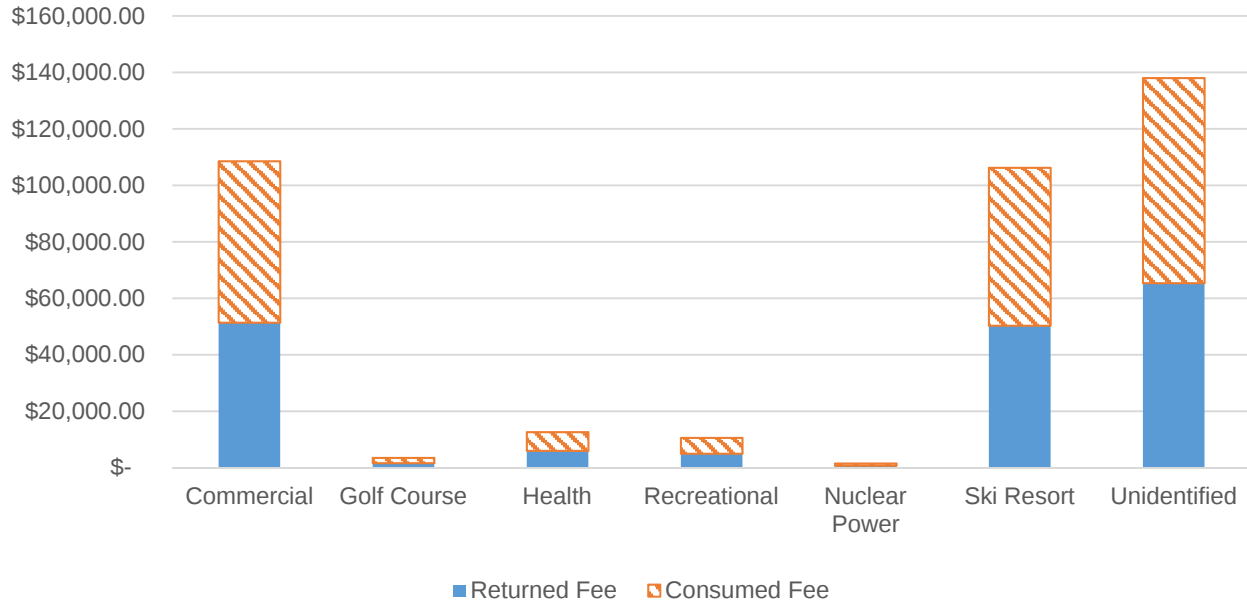
**Commercial & Institutional Sector Fees
CY 2015**

Facility	Total Withdrawal	Coefficient	Water Used & Returned	Water Consumed	Returned Fee	Consumed Fee	Total Fees
Commercial	571,240,681	0.1	514,116,613	57,124,068	\$ 51,412	\$ 57,124	\$ 108,536
Golf Course	18,424,412	0.1	16,581,971	1,842,441	1,658	1,842	3,501
Health	66,453,236	0.1	59,807,912	6,645,324	5,981	6,645	12,626
Recreational	55,641,724	0.1	50,077,552	5,564,172	5,008	5,564	10,572
Nuclear Power	8,035,558	0.1	7,232,002	803,556	723	804	1,527
Ski Resort	559,199,056	0.1	503,279,150	55,919,906	50,328	55,920	106,248
Unidentified	726,388,739	0.1	653,749,865	72,638,874	65,375	72,639	138,014

Source: Developed by LBFC staff using data provided by DEP.

Exhibit 30

Commercial & Institutional Fees
CY 2015



Source: Developed by LBFC staff using data provided by DEP.

The Hydroelectric Sector

Under House Bill 20, the Hydroelectric sector would pay \$2.4 billion based on 23.7 trillion gallons of water used and returned to the source, of which nearly 54 percent of the total would be paid by hydroelectric dams. The fees are shown in Table 18 and Exhibit 31.

Table 18

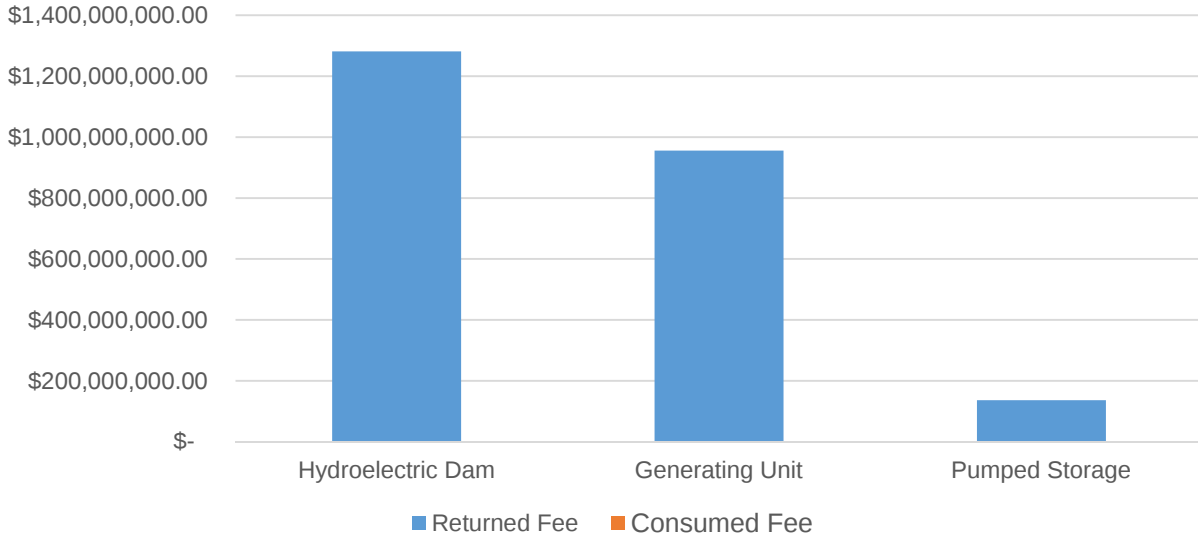
Hydroelectric Sector Fees
CY 2015

Facility	Total Withdrawal	Coefficient	Water Used & Returned	Water Consumed	Returned Fee	Consumed Fee	Total Fees
Hydroelectric Dam	12,814,796,805,635	0	12,814,796,805,635	0	\$1,281,479,681	0	\$ 1,281,479,681
Generating Unit	9,559,549,672,178	0	9,559,549,672,178	0	955,954,967	0	955,954,967
Pumped Storage	1,367,838,428,046	0	1,367,838,428,046	0	136,783,843	0	136,783,843

Source: Developed by LBFC staff using data provided by DEP.

Exhibit 31

Hydroelectric Sector Fees
CY 2015



Source: Developed by LBFC staff using data provided by DEP.

The Industrial Sector

The Industrial sector would pay \$43.6 million in fees under House Bill 20. In 2015 this sector withdrew and returned 206.3 billion gallons of water and consumed nearly 23 billion gallons of water. The manufacturing sector would pay 99.7 percent of the fees in this category. The fees are shown in Table 19 and Exhibit 32.

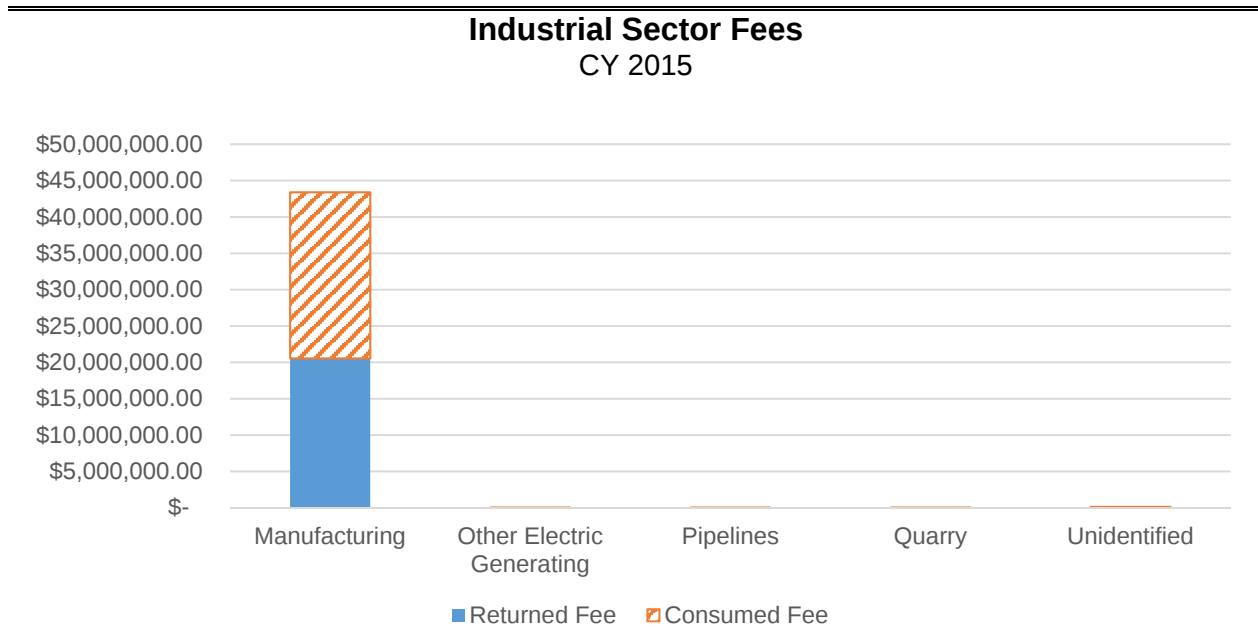
Table 19

Industrial Sector Fees
CY 2015

Facility	Total Withdrawal	Coefficient	Water Used & Returned	Water Consumed	Returned Fee	Consumed Fee	Total Fees
Manufacturing	228,444,021,213	0.1	205,599,619,092	22,844,402,121	\$20,559,962	\$22,844,402	\$43,404,364
Other Electric Generating	5,473,537	0.1	4,926,183	547,354	493	547	1,040
Pipelines	2,998,050	0.1	2,698,245	299,805	270	300	570
Quarry	122,383,000	0.1	110,144,700	12,238,300	11,014	12,238	23,253
Unidentified	660,932,913	0.1	594,839,622	66,093,291	59,484	66,093	125,577

Source: Developed by LBFC staff using data provided by DEP.

Exhibit 32



Source: Developed by LBFC staff using data provided by DEP.

The Irrigation Sector

Under House Bill 20, the Irrigation Sector would pay \$1.8 million based on 2 billion gallons withdrawn. The sector withdrew and returned 202 million gallons of water and consumed 1.8 billion gallons of water. Golf courses account for 99 per cent of the fees in this sector. The fees are shown in Table 20 and Exhibit 33.

Table 20

Irrigation Sector Fees CY 2015							
Facility	Total Withdrawal	Coefficient	Water Used & Returned	Water Consumed	Returned Fee	Consumed Fee	Total Fees
Commercial	9,413,708	0.9	941,371	8,472,337	\$ 94	\$ 8,472	\$ 8,566
Golf Course	2,004,227,893	0.9	200,422,789	1,803,805,104	20,042	1,803,805	1,823,847
Unidentified	7,363,247	0.9	736,325	6,626,922	74	6,627	6,701

Source: Developed by LBFC staff using data provided by DEP.

Exhibit 33

Irrigation Sector Fees
CY 2015



Source: Developed by LBFC staff using data provided by DEP.

The Mining Sector

The Mining sector would pay \$3 million in fees if House Bill 20 were to be enacted. In 2015, the sector withdrew and returned 14.2 billion gallons of water and consumed nearly 1.6 billion gallons. Quarries, acid mine drainage treatment facilities, and deep mines account for 84 percent of the fees in this category. The fees are shown in Table 21 and Exhibit 34.

Table 21

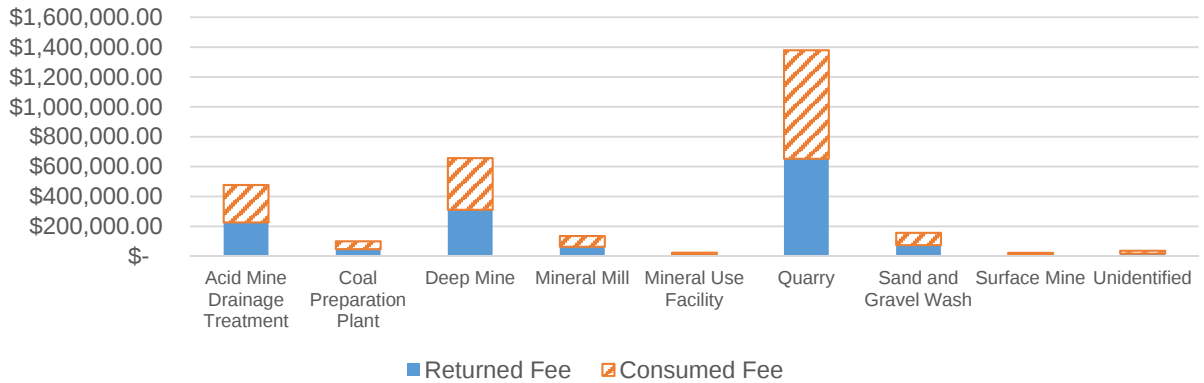
Mining Sector Fees
CY 2015

Facility	Total Withdrawal	Coefficient	Water Used & Returned	Water Consumed	Returned Fee	Consumed Fee	Total Fees
Acid Mine Drainage Treatment	2,513,160,000	0.1	2,261,844,000	251,316,000	\$226,184	\$251,316	\$477,500
Coal Preparation Plant	525,926,805	0.1	473,334,125	52,592,681	47,333	52,593	99,926
Deep Mine	3,459,325,161	0.1	3,113,392,645	345,932,516	311,339	345,933	657,272
Mineral Mill	710,764,950	0.1	639,688,455	71,076,495	63,969	71,076	135,045
Mineral Use Facility	124,953,256	0.1	112,457,930	12,495,326	11,246	12,495	23,741
Quarry	7,257,331,295	0.1	6,531,598,166	725,733,130	653,160	725,733	1,378,893
Sand and Gravel Wash	828,501,804	0.1	745,651,624	82,850,180	74,565	82,850	157,415
Surface Mine	120,431,340	0.1	108,388,206	12,043,134	10,839	12,043	22,882
Unidentified	194,593,320	0.1	175,133,988	19,459,332	17,513	19,459	36,973

Source: Developed by LBFC staff using data provided by DEP.

Exhibit 34

Mining Sector Fees
CY 2015



Source: Developed by LBFC staff using data provided by DEP.

The Oil & Gas Sector

The Oil & Gas sector would pay \$ 2.6 million in fees under House Bill 20. In 2015, these entities withdrew 2.6 billion gallons of water of which only 2.6 million were used and returned. Unconventional gas operators account for 90 percent of the fees. The fees are shown in Table 22 and Exhibit 35.

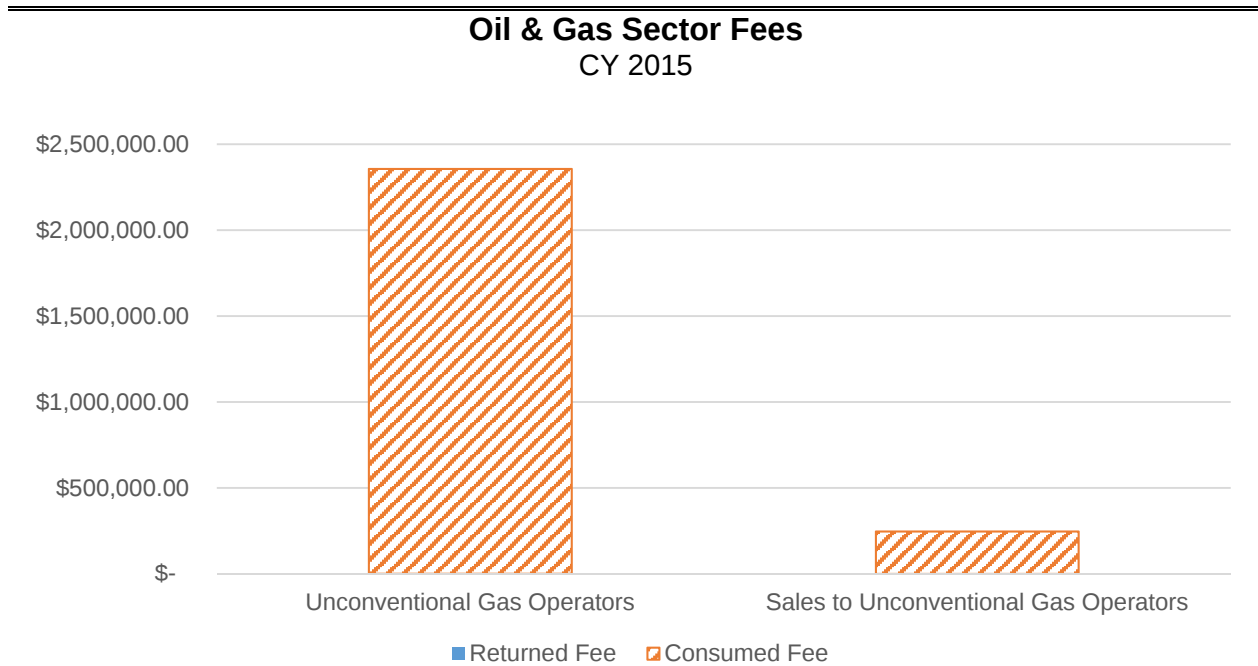
Table 22

Oil & Gas Sector Fees
CY 2015

Facility	Total Withdrawal	Coefficient	Water Used & Returned	Water Consumed	Returned Fee	Consumed Fee	Total Fees
Unconventional Gas Operators	2,358,483,031	0.999	2,358,483	2,356,124,548	\$236	\$2,356,125	\$2,356,360
Sales to Unconventional Gas Operators	247,039,086	0.999	247,039	246,792,047	25	246,792	246,817

Source: Developed by LBFC staff using data provided by DEP.

Exhibit 35



Source: Developed by LBFC staff using data provided by DEP.

Thermoelectric Power

The Thermoelectric Power sector would pay \$126 million in fees under House Bill 20, with nuclear generation facilities accounting for nearly 68 percent of the fees. In total, this sector withdraws 1.17 trillion gallons of water annually, of which 1.16 trillion gallons are used and returned, while 9.8 billion gallons are consumed. The fees for this sector are shown in Table 23 and Exhibit 36.

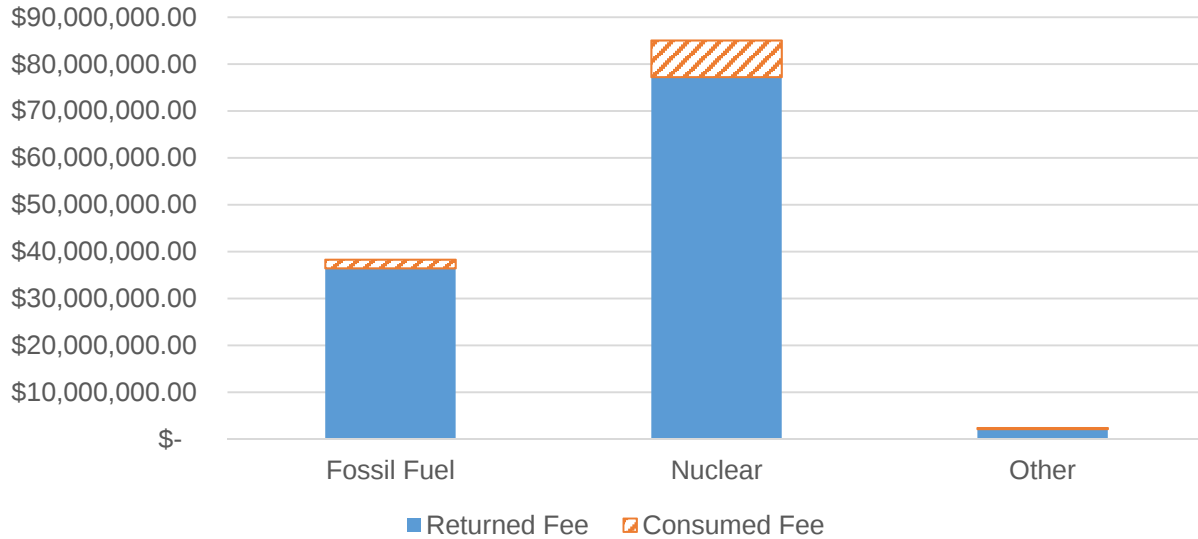
Table 23

Thermoelectric Power Sector Fees							
CY 2015							
Facility	Total Withdrawal	Coef- ficient	Water Used & Returned	Water Consumed	Returned Fee	Consumed Fee	Total Fees
Fossil Fuel	366,349,706,096	0.005	364,517,957,566	1,831,748,530	\$36,451,796	\$1,831,749	\$38,283,544
Nuclear	780,272,418,116	0.01	772,469,693,935	7,802,724,181	77,246,969	7,802,724	85,049,694
Other	21,848,839,630	0.01	21,630,351,234	218,488,396	2,163,035	218,488	2,381,524

Source: Developed by LBFC staff using data provided by DEP.

Exhibit 36

Thermoelectric Power Sector Fees
CY 2015



Source: Developed by LBFC staff using data provided by DEP.

Thermoelectric Power – Recirculated

House Bill 20 would require the Thermoelectric Power Re sector to pay \$79 million in fees based on 118 billion gallons of water withdrawn per year. The total estimated amount of water used and returned for this sector totals 43.6 billion gallons per year. Nearly 75 billion gallons was consumed in 2015. The fees for this sector are shown in Table 24 and Exhibit 37.

Table 24

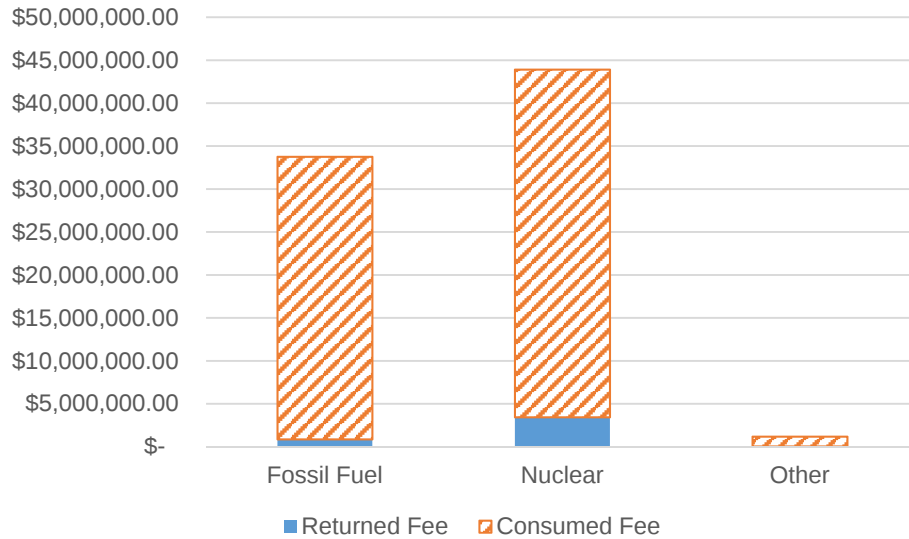
Thermoelectric Power Re Sector Fees
CY 2015

Facility	Total Withdrawal	Coefficient	Water Used & Returned	Water Consumed	Returned Fee	Consumed Fee	Total Fees
Fossil Fuel	41,634,373,075	0.79	8,743,218,346	32,891,154,729	\$874,322	\$32,891,155	\$33,765,477
Nuclear	74,942,198,017	0.54	34,473,411,088	40,468,786,929	3,447,341	40,468,787	43,916,128
Other	1,561,048,500	0.73	421,483,095	1,139,565,405	42,148	1,139,565	1,181,714

Source: Developed by LBFC staff using data provided by DEP.

Exhibit 37

Thermoelectric Re Sector Fees
CY 2015



Source: Developed by LBFC staff using data provided by DEP.

Wastewater Collection and Treatment

The Wastewater Collection and Treatment sector would be required to pay approximately \$6,000 under House Bill 20. In 2015, facilities in this category used and returned 56 million gallons of water and consumed none. Acid mine drainage accounts for 92 percent of the fees in this sector. The fees for this sector are shown in Table 25 and Exhibit 38.

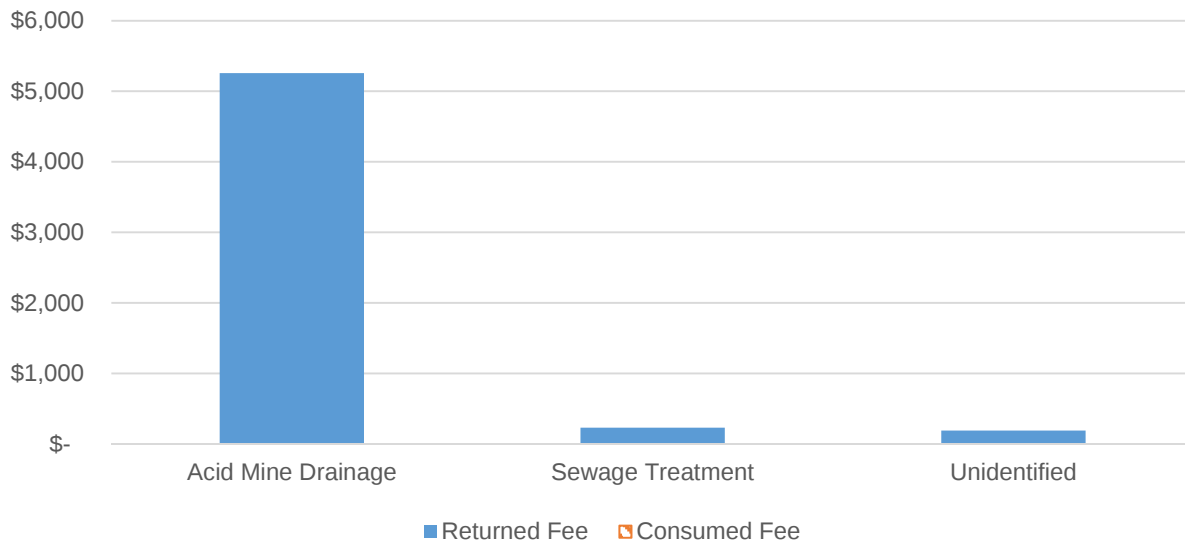
Table 25

Wastewater Collection and Treatment Sector Fees
CY 2015

Facility	Total With-drawal	Coeffi-cient	Water Used & Returned	Water Consumed	Returned Fee	Consumed Fee	Total Fees
Acid Mine Drainage	52,574,550	0.0	52,574,550	0	\$5,257	0	\$5,257
Sewage Treatment	2,296,633	0.0	2,296,633	0	230	0	230
Unidentified	1,898,000	0.0	1,898,000	0	190	0	190

Source: Developed by LBFC staff using data provided by DEP.

Wastewater Collection and Treatment Sector Fees CY 2015



Source: Developed by LBFC staff using data provided by DEP.

B. A minimum threshold of 10,000 gallons per day should apply to the assessment of a water use fee.

Act 220 of 2002 only requires registration and periodic water use reporting to the Pennsylvania Department of Environmental Protection in the following circumstances:

- the entity is a public water supply agency;
- the entity is a hydropower facility; and
- the entity withdraws 10,000 gallons per day or more from one or more points of withdrawal within a watershed operated as a system either concurrently or sequentially.

Given that entities are not required to report water withdrawals under 10,000 gallons per day, a fee threshold should be set using the same reporting requirements.

C. A water use fee of \$0.000018 per gallon of water withdrawn and returned and \$0.00018 per gallon of water withdrawn and consumed would generate \$500 million in fees if there were no exemptions to the fee.³

Calculating the Fee

To determine the water use fee applied to water that is withdrawn and returned, and water that is consumed, we chose to use the same ratio for the fees used in House Bill 20. In the legislation, the fee for water that is consumed is \$0.001 per gallon and the fee for water that is returned is \$0.0001 per gallon; the consumed water fee is 10 times that of the returned water fee. For our analysis, we determined the same ratio between the two should be established using the following formula:

Where WC = Water Consumed; WR = Water Withdrawn and Returned; F = Fee; and DR = Desired Revenue

F	x	WR	+	10F	x	WC	=	DR
---	---	----	---	-----	---	----	---	----

To simplify:

F	=	$\frac{DR}{WR + 10(WC)}$
---	---	--------------------------

Getting back to our *original* ratio, the fee for water that is withdrawn and returned is F and the fee for water that is consumed is 10F.

To generate \$500,000,000 in revenue (DR) in a water resource fee (F), the equation would be as follows:

F	=	$\frac{DR}{WR + 10(WC)}$
F	=	$\frac{\$500,000,000}{25,652,897,280,725 + 10(166,988,407,615)}$
F	=	\$0.00001829975
10F	=	\$0.00018299748

³ We used data provided by the DEP; however, the 2015 DEP water withdrawal amounts for the Oil and Gas sector are limited to the Ohio River Basin and, therefore, our calculations do not include water withdrawal amounts for the Oil and Gas sector in the Susquehanna River Basin or the subsequent fees related to them. In 2015 the SRBC reported 1.3 billion gallons of water used for natural gas extraction (approximately 0.0005 percent of the total withdrawn that year); the impact on the fee calculations would be minimal.

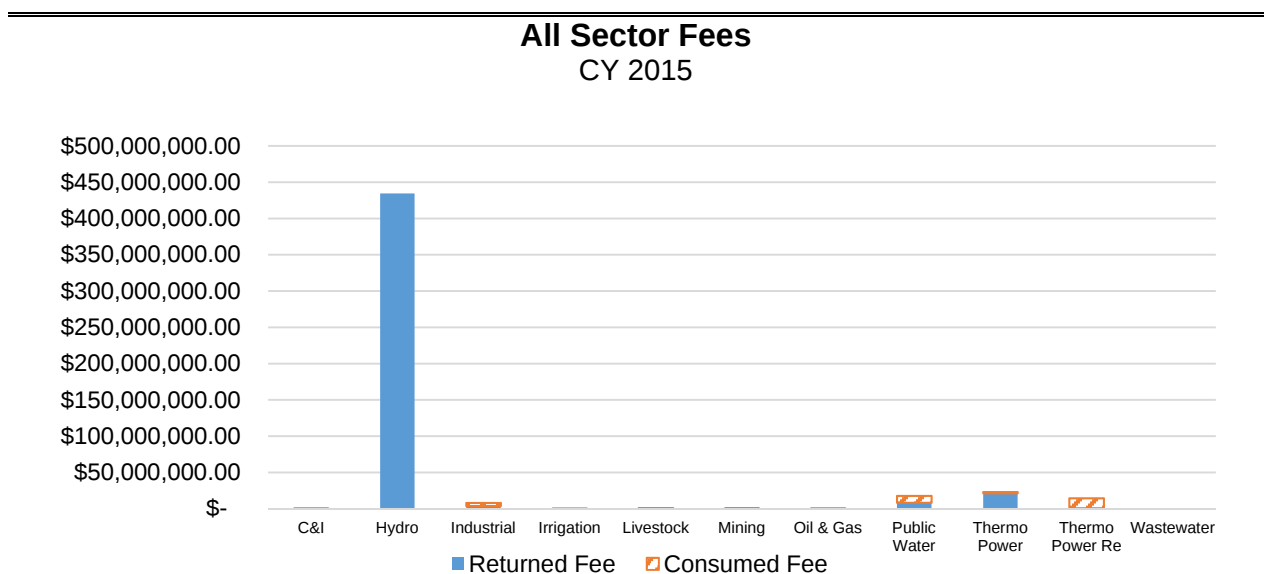
These numbers are based on 25.8 trillion gallons of water used in 2015. Of that, 25.7 trillion gallons of water was withdrawn and returned while 167 billion gallons was consumed. The hydroelectric sector would pay the vast majority of the proposed fee – just under 87 percent. The three power generating sectors—hydroelectric, thermoelectric, and thermoelectric recirculated—combined would pay just over 94 percent of the fees needed to reach \$500 million in revenue. The fees are shown in Table 26 and Exhibit 39.

Table 26

All Sector Fees						
CY 2015						
Facility	Total Withdrawal	Water Used & Returned	Water Consumed	Returned Fee	Consumed Fee	Total Fees
Commercial & Institutional	2,060,622,505	1,854,560,255	206,062,251	\$ 33,938	\$ 37,709	\$ 71,647
Hydroelectric	23,742,184,905,859	23,742,184,905,859	0	434,475,989	0	434,475,989
Industrial	229,681,654,732	206,713,489,259	22,968,165,473	3,782,805	4,203,116	7,985,921
Irrigation	2,331,860,812	233,186,081	2,098,674,731	4,267	384,052	388,319
Livestock	29,853,986,324	27,544,044,268	2,309,942,056	504,049	422,714	926,763
Mining	15,734,987,931	14,161,489,138	1,573,498,793	259,152	287,946	547,098
Oil & Gas	2,605,522,117	2,605,522	2,602,916,595	48	476,327	476,375
Public Water Supply	508,766,795,442	457,890,115,898	50,876,679,544	8,379,274	9,310,304	17,689,577
Thermoelectric Power	1,168,470,963,842	1,158,618,002,734	9,852,961,108	21,202,417	1,803,067	23,005,484
Thermoelectric Power Re	118,137,619,592	43,638,112,529	74,499,507,063	798,566	13,633,222	14,431,788
Wastewater Collection and Treatment	56,769,183	56,769,183	0	1,038	0	1,038

Source: Developed by LBFC staff using data provided by DEP.

Exhibit 39



Source: Developed by LBFC staff using data provided by DEP.

The Commercial & Institutional Sector

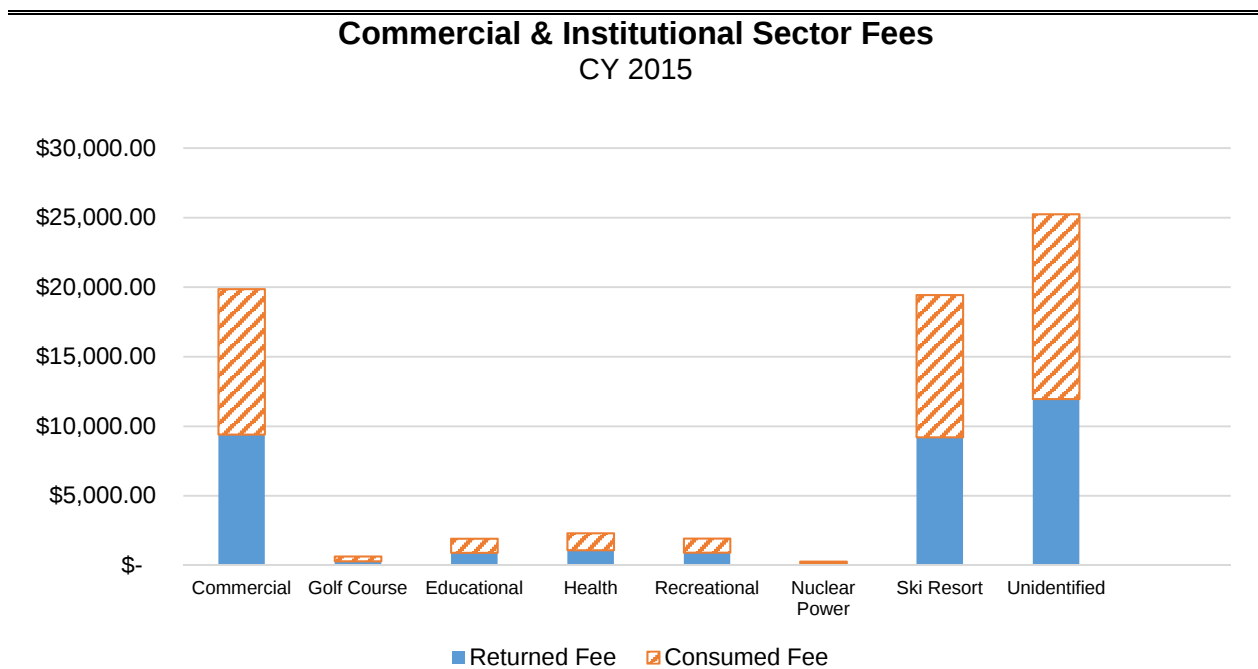
The Commercial & Institutional sector would pay \$71,000 in fees under this scenario, based on 2015 data. Total water withdrawn in 2015 was just over 2 billion gallons, with 1.8 billion gallons returned and 206 million gallons consumed. Three entities—unidentified facilities, ski resorts, and commercial facilities—accounted for 90 percent of the total for this sector. The fees are shown in Table 27 and Exhibit 40.

Table 27

Commercial & Institutional Sector Fees							
CY 2015							
Facility	Total Withdrawal	Coefficient	Water Used & Returned	Water Consumed	Returned Fee	Consumed Fee	Total Fees
Commercial	571,240,681	0.1	514,116,613	57,124,068	\$ 9,408	\$ 10,454	\$ 19,862
Golf Course	18,424,412	0.1	16,581,971	1,842,441	303	337	641
Educational	55,239,099	0.1	49,715,189	5,523,910	910	1,011	1,921
Health	66,453,236	0.1	59,807,912	6,645,324	1,094	1,216	2,311
Recreational	55,641,724	0.1	50,077,552	5,564,172	916	1,018	1,935
Nuclear Power	8,035,558	0.1	7,232,002	803,556	132	147	279
Ski Resort	559,199,056	0.1	503,279,150	55,919,906	9,210	10,233	19,443
Unidentified	726,388,739	0.1	653,749,865	72,638,874	11,963	13,293	25,256

Source: Developed by LBFC staff using data provided by DEP.

Exhibit 40



Source: Developed by LBFC staff using data provided by DEP.

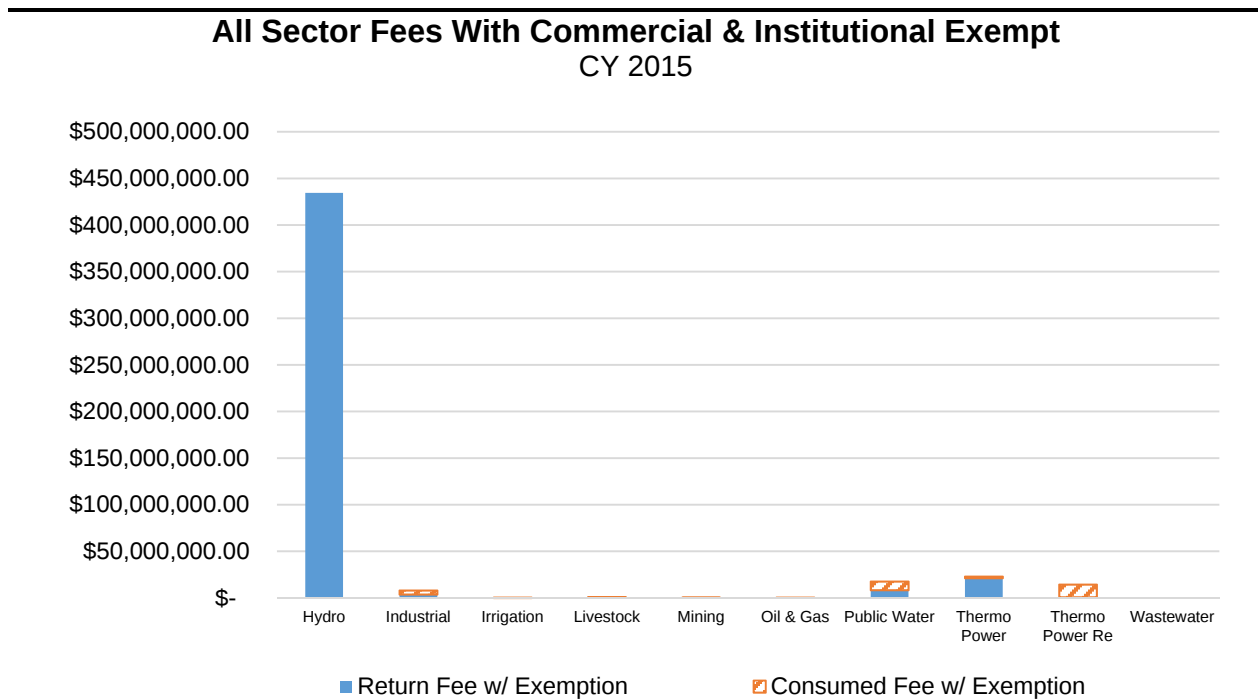
The impact on other sectors, if the Commercial & Institutional sector were exempt, is shown in Table 28 and Exhibit 41.

Table 28

All Sector Fees With Commercial & Institutional Exempt CY 2015							
Facility	Returned Fee	Consumed Fee	Total Fees	Return Fee w/ Exemption	Consumed Fee w/ Exemption	Total Fees	Change
Hydroelectric	\$434,475,989	\$ 0	\$434,475,989	\$434,538,256	\$ 0	\$434,538,256	\$ 62,267
Industrial	3,782,805	4,203,116	7,985,921	3,783,347	4,203,719	7,987,065	1,144
Irrigation	4,267	384,052	388,319	4,268	384,107	388,375	56
Livestock	504,049	422,714	926,763	504,121	422,774	926,895	133
Mining	259,152	287,946	547,098	259,189	287,988	547,176	78
Oil & Gas	48	476,327	476,375	48	476,395	476,443	68
Public Water Supply	8,379,274	9,310,304	17,689,577	8,380,474	9,311,638	17,692,113	2,535
Thermoelectric Power	21,202,417	1,803,067	23,005,484	21,205,456	1,803,325	23,008,781	3,297
Thermoelectric Power Re	798,566	13,633,222	14,431,788	798,681	13,635,176	14,433,856	2,068
Wastewater Collection and Treatment	1,039	0	1,039	1,039	0	1,039	0

Source: Developed by LBFC staff using data provided by DEP.

Exhibit 41



Source: Developed by LBFC staff using data provided by DEP.

The Hydroelectric Sector

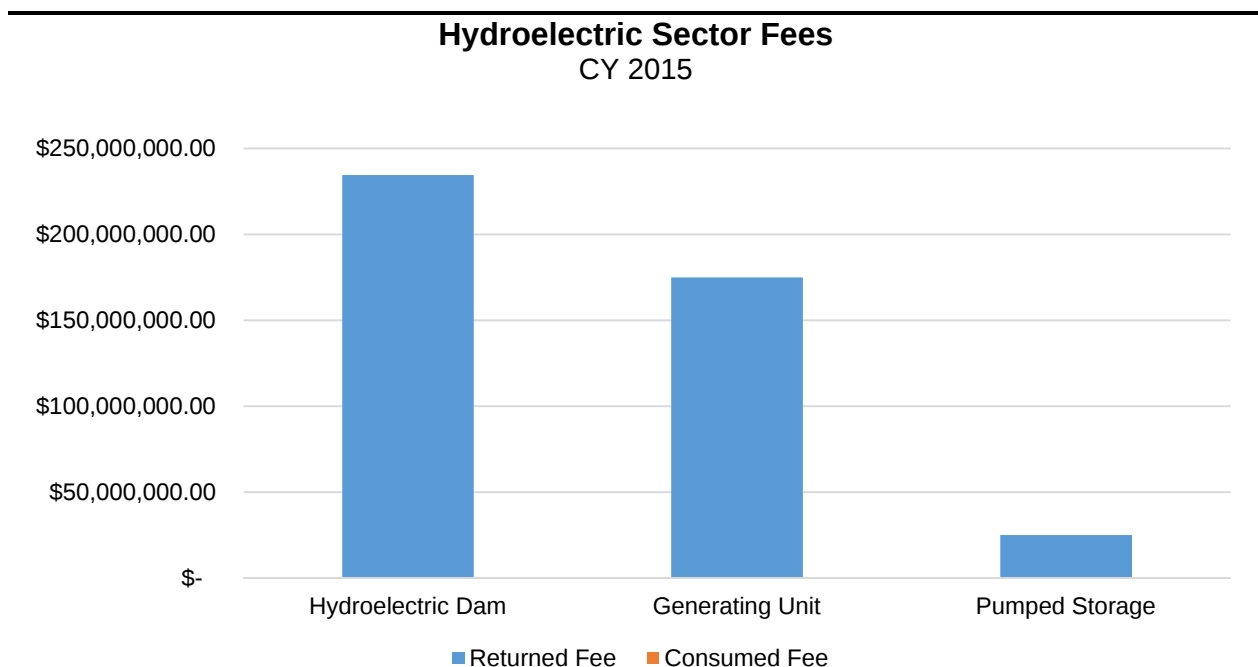
The Hydroelectric sector, under a scenario designed to collect \$500 million in fees, would pay \$434 million, or nearly 87 percent of the total, based on 2015 data. The total water withdrawn for the same period was just under 24 trillion gallons and no water was consumed. The fees are shown in Table 29 and Exhibit 42.

Table 29

Hydroelectric Sector Fees							
CY 2015							
Facility	Total Withdrawal	Co-efficient	Water Used & Returned	Water Consumed	Returned Fee	Consumed Fee	Total Fees
Hydro-electric Dam	12,814,796,805,635	0	12,814,796,805,635	0	\$234,507,546	0	\$234,507,546
Generating Unit	9,559,549,672,178	0	9,559,549,672,178	0	174,937,345	0	174,937,345
Pumped Storage	1,367,838,428,046	0	1,367,838,428,046	0	25,031,098	0	25,031,098

Source: Developed by LBFC staff using data provided by DEP.

Exhibit 42



Source: Developed by LBFC staff using data provided by DEP.

Exempting hydroelectric power would have a significant impact on other sectors. Thermoelectric power would pay \$248 million in additional fees. The Public Water Supply Sector would pay an additional \$117 million in fees. Together, these

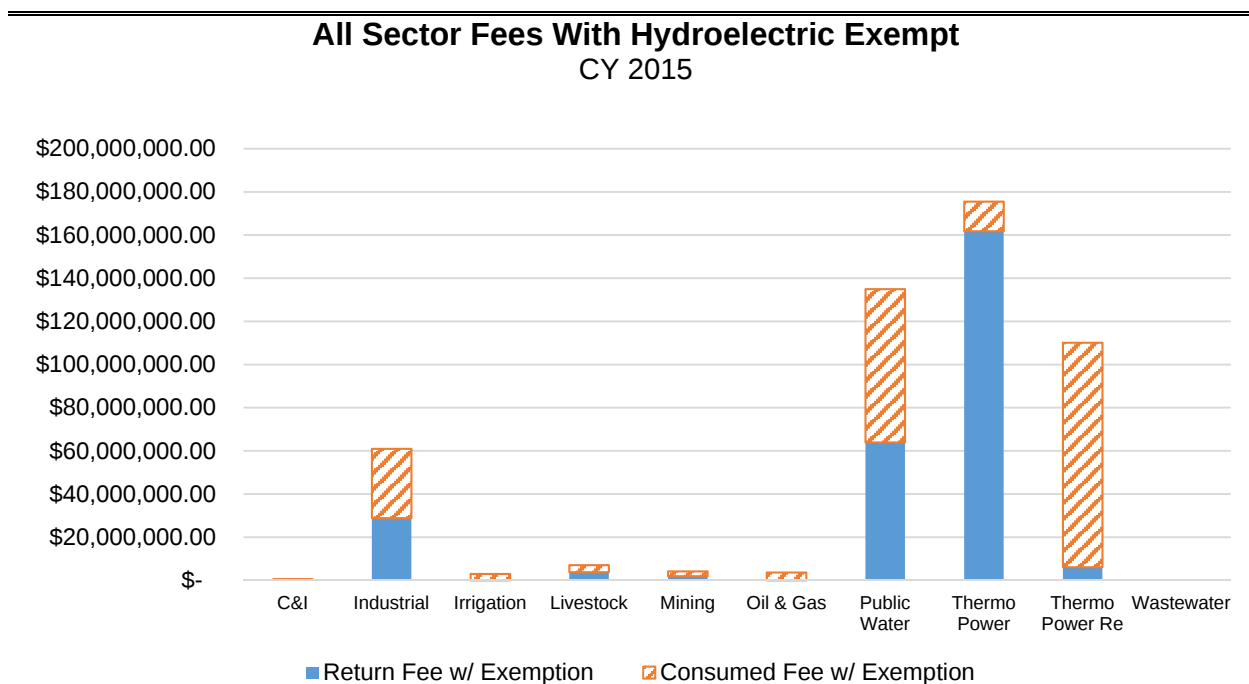
sectors would pay 84 percent of the additional fees if hydroelectric were to be exempted. The impact on all other sectors is shown in Table 30 and Exhibit 43.

Table 30

All Sector Fees With Hydroelectric Exempt CY 2015							
Facility	Returned Fee	Consumed Fee	Total Fees	Return Fee w/ Exemption	Consumed Fee w/ Exemption	Total Fees	Change
Commercial & Institutional	\$ 33,938	\$ 37,709	\$ 71,647	\$ 258,974	\$ 287,748	\$ 546,722	\$ 475,075
Hydroelectric	434,475,989	0	434,475,989	0	0	0	0
Industrial	3,782,805	4,203,116	7,985,921	28,865,790	32,073,100	60,938,890	52,952,969
Irrigation	4,267	384,052	388,319	32,562	2,930,622	2,963,184	2,574,865
Livestock	504,049	422,714	926,763	3,846,293	3,225,639	7,071,931	6,145,169
Mining	259,152	287,946	547,098	1,977,532	2,197,258	4,174,790	3,627,692
Oil & Gas	48	476,327	476,375	364	3,634,753	3,635,117	3,158,742
Public Water Supply	8,379,274	9,310,304	17,689,577	63,940,481	71,044,978	134,985,459	117,295,882
Thermoelectric Power	21,202,417	1,803,067	23,005,484	161,791,201	13,758,827	175,550,028	152,544,544
Thermoelectric Power Re	798,566	13,633,222	14,431,788	6,093,693	104,032,258	110,125,952	95,694,164
Wastewater Collection and Treatment	1,039	0	1,039	7,927	0	7,927	6,888

Source: Developed by LBFC staff using data provided by DEP.

Exhibit 43



Source: Developed by LBFC staff using data provided by DEP.

The Industrial Sector

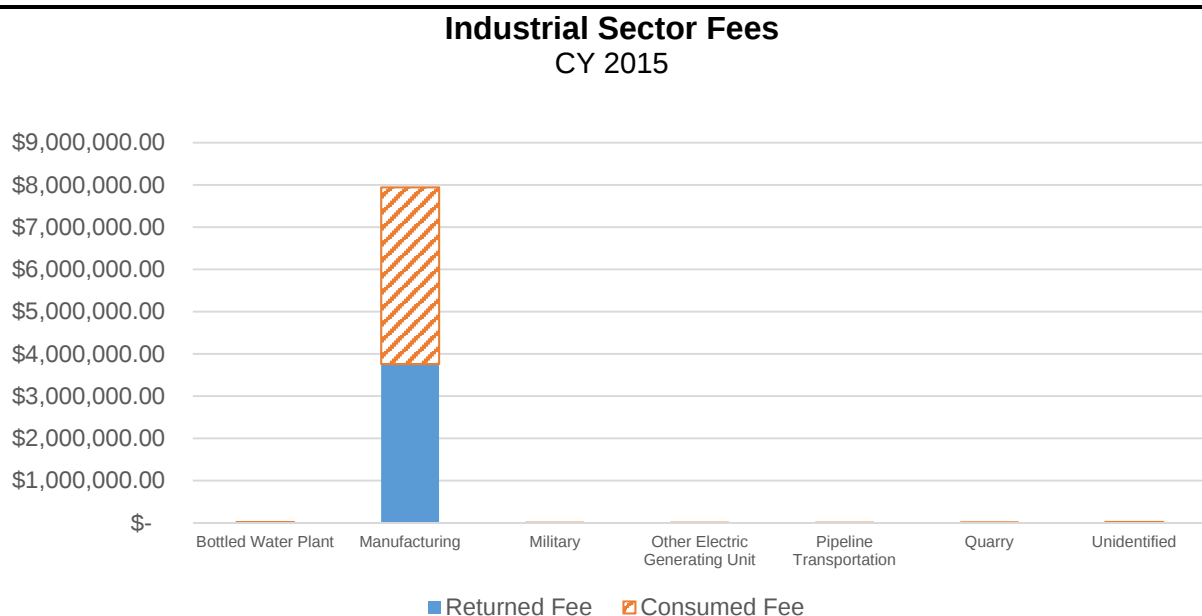
The Industrial sector would pay \$7.9 million in fees under this scenario, based on 2015 data. Total water withdrawals were 230 billion gallons, with 207 billion gallons returned and 23 billion gallons consumed. Manufacturing accounts for over 99 percent of the total in this sector. The fees are shown in Table 31 and Exhibit 44.

Table 31

Industrial Sector Fees							
CY 2015							
Facility	Total With- drawal	Coeffi- cient	Water Used & Returned	Water Consumed	Returned Fee	Con- sumed Fee	Total Fees
Bottled Water Plant	442,323,419	0.1	398,091,077	44,232,342	\$ 7,285	\$ 8,094	\$ 15,379
Manufactur- ing	228,444,021,213	0.1	205,599,619,092	22,844,402,121	3,762,421	4,180,468	7,942,889
Military	3,522,600	0.1	3,170,340	352,260	58	64	122
Other Electric Generating Unit	5,473,537	0.1	4,926,183	547,354	90	100	190
Pipeline Transporta- tion	2,998,050	0.1	2,698,245	299,805	49	55	104
Quarry	122,383,000	0.1	110,144,700	12,238,300	2,016	2,240	4,255
Unidentified	660,932,913	0.1	594,839,622	66,093,291	10,885	12,095	22,980

Source: Developed by LBFC staff using data provided by DEP.

Exhibit 44



Source: Developed by LBFC staff using data provided by DEP.

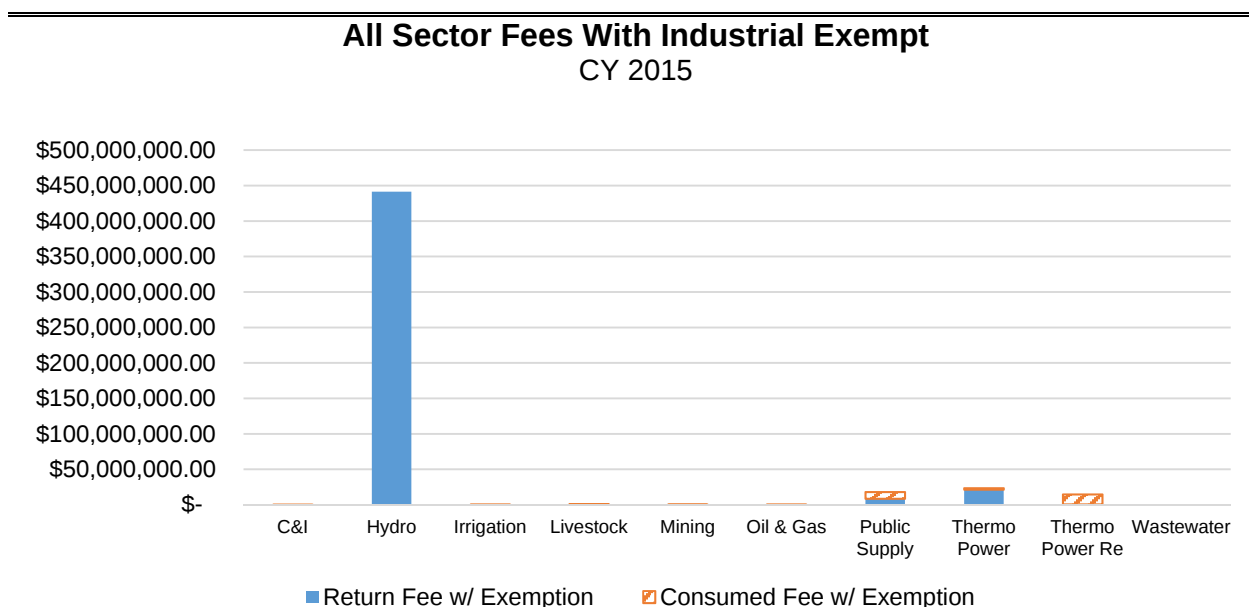
Exempting the industrial sector would require an increase of \$7 million in fees paid by the hydroelectric sector. If all power producing sectors were combined, the increase would be just over \$7.6 million. The increase in fees is shown in Table 32 and Exhibit 45.

Table 32

All Sector Fees With Industrial Exempt CY 2015							
Facility	Returned Fee	Consumed Fee	Total Fees	Return Fee w/ Exemption	Consumed Fee w/ Exemption	Total Fees	Change
Commercial & Institutional	\$ 33,938	\$ 37,709	\$ 71,647	\$ 34,489	\$ 38,321	\$ 72,810	\$ 1,163
Hydroelectric	434,475,989	0	434,475,989	441,528,005	0	441,528,005	7,052,015
Industrial	3,782,805	4,203,116	7,985,921	0	0	0	0
Irrigation	4,267	384,052	388,319	4,337	390,286	394,622	6,303
Livestock	504,049	422,714	926,763	512,230	429,575	941,805	15,042
Mining	259,152	287,946	547,098	263,358	292,620	555,978	8,880
Oil & Gas	48	476,327	476,375	48	484,058	484,107	7,732
Public Water Supply	8,379,274	9,310,304	17,689,577	8,515,278	9,461,420	17,976,698	287,121
Thermoelectric Power	21,202,417	1,803,067	23,005,484	21,546,555	1,832,333	23,378,888	373,404
Thermoelectric Power Re	798,566	13,633,222	14,431,788	811,528	13,854,504	14,666,032	234,244
Wastewater Collection and Treatment	1,039	0	1,039	1,056	0	1,056	17

Source: Developed by LBFC staff using data provided by DEP.

Exhibit 45



Source: Developed by LBFC staff using data provided by DEP.

The Irrigation Sector

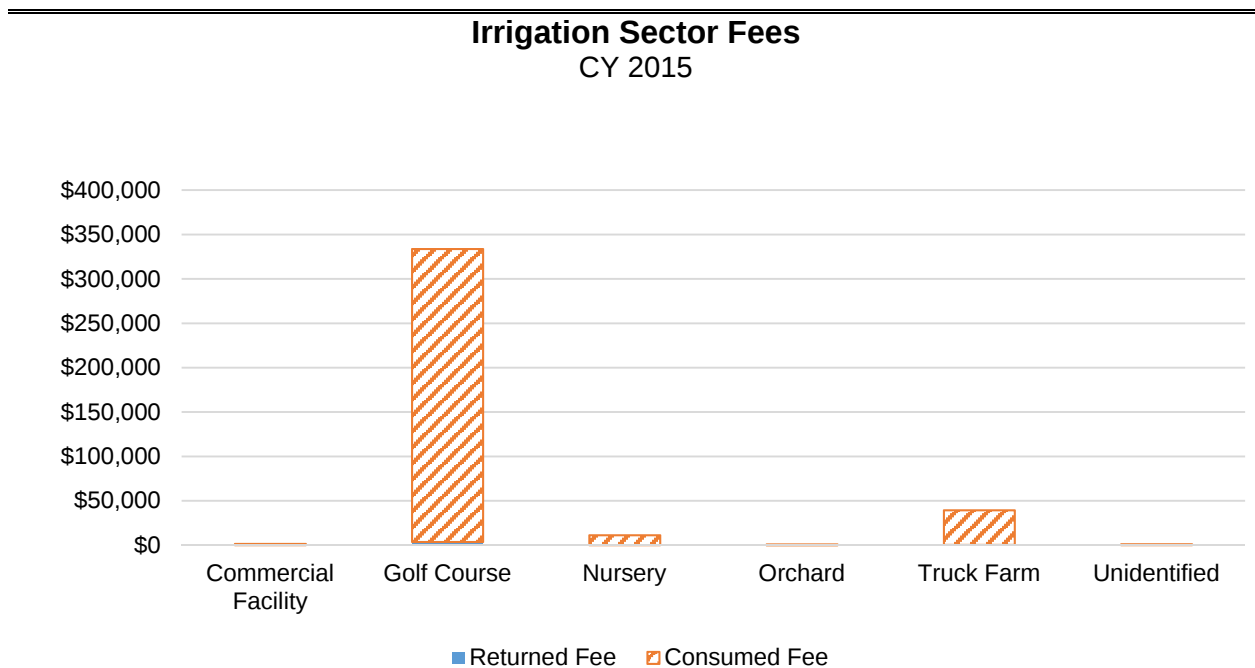
Based on 2015 data, the Irrigation sector would pay \$388,000 in fees under a scenario designed to generate \$500 million in total revenue, with golf courses paying 86 percent of the sector's fees. Facilities in this sector withdrew 2.3 billion gallons of water in 2015 – consuming nearly 90 percent of the total. The fees are shown in Table 33 and Exhibit 46.

Table 33

Irrigation Sector Fees CY 2015							
Facility	Total Withdrawal	Coefficient	Water Used & Returned	Water Consumed	Returned Fee	Consumed Fee	Total Fees
Commercial Facility	9,413,708	0.9	941,371	8,472,337	\$ 17	\$ 1,550	\$ 1,568
Golf Course	2,004,227,893	0.9	200,422,789	1,803,805,104	3,668	330,092	333,759
Nursery	68,013,548	0.9	6,801,355	61,212,193	124	11,202	11,326
Orchard	5,741,440	0.9	574,144	5,167,296	11	946	956
Truck Farm	237,100,976	0.9	23,710,098	213,390,878	434	39,050	39,484
Unidentified	7,363,247	0.9	736,325	6,626,922	13	1,213	1,226

Source: Developed by LBFC staff using data provided by DEP.

Exhibit 46



Source: Developed by LBFC staff using data provided by DEP.

The impact on other sectors, if the Irrigation Sector were to be exempted, is shown in Table 34 and Exhibit 47.

Table 34

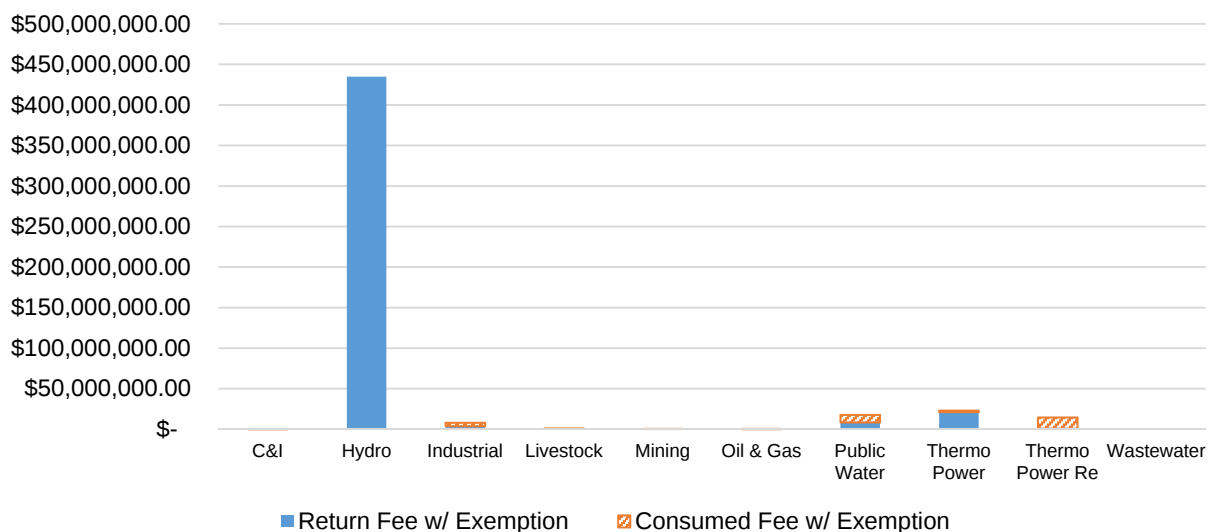
**All Sectors With Irrigation Exempt
CY 2015**

Facility	Return Fee	Consumed Fee	Total Fees	Return Fee w/ Exemption	Consumed Fee w/ Exemption	Total Fees	Change
Commercial & Institutional	\$ 33,938	\$ 37,709	\$ 71,647	\$ 33,964	\$ 37,738	\$ 71,703	\$ 56
Hydroelectric	434,475,989	0	434,475,989	434,813,682	0	434,813,682	337,693
Industrial	3,782,805	4,203,116	7,985,921	3,785,745	4,206,383	7,992,128	6,207
Irrigation	4,267	384,052	388,319	0	0	0	0
Livestock	504,049	422,714	926,763	504,441	423,042	927,483	720
Mining	259,152	287,946	547,098	259,353	288,170	547,523	425
Oil & Gas	48	476,327	476,375	48	476,697	476,745	370
Public Water Supply	8,379,274	9,310,304	17,689,577	8,385,786	9,317,540	17,703,326	13,749
Thermoelectric Power	21,202,417	1,803,067	23,005,484	21,218,896	1,804,468	23,023,365	17,881
Thermoelectric Power Re	798,566	13,633,222	14,431,788	799,187	13,643,818	14,443,005	11,217
Wastewater Collection and Treatment	1,039	0	1,039	1,040	0	1,040	1

Source: Developed by LBFC staff using data provided by DEP.

Exhibit 47

**All Sectors With Irrigation Exempt
CY 2015**



Source: Developed by LBFC staff using data provided by DEP.

The Livestock Sector

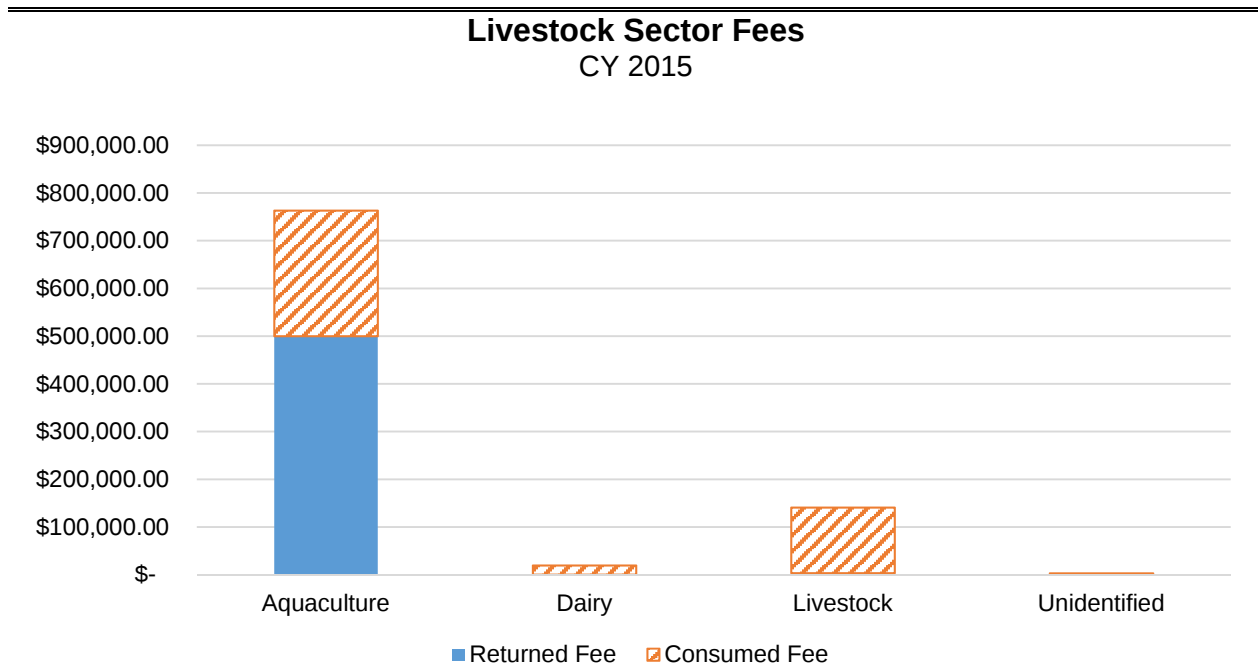
The Livestock sector would pay \$927,000 in fees under this scenario. In 2015, total water withdrawn was just under 30 billion gallons, with water returned approximately 27 billion gallons and water consumed just over 2 billion gallons. Aquaculture makes up 82 percent of the fees paid by the Livestock Sector. The fees are shown in Table 35 and Exhibit 48.

Table 35

Livestock Sector Fees							
CY 2015							
Facility	Total With-drawal	Coefficient	Water Used & Returned	Water Consumed	Returned Fee	Consumed Fee	Total Fees
Aquaculture	28,764,329,337	0.05	27,326,112,870	1,438,216,467	\$500,061	\$ 263,190	\$763,251
Dairy	130,123,700	0.8	26,024,740	104,098,960	476	19,050	19,526
Livestock	938,508,507	0.8	187,701,701	750,806,806	3,435	137,396	140,831
Unidentified	21,024,780	0.8	4,204,956	16,819,824	77	3,078	3,155

Source: Developed by LBFC staff using data provided by DEP.

Exhibit 48



Source: Developed by LBFC staff using data provided by DEP.

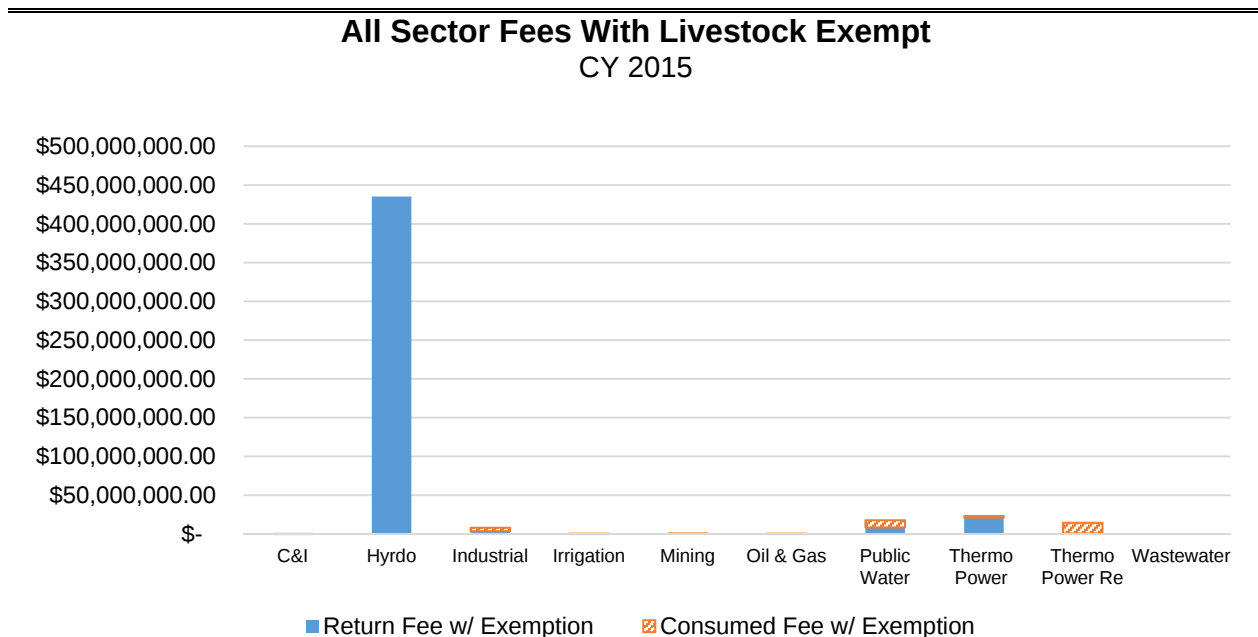
Exempting the Livestock Sector would have the following impact, shown in Table 36 and Exhibit 49.

Table 36

All Sector Fees With Livestock Exempt CY 2015							
Facility	Return Fee	Consumed Fee	Total Fees	Return Fee w/ Exemption	Consumed Fee w/ Exemption	Total Fees	Change
Commercial & Institutional	\$ 33,938	\$ 37,709	\$ 71,647	\$ 34,001	\$ 37,779	\$ 71,780	\$ 133
Hydroelectric	434,475,989	0	434,475,989	435,282,797	0	435,282,797	806,808
Industrial	3,782,805	4,203,116	7,985,921	3,789,829	4,210,921	8,000,751	14,830
Irrigation	4,267	384,052	388,319	4,275	384,765	389,041	721
Livestock	504,049	422,714	926,763	0	0	0	0
Mining	259,152	287,946	547,098	259,633	288,481	548,114	1,016
Oil & Gas	48	476,327	476,375	48	477,212	477,259	885
Public Water Supply	8,379,274	9,310,304	17,689,577	8,394,834	9,327,593	17,722,426	32,849
Thermoelectric Power	21,202,417	1,803,067	23,005,484	21,241,789	1,806,415	23,048,204	42,720
Thermoelectric Power Re	798,566	13,633,222	14,431,788	800,049	13,658,538	14,458,587	26,799
Wastewater Collection and Treatment	1,039	0	1,039	1,041	0	1,041	2

Source: Developed by LBFC staff using data provided by DEP.

Exhibit 49



Source: Developed by LBFC staff using data provided by DEP.

The Mining Sector

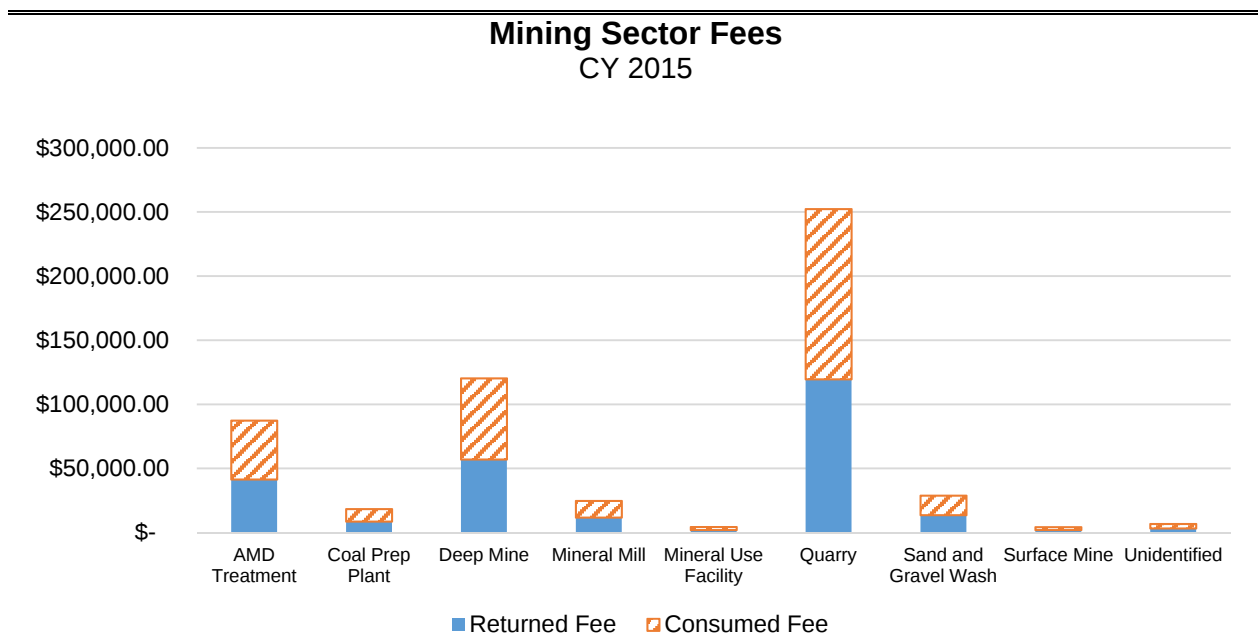
The Mining sector would pay \$547,000 in fees in the \$500 million scenario. In 2015, entities in this sector withdrew 15.7 billion gallons of water. Of that, 14.1 billion was returned and 1.6 billion was consumed. Quarries, deep mines, and acid mine drainage treatment facilities accounted for 84 percent of the total. The fees are shown in Table 37 and Exhibit 50.

Table 37

Mining Sector Fees							
CY 2015							
Facility	Total Withdrawal	Coefficient	Water Used & Returned	Water Consumed	Returned Fee	Consumed Fee	Total Fees
AMD Treat-ment	2,513,160,000	0.1	2,261,844,000	251,316,000	\$ 41,391	\$45,990	\$87,381
Coal Prep Plant	525,926,805	0.1	473,334,125	52,592,681	8,662	9,624	18,286
Deep Mine	3,459,325,161	0.1	3,113,392,645	345,932,516	56,974	63,305	120,279
Mineral Mill	710,764,950	0.1	639,688,455	71,076,495	11,706	13,007	24,713
Mineral Use Facility	124,953,256	0.1	112,457,930	12,495,326	2,058	2,287	4,345
Quarry	7,257,331,295	0.1	6,531,598,166	725,733,130	119,527	132,807	252,334
Sand and Gravel Wash	828,501,804	0.1	745,651,624	82,850,180	13,645	15,161	28,807
Surface Mine	120,431,340	0.1	108,388,206	12,043,134	1,983	2,204	4,187
Unidentified	194,593,320	0.1	175,133,988	19,459,332	3,205	3,561	6,766

Source: Developed by LBFC staff using data provided by DEP.

Exhibit 50



Source: Developed by LBFC staff using data provided by DEP.

Exempting mining, while continuing to maintain \$500 million in fee revenue would require the other sectors to make up the difference. The largest increase would fall on the Hydroelectric sector at \$476,000. The impact on other sectors are shown in Table 38 and Exhibit 51.

Table 38

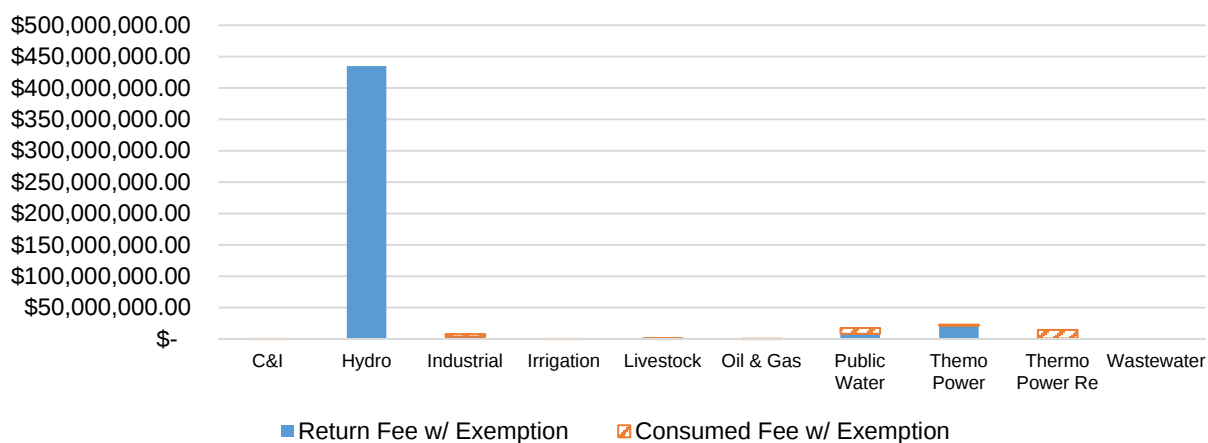
**All Sector Fees With Mining Exempt
CY 2015**

Facility	Return Fee	Consumed Fee	Total Fees	Return Fee w/ Exemption	Consumed Fee w/ Exemption	Total Fees	Change
Commercial & Institutional	\$ 33,938	\$ 37,709	\$ 71,647	\$ 33,975	\$ 37,750	\$ 71,725	\$ 78
Hydroelectric	434,475,989	0	434,475,989	434,951,912	0	434,951,912	475,923
Industrial	3,782,805	4,203,116	7,985,921	3,786,948	4,207,720	7,994,669	8,748
Irrigation	4,267	384,052	388,319	4,272	384,473	388,745	425
Livestock	504,049	422,714	926,763	504,601	423,177	927,778	1,015
Mining	259,152	287,946	547,098	0	0	0	0
Oil & Gas	48	476,327	476,375	48	476,849	476,897	522
Public Water Supply	8,379,274	9,310,304	17,689,577	8,388,452	9,320,502	17,708,954	19,377
Thermoelectric Power	21,202,417	1,803,067	23,005,484	21,225,642	1,805,042	23,030,684	25,200
Thermoelectric Power Re	798,566	13,633,222	14,431,788	799,441	13,648,155	14,447,597	15,809
Wastewater Collection and Treatment	1,039	0	1,039	1,040	0	1,040	1

Source: Developed by LBFC staff using data provided by DEP.

Exhibit 51

**All Sector Fees With Mining Exempt
CY 2015**



Source: Developed by LBFC staff using data provided by DEP.

The Oil & Gas Sector

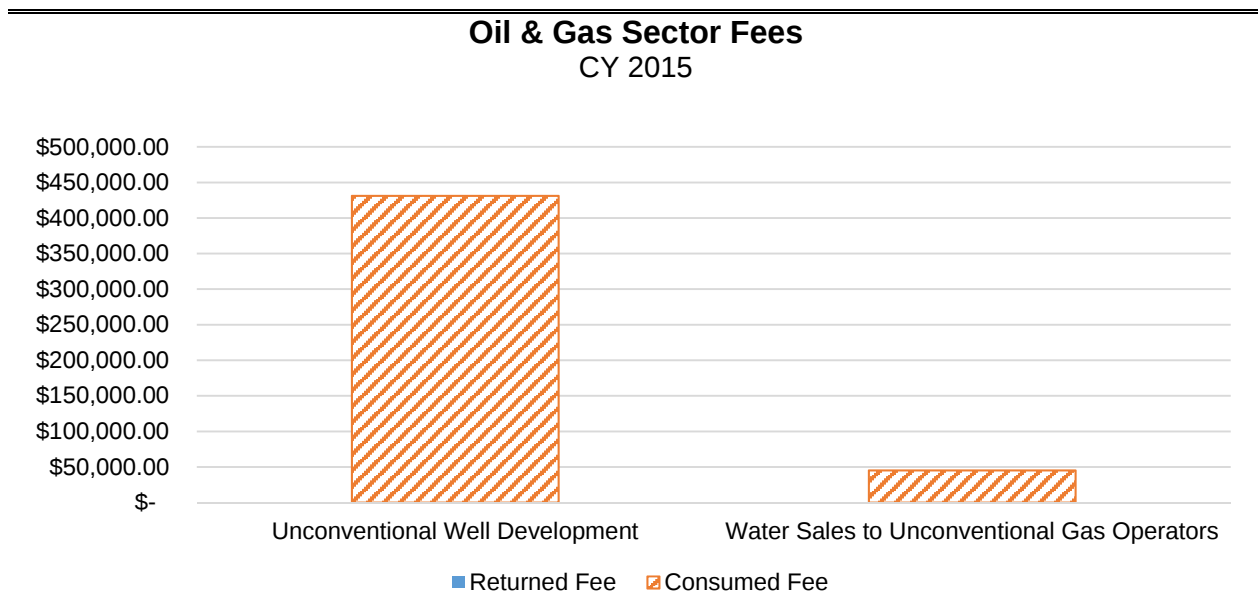
The Oil & Gas Sector would be required to pay \$476,000 in fees based on 2.6 billion gallons withdrawn, of which, nearly 91 percent would be consumed. The fees are shown in Table 39 and Exhibit 52.

Table 39

Oil & Gas Sector Fees							
CY 2015							
Facility	Total Withdrawal	Coefficient	Water Used & Returned	Water Consumed	Returned Fee	Consumed Fee	Total Fees
Unconventional Well Development	2,358,483,031	0.999	2,358,483	2,356,124,548	\$43	\$431,165	\$431,208
Water Sales to Unconventional Gas Operators	247,039,086	0.999	247,039	246,792,047	5	45,162	45,167

Source: Developed by LBFC staff using data provided by DEP.

Exhibit 52



Source: Developed by LBFC staff using data provided by DEP.

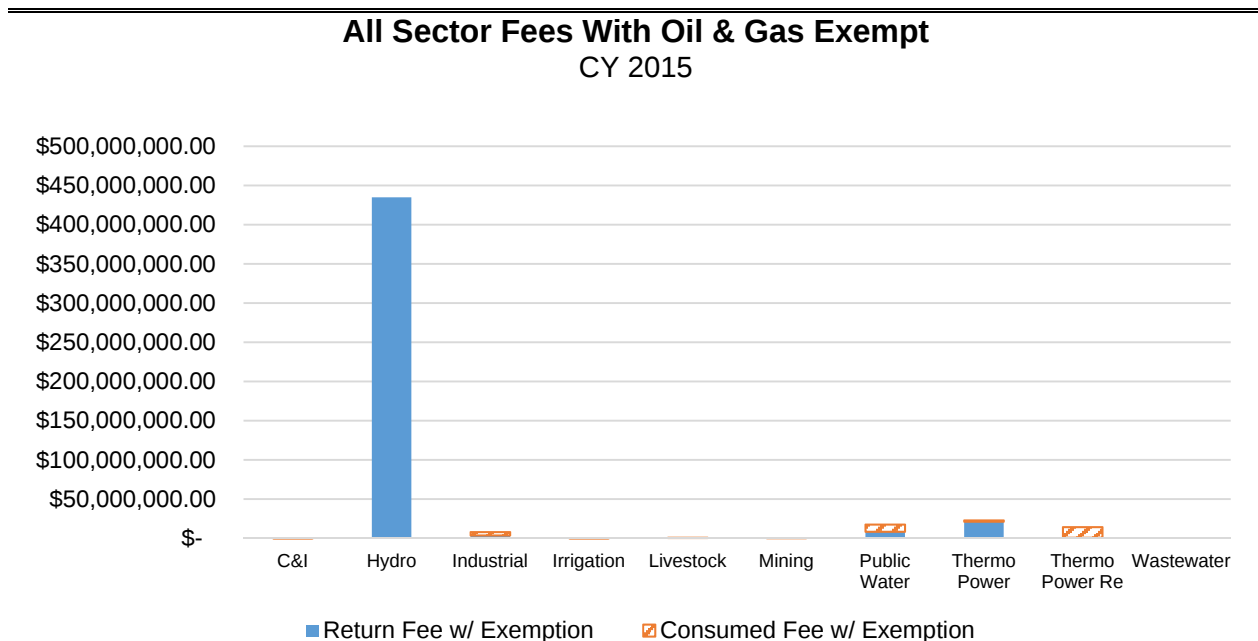
Exempting the Oil & Gas Sector would have the following impact, shown in Table 40 and Exhibit 53.

Table 40

All Sector Fees With Oil & Gas Exempt CY 2015							
Facility	Return Fee	Consumed Fee	Total Fees	Return Fee w/ Exemption	Consumed Fee w/ Exemption	Total Fees	Change
Commercial & Institutional	\$ 33,938	\$ 37,709	\$ 71,647	\$ 33,970	\$ 37,745	\$ 71,715	\$ 68
Hydroelectric	434,475,989	0	434,475,989	434,890,331	0	434,890,331	414,342
Industrial	3,782,805	4,203,116	7,985,921	3,786,412	4,207,125	7,993,537	7,616
Irrigation	4,267	384,052	388,319	4,271	384,418	388,690	370
Livestock	504,049	422,714	926,763	504,530	423,117	927,646	884
Mining	259,152	287,946	547,098	259,399	288,221	547,620	522
Oil & Gas	48	476,327	476,375	0	0	0	0
Public Water Supply	8,379,274	9,310,304	17,689,577	8,387,264	9,319,183	17,706,447	16,870
Thermoelectric Power	21,202,417	1,803,067	23,005,484	21,222,637	1,804,787	23,027,423	21,939
Thermoelectric Power Re	798,566	13,633,222	14,431,788	799,328	13,646,223	14,445,551	13,763
Wastewater Collection and Treatment	1,039	0	1,039	1,040	0	1,040	1

Source: Developed by LBFC staff using data provided by DEP.

Exhibit 53



Source: Developed by LBFC staff using data provided by DEP.

The Public Water Supply Sector

The Public Water Supply Sector would pay \$17.7 million in fees under this scenario, based on 2015 data. Total water withdrawn was just over 508 billion gallons, of which 458 billion gallons was returned and 51 billion gallons was consumed. Three entities—authorities, municipal water, and privately owned water companies—accounted for 92 percent of the fees paid by this sector. The fees are shown in Table 41 and Exhibit 54.

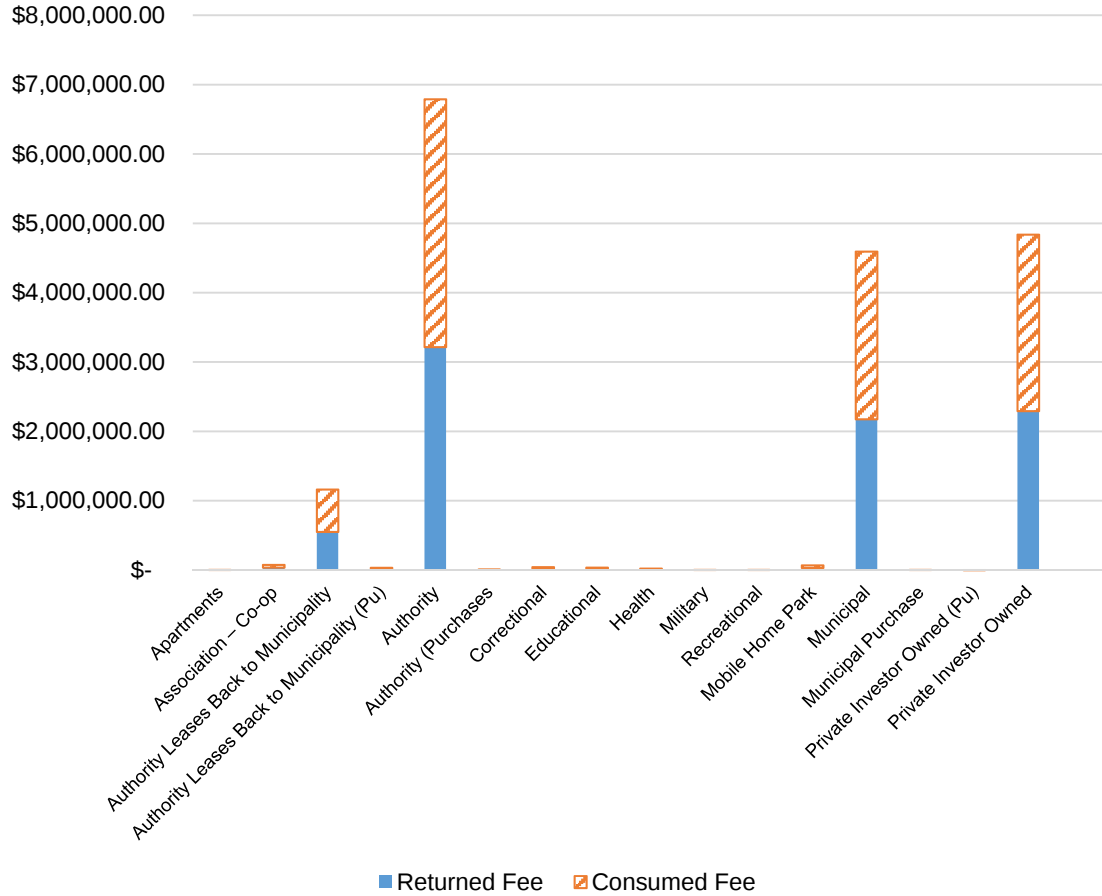
Table 41

Public Water Supply Sector Fees							
CY 2015							
Facility	Total Withdrawal	Coefficient	Water Used & Returned	Water Consumed	Returned Fee	Consumed Fee	Total Fees
Apartments	154,442,866	0.1	138,998,579	15,444,287	\$ 2,544	\$ 2,826	\$ 5,370
Association – Co-op	2,154,262,181	0.1	1,938,835,963	215,426,218	35,480	39,422	74,903
Authority Leases Back to Municipality	33,400,572,068	0.1	30,060,514,861	3,340,057,207	550,100	611,222	1,161,322
Authority Leases Back to Municipality (Pu)	1,015,167,389	0.1	913,650,650	101,516,739	16,720	18,577	35,297
Authority	195,280,507,100	0.1	175,752,456,390	19,528,050,710	3,216,226	3,573,584	6,789,810
Authority (Purchases)	278,897,447	0.1	251,007,702	27,889,745	4,593	5,104	9,697
Correctional	1,238,982,136	0.1	1,115,083,922	123,898,214	20,406	22,673	43,079
Educational	1,055,017,813	0.1	949,516,032	105,501,781	17,376	19,307	36,682
Health	663,230,595	0.1	596,907,536	66,323,060	10,923	12,137	23,060
Military	127,917,322	0.1	115,125,590	12,791,732	2,107	2,341	4,448
Recreational	61,417,300	0.1	55,275,570	6,141,730	1,012	1,124	2,135
Mobile Home Park	1,951,083,803	0.1	1,755,975,423	195,108,380	32,134	35,704	67,838
Municipal	132,089,949,297	0.1	118,880,954,367	13,208,994,930	2,175,491	2,417,213	4,592,704
Municipal Purchase	98,967,000	0.1	89,070,300	9,896,700	1,630	1,811	3,441
Private Investor Owned (Pu)	42,231,800	0.1	38,008,620	4,223,180	696	773	1,468
Private Investor Owned	139,154,149,325	0.1	125,238,734,393	13,915,414,933	2,291,837	2,546,486	4,838,323

Source: Developed by LBFC staff using data provided by DEP.

Exhibit 54

Public Water Supply Sector Fees
CY 2015



Source: Developed by LBFC staff using data provided by DEP.

Exempting the Public Water Supply sector would significantly impact other industries. For example, the Hydroelectric sector would see an increase in fees of \$15.9 million, while the combined Thermoelectric sectors would see an increase of \$1.4 million. The impact on all other sectors is shown in Table 42 and Exhibit 55.

Table 42

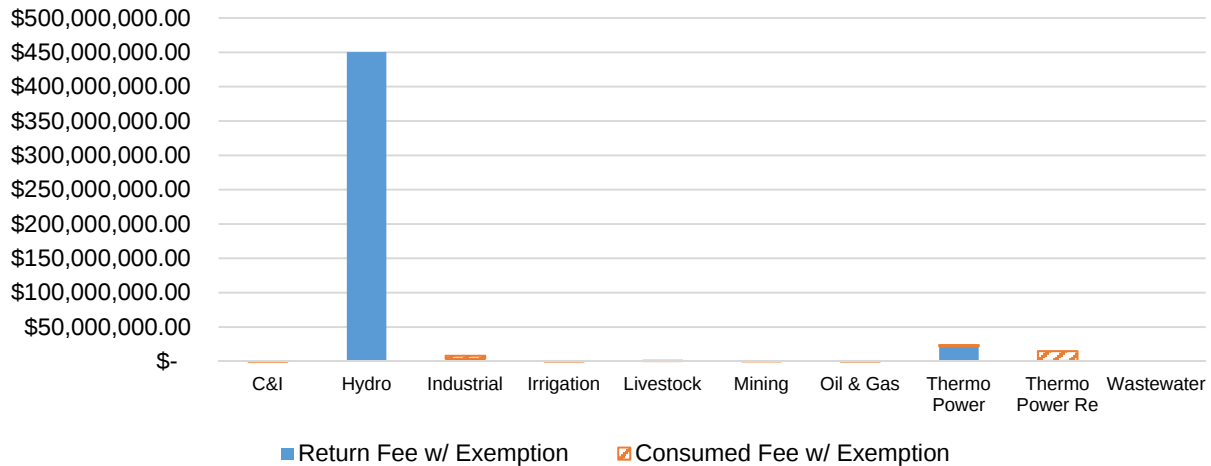
**All Sector Fees With Public Water Exempt
CY 2015**

Facility	Return Fee	Consumed Fee	Total Fees	Return Fee w/ Exemption	Consumed Fee w/ Exemption	Total Fees	Change
Commercial & Institutional	\$ 33,938	\$ 37,709	\$ 71,647	\$ 35,183	\$ 39,092	\$ 74,275	\$ 2,628
Hydroelectric	434,475,989	0	434,475,989	450,411,155	0	450,411,155	15,935,166
Industrial	3,782,805	4,203,116	7,985,921	3,921,546	4,357,273	8,278,819	292,898
Irrigation	4,267	384,052	388,319	4,424	398,138	402,562	14,242
Livestock	504,049	422,714	926,763	522,536	438,217	960,753	33,991
Mining	259,152	287,946	547,098	268,657	298,507	567,164	20,066
Oil & Gas	48	476,327	476,375	49	493,797	493,847	17,472
Public Water Supply	8,379,274	9,310,304	17,689,577	0	0	0	0
Thermoelectric Power	21,202,417	1,803,067	23,005,484	21,980,053	1,869,198	23,849,250	843,766
Thermoelectric Power Re	798,566	13,633,222	14,431,788	827,855	14,133,244	14,961,099	529,311
Wastewater Collection and Treatment	1,039	0	1,039	1,077	0	1,077	38

Source: Developed by LBFC staff using data provided by DEP.

Exhibit 55

**All Sector Fees With Public Water Exempt
CY 2015**



Source: Developed by LBFC staff using data provided by DEP.

The Thermoelectric Sector

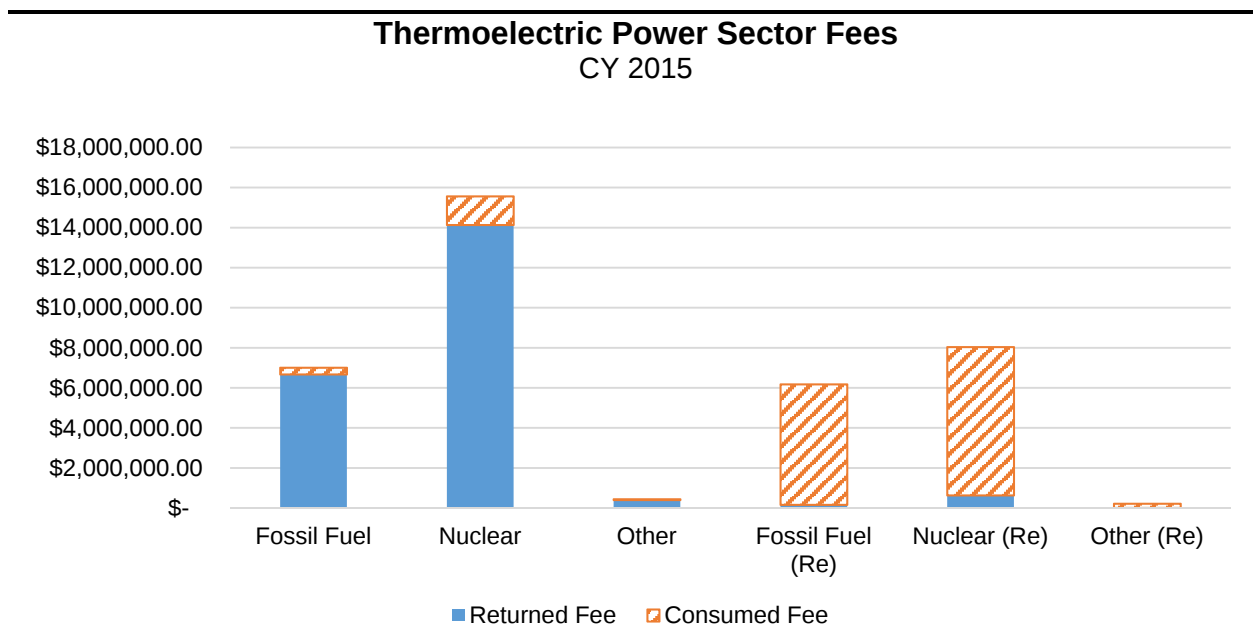
The Thermoelectric sector will pay \$37.4 million under the \$500 million scenario, based on 2015 data. Total water withdrawals were 1.3 trillion gallons. Water returned was 1.2 trillion gallons, while consumed water was 84 billion gallons. Nuclear power accounted for 42 percent of the total for this sector. The fees are shown in Table 43 and Exhibit 56.

Table 43

Thermoelectric Power Sector Fees							
CY 2015							
Facility	Total Withdrawal	Coef- fi- cient	Water Used & Returned	Water Consumed	Returned Fee	Con- sumed Fee	Total Fees
Fossil Fuel	366,349,706,096	0.005	364,517,957,566	1,831,748,530	\$ 6,670,587	\$ 335,205	\$7,005,792
Nuclear	780,272,418,116	0.01	772,469,693,935	7,802,724,181	14,136,000	1,427,879	15,563,879
Other	21,848,839,630	0.01	21,630,351,234	218,488,396	395,830	39,983	435,813
Fossil Fuel (Re)	41,634,373,075	0.79	8,743,218,346	32,891,154,729	159,999	6,018,998	6,178,997
Nuclear (Re)	74,942,198,017	0.54	34,473,411,088	40,468,786,929	630,855	7,405,686	8,036,541
Other (Re)	1,561,048,500	0.73	421,483,095	1,139,565,405	7,713	208,538	216,251

Source: Developed by LBFC staff using data provided by DEP.

Exhibit 56



Source: Developed by LBFC staff using data provided by DEP.

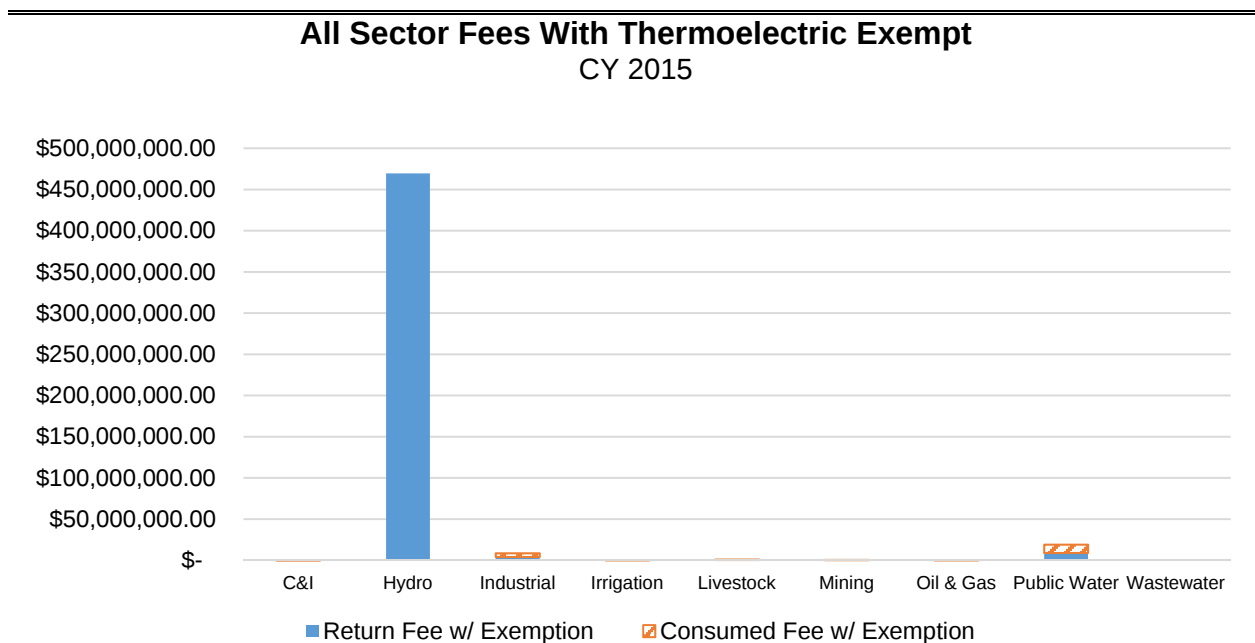
Exempting the Thermoelectric Sector would have the following impact, shown in Table 44 and Exhibit 57.

Table 44

All Sector Fees With Thermoelectric Exempt CY 2015							
Facility	Return Fee	Consumed Fee	Total Fees	Return Fee w/ Exemption	Consumed Fee w/ Exemption	Total Fees	Change
Commercial & Institutional	\$ 33,938	\$ 37,709	\$ 71,647	\$ 36,685	\$ 40,761	\$ 77,446	\$ 5,799
Hydroelectric	434,475,989	0	434,475,989	469,640,076	0	469,640,076	35,164,087
Industrial	3,782,805	4,203,116	7,985,921	4,088,964	4,543,293	8,632,257	646,336
Irrigation	4,267	384,052	388,319	4,613	415,135	419,748	31,428
Livestock	504,049	422,714	926,763	544,844	456,926	1,001,770	75,007
Mining	259,152	287,946	547,098	280,126	311,251	591,377	44,279
Oil & Gas	48	476,327	476,375	52	514,878	514,930	38,555
Public Water Supply	8,379,274	9,310,304	17,689,577	9,057,446	10,063,828	19,121,274	1,431,697
Thermoelectric Power	21,202,417	1,803,067	23,005,484	0	0	0	0
Thermoelectric Power Re	798,566	13,633,222	14,431,788	0	0	0	0
Wastewater Collection and Treatment	1,039	0	1,039	1,123	0	1,123	84

Source: Developed by LBFC staff using data provided by DEP.

Exhibit 57



Source: Developed by LBFC staff using data provided by DEP.

The Wastewater Sector

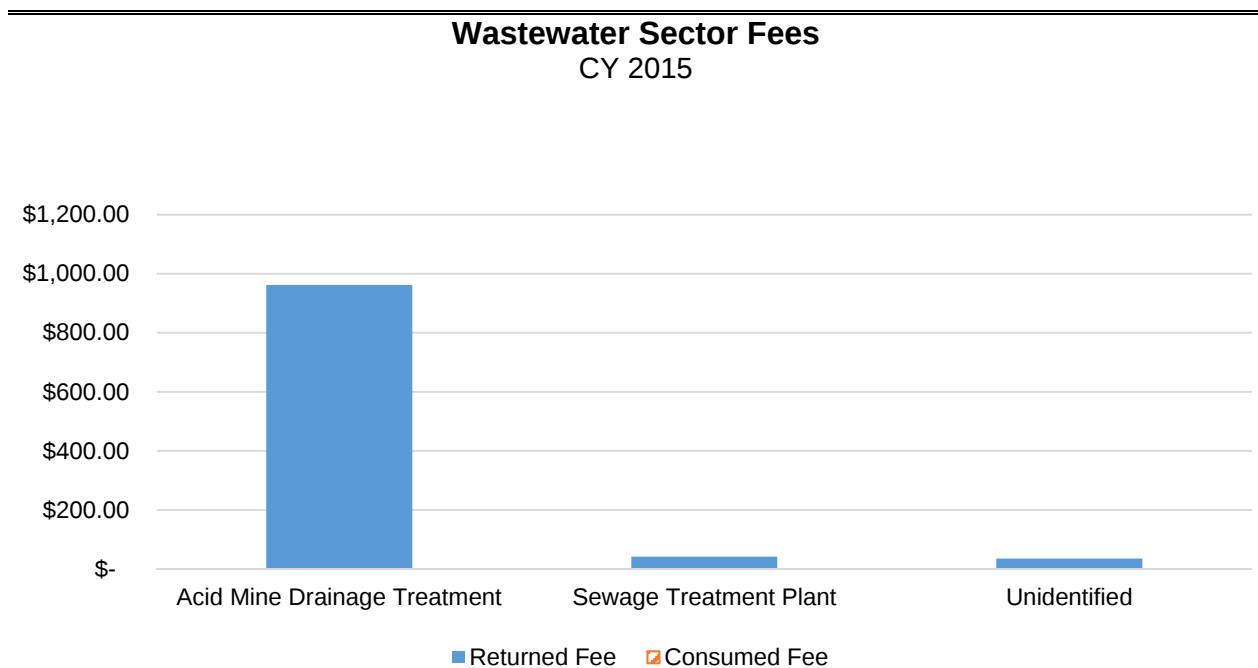
The Wastewater sector would pay \$1,039 in fees under this scenario, based on 2015 data. Total water withdrawals were 56.7 million gallons—all of which was returned. Acid mine drainage treatment accounts for 92.6 percent of the fees in this category. Fees are shown in Table 45 and Exhibit 58.

Table 45

Wastewater Sector Fees							
CY 2015							
Facility	Total Withdrawal	Coefficient	Water Used & Returned	Water Consumed	Returned Fee	Consumed Fee	Total Fees
Acid Mine Drainage Treatment	52,574,550	0	52,574,550	0	\$962	\$0	\$962
Sewage Treatment Plant	2,296,633	0	2,296,633	0	42	0	42
Unidentified	1,898,000	0	1,898,000	0	35	0	35

Source: Developed by LBFC staff using data provided by DEP.

Exhibit 58



Source: Developed by LBFC staff using data provided by DEP.

Exempting the Wastewater Sector would have the following impact, shown in Table 46 and Exhibit 59.

Table 46

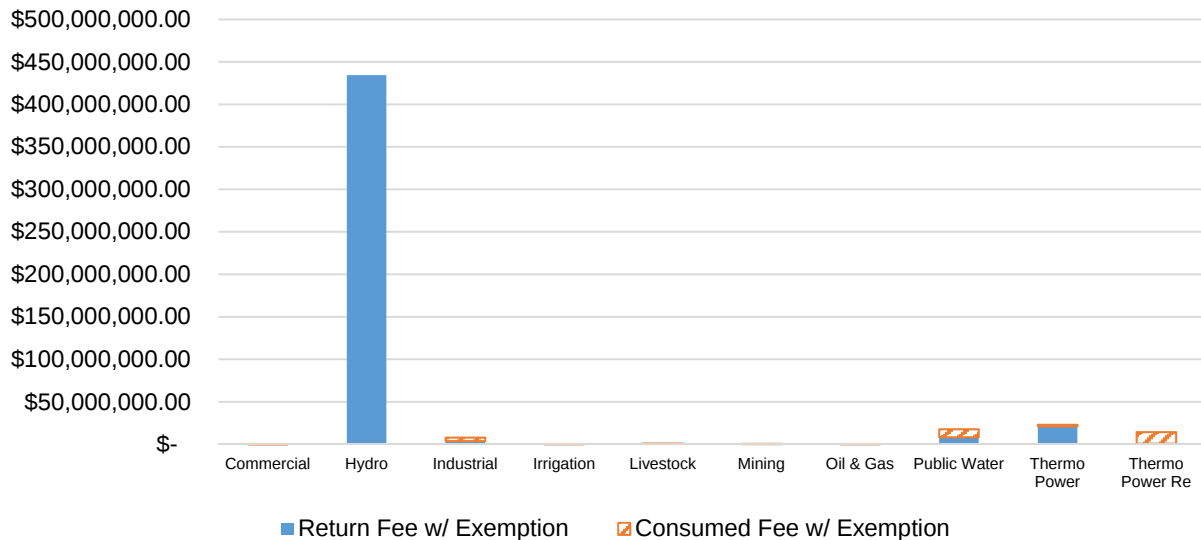
**All Sector Fees With Wastewater Exempt
CY 2015**

Facility	Return Fee	Consumed Fee	Total Fees	Return Fee w/ Exemption	Consumed Fee w/ Exemption	Total Fees	Change
Commercial & Institutional	\$ 33,938	\$ 37,709	\$ 71,647	\$ 33,938	\$ 37,709	\$ 71,647	\$ 0
Hydroelectric	434,475,989	-	434,475,989	434,476,892	0	434,476,892	903
Industrial	3,782,805	4,203,116	7,985,921	3,782,813	4,203,125	7,985,938	17
Irrigation	4,267	384,052	388,319	4,267	384,053	388,320	1
Livestock	504,049	422,714	926,763	504,050	422,714	926,765	2
Mining	259,152	287,946	547,098	259,152	287,947	547,099	1
Oil & Gas	48	476,327	476,375	48	476,328	476,376	1
Public Water Supply	8,379,274	9,310,304	17,689,577	8,379,291	9,310,323	17,689,614	37
Thermoelectric Power	21,202,417	1,803,067	23,005,484	21,202,461	1,803,071	23,005,532	48
Thermoelectric Power Re	798,566	13,633,222	14,431,788	798,568	13,633,250	14,431,818	30
Wastewater Collection and Treatment	1,039	0	1,039	0	0	0	0

Source: Developed by LBFC staff using data provided by DEP.

Exhibit 59

**All Sector Fees With Wastewater Exempt
CY 2015**



Source: Developed by LBFC staff using data provided by DEP.

Exempting All Agriculture Sector Facilities

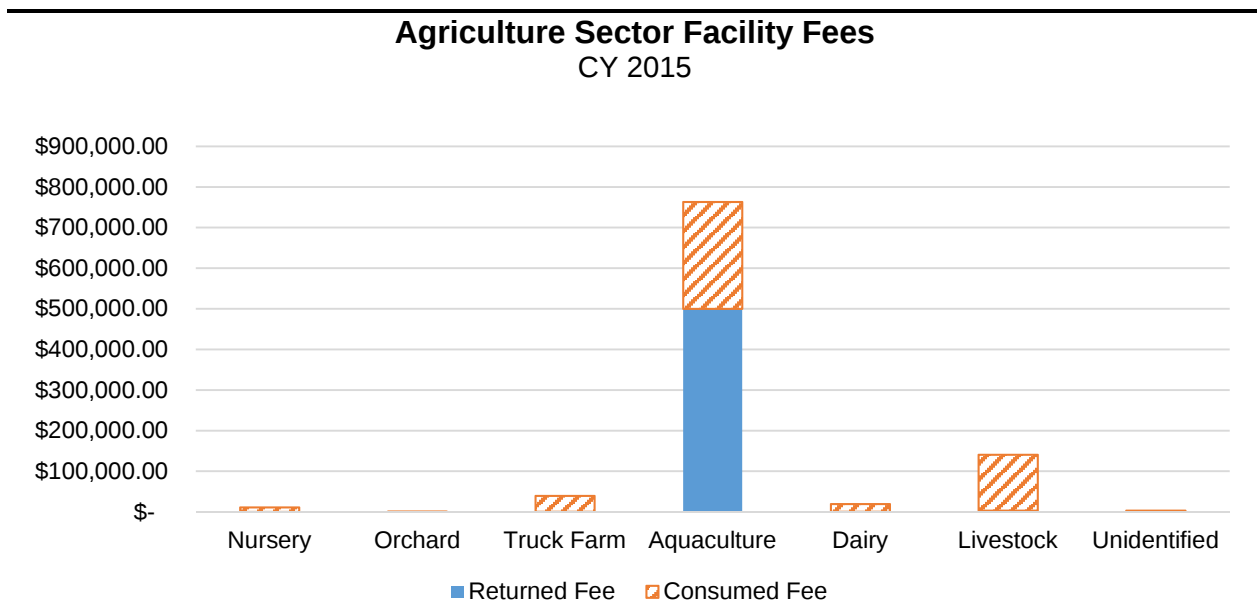
Exempting all facilities associated with the Agriculture sector—nurseries, orchards, truck farms, aquaculture, dairies, and livestock—would reduce fee revenue by almost \$1 million, 78 percent of which would come from aquaculture facilities. The exemptions by facility type are shown in Table 47 and Exhibit 60.

Table 47

Facility	Total With-drawal	Coeffi-cient	Water Used & Returned	Water Consumed	Returned Fee	Consumed Fee	Total Fees
Nursery	68,013,548	0.9	6,801,355	61,212,193	\$ 124	\$ 11,202	\$ 11,326
Orchard	5,741,440	0.9	574,144	5,167,296	11	946	956
Truck Farm	237,100,976	0.9	23,710,098	213,390,878	434	39,050	39,484
Aquaculture	28,764,329,337	0.05	27,326,112,870	1,438,216,467	500,061	263,190	763,251
Dairy	130,123,700	0.8	26,024,740	104,098,960	476	19,050	19,526
Livestock	938,508,507	0.8	187,701,701	750,806,806	3,435	137,396	140,831
Unidentified	21,024,780	0.8	4,204,956	16,819,824	77	3,078	3,155

Source: Developed by LBFC staff using data provided by DEP.

Exhibit 60



Source: Developed by LBFC staff using data provided by DEP.

If all agriculture facilities were to be exempted from the fee, the remaining sectors would see an increase in their fees by an equal amount in order to maintain

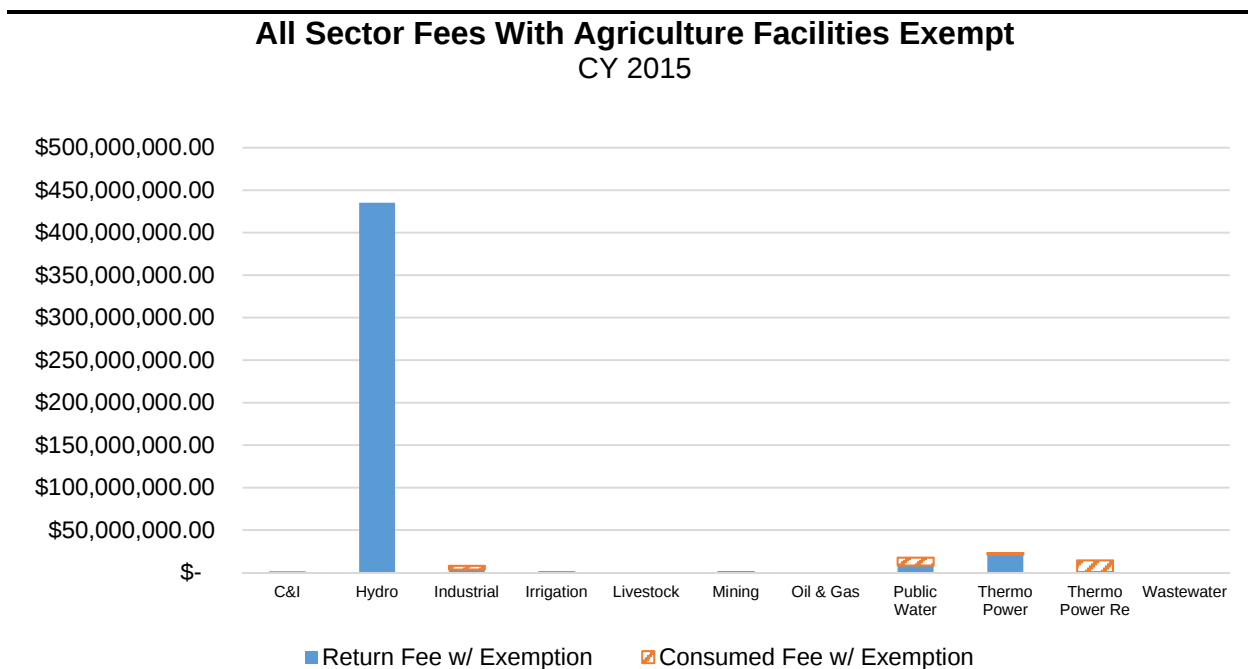
\$500 million in total revenue. The increases are shown, by sector, in Table 48 and Exhibit 61.

Table 48

All Sector Fees With Agriculture Facilities Exempt CY 2015							
Facility	Return Fee	Consumed Fee	Total Fees	Return Fee w/ Exemption	Consumed Fee w/ Exemption	Total Fees	Change
Commercial & Institutional	\$ 33,938	\$ 37,709	\$ 71,647	\$ 34,005	\$ 37,783	\$ 71,787	\$ 140
Hydroelectric	434,475,989	0	434,475,989	435,327,951	0	435,327,951	851,962
Industrial	3,782,805	4,203,116	7,985,921	3,790,222	4,211,358	8,001,581	15,660
Irrigation	4,267	384,052	388,319	3,706	333,508	337,213	660
Livestock	504,049	422,714	926,763	0	0	0	0
Mining	259,152	287,946	547,098	259,660	288,511	548,171	1,073
Oil & Gas	48	476,327	476,375	48	477,261	477,309	934
Public Water Supply	8,379,274	9,310,304	17,689,577	8,395,704	9,328,560	17,724,265	34,687
Thermoelectric Power	21,202,417	1,803,067	23,005,484	21,243,993	1,806,603	23,050,595	45,111
Thermoelectric Power Re	798,566	13,633,222	14,431,788	800,132	13,659,955	14,460,087	28,299
Wastewater Collection and Treatment	1,039	-0	1,039	1,041	-0	1,041	2

Source: Developed by LBFC staff using data provided by DEP.

Exhibit 61



Source: Developed by LBFC staff using data provided by DEP.

Exempting All Power Generation

Exempting all power generation facilities (hydroelectric and thermoelectric) would decrease fee revenue by \$472 million, of which nearly \$235 million, or about 50 percent, would come from hydroelectric dams. Power generation withdrew 25 trillion gallons of water in 2015, with only 84 billion gallons (0.34 percent) consumed. The exemptions by facility type are shown in Table 49 and Exhibit 62.

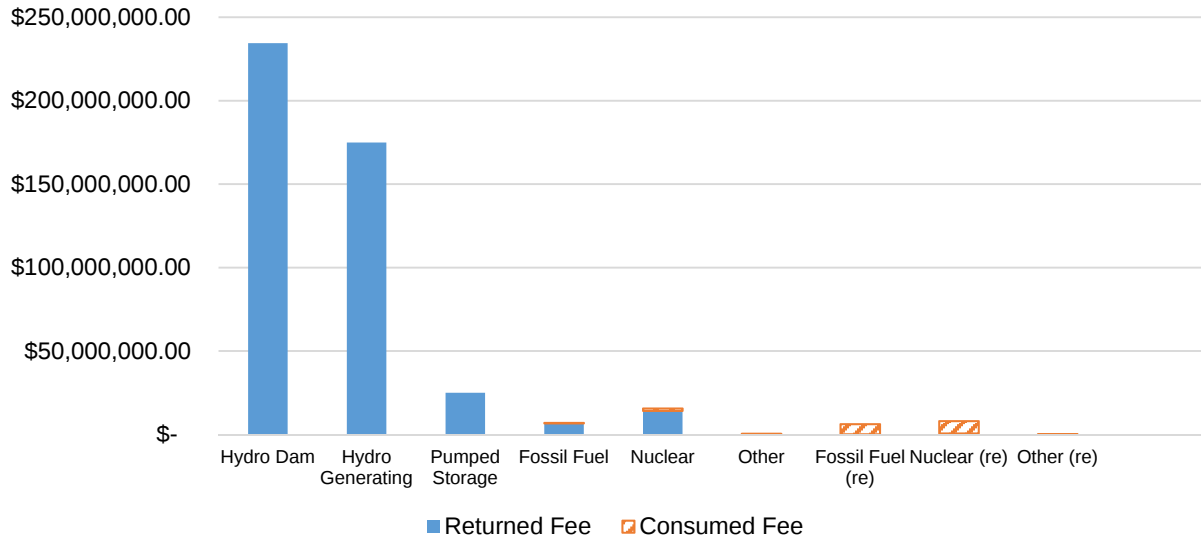
Table 49

Power Generation Facility Fees CY 2015

Facility	Total Withdrawal	Coef- fi- cient	Water Used & Returned	Water Consumed	Returned Fee	Con- sumed Fee	Total Fees
Hydroe- lectric Dam	12,814,796,805,635	0	12,814,796,805,635	0	\$234,507,546	\$ 0	\$234,507,546
Hydroe- lectric Generat- ing Unit	9,559,549,672,178	0	9,559,549,672,178	0	174,937,345	0	174,937,345
Pumped Storage Generat- ing Unit	1,367,838,428,046	0	1,367,838,428,046	0	25,031,098	0	25,031,098
Fossil Fuel	366,349,706,096	0.005	364,517,957,566	1,831,748,530	6,670,587	335,205	7,005,792
Nuclear	780,272,418,116	0.01	772,469,693,935	7,802,724,181	14,136,000	1,427,879	15,563,879
Other	21,848,839,630	0.01	21,630,351,234	218,488,396	395,830	39,983	435,813
Fossil Fuel (re)	41,634,373,075	0.79	8,743,218,346	32,891,154,729	159,999	6,018,998	6,178,997
Nuclear (re)	74,942,198,017	0.54	34,473,411,088	40,468,786,929	630,855	7,405,686	8,036,541
Other (re)	1,561,048,500	0.73	421,483,095	1,139,565,405	7,713	208,538	216,251

Source: Developed by LBFC staff using data provided by DEP.

Power Generation Facility Fees CY 2015



Source: Developed by LBFC staff using data provided by DEP.

If all power generation facilities were exempted from the fee, the remaining sectors would see an increase in their fees of the same amount in order to maintain \$500 million in total fee revenue. The Public Water Supply sector would realize the largest increase in fees at \$297 million, which equals 63 percent of the total increase. The increases are shown, by sector, in Table 50 and Exhibit 63.

Table 50

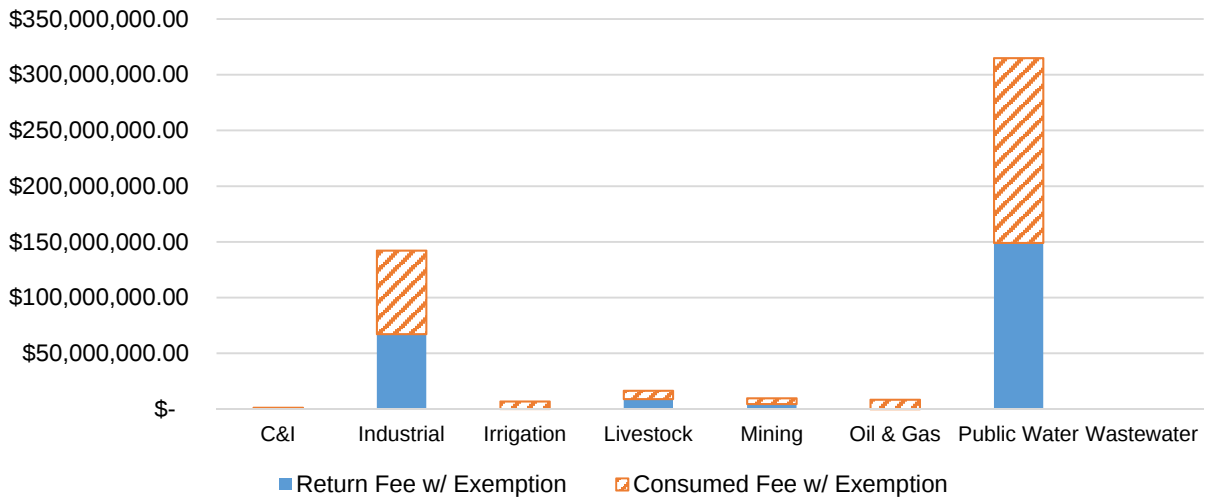
**All Sector Fees With Power Generation Exempt
CY 2015**

Facility	Return Fee	Consumed Fee	Total Fees	Return Fee w/ Exemption	Consumed Fee w/ Exemption	Total Fees	Change
Commercial & Institutional	\$ 33,938	\$ 37,709	\$ 71,647	\$ 604,164	\$ 671,293	\$ 1,275,457	\$ 1,203,810
Hydroelectric	434,475,989	0	434,475,989	0	0	0	0
Industrial	3,782,805	4,203,116	7,985,921	67,341,472	74,823,857	142,165,329	134,179,408
Irrigation	4,267	384,052	388,319	75,966	6,836,895	6,912,861	6,524,541
Livestock	504,049	422,714	926,763	8,973,079	7,525,145	16,498,224	15,571,461
Mining	259,152	287,946	547,098	4,613,417	5,126,019	9,739,436	9,192,338
Oil & Gas	48	476,327	476,375	849	8,479,574	8,480,423	8,004,048
Public Water Supply	8,379,274	9,310,304	17,689,577	149,167,789	165,741,988	314,909,777	297,220,200
Thermoelectric Power	21,202,417	1,803,067	23,005,484	0	0	0	0
Thermoelectric Power Re	798,566	13,633,222	14,431,788	0	0	0	0
Wastewater Collection and Treatment	1,039	0	1,039	18,494	0	18,494	17,455

Source: Developed by LBFC staff using data provided by DEP.

Exhibit 63

**All Sector Fees With Power Generation Exempt
CY 2015**



Source: Developed by LBFC staff using data provided by DEP.

D. A water use fee of \$0.000010 per gallon of water withdrawn and returned and \$0.00010 per gallon of water withdrawn and consumed would generate \$300 million in fees if there were no exemption to the fee.⁴

Calculating the Fee

To determine the water use fee to apply to water that is withdrawn and returned, and water that is consumed, we applied the same calculations used in Section C of this chapter. As shown earlier, the fee for water that is consumed (WC) is ten times greater than the fee for water that is withdrawn and returned (WR). While in Section C the desired revenue (DR) was \$500 million, in this section DR is \$300 million. The simplified formula is as follows:

$$F = \frac{DR}{WR + 10(WC)}$$

Where DR = \$300,000,000; WR = 25,652,897,280,725; and WC = 166,988,407,615 we find the following:

F	=	$\frac{\$300,000,000}{25,652,897,280,725 + 10(166,988,407,615)}$
F	=	0.00001097985
10F	=	0.00010979849

These numbers are based on 25.8 trillion gallons of water used in 2015. Of that, 25.7 trillion gallons of water was withdrawn and returned while 167 billion was consumed. The hydroelectric sector would pay the vast majority of the proposed fee, just under 87 percent. If combined, the three power generating sectors, hydroelectric, thermoelectric, and thermoelectric recirculated, would pay just over 94 percent of the fees needed to reach \$300 million in revenue. The fees are shown in Table 51 and Exhibit 64.

⁴ We used data provided by the DEP; however, the 2015 DEP water withdrawal amounts for the Oil and Gas sector are limited to the Ohio River Basin and, therefore, our calculations do not include water withdrawal amounts for the Oil and Gas sector in the Susquehanna River Basin or the subsequent fees related to them. In 2015 the SRBC reported 1.3 billion gallons of water used for natural gas extraction (approximately 0.0005 percent of the total withdrawn that year); the impact on the fee calculations would be minimal.

Table 51

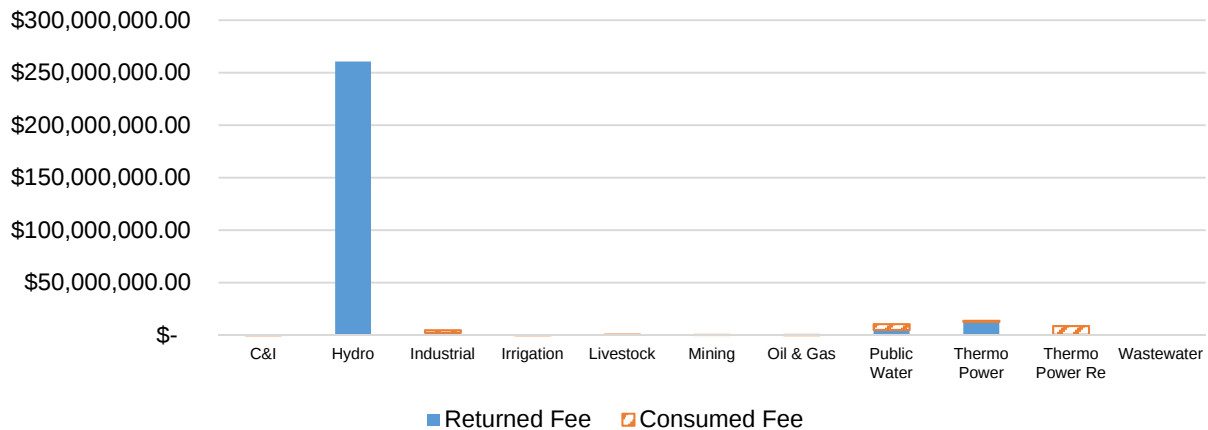
All Sector Fees CY 2015

Facility	Total Withdrawal	Water Used & Returned	Water Consumed	Returned Fee	Consumed Fee	Total Fees
Commercial & Institutional	2,060,622,505	1,854,560,255	206,062,251	\$ 20,363	\$ 22,625	\$ 42,988
Hydroelectric	23,742,184,905,859	23,742,184,905,859	0	260,685,593	0	260,685,593
Industrial	229,681,654,732	206,713,489,259	22,968,165,473	2,269,683	2,521,870	4,791,553
Irrigation	2,331,860,812	233,186,081	2,098,674,731	2,560	230,431	232,992
Livestock	29,853,986,324	27,544,044,268	2,309,942,056	302,429	253,628	556,058
Mining	15,734,987,931	14,161,489,138	1,573,498,793	155,491	172,768	328,259
Oil & Gas	2,605,522,117	2,605,522	2,602,916,595	29	285,796	285,825
Public Water Supply	508,766,795,442	457,890,115,898	50,876,679,544	5,027,564	5,586,182	10,613,746
Thermoelectric Power	1,168,470,963,842	1,158,618,002,734	9,852,961,108	12,721,450	1,081,840	13,803,290
Thermoelectric Power Re	118,137,619,592	43,638,112,529	74,499,507,063	479,140	8,179,933	8,659,073
Wastewater Collection and Treatment	56,769,183.00	56,769,183.00	0	623	0	623

Source: Developed by LBFC staff using data provided by DEP.

Exhibit 64

All Sector Fees CY 2015



Source: Developed by LBFC staff using data provided by DEP.

The Commercial & Institutional Sector

The Commercial & Institutional sector would pay \$43,000 in fees under this scenario, based on 2015 data. Total water withdrawn in 2015 was just over 2 billion gallons with 1.8 billion gallons returned and 206 million gallons consumed. Three entities—unidentified facilities, ski resorts, and commercial facilities—accounted

for 90 percent of the total for this sector. The fees are shown in Table 52 and Exhibit 65.

Table 52

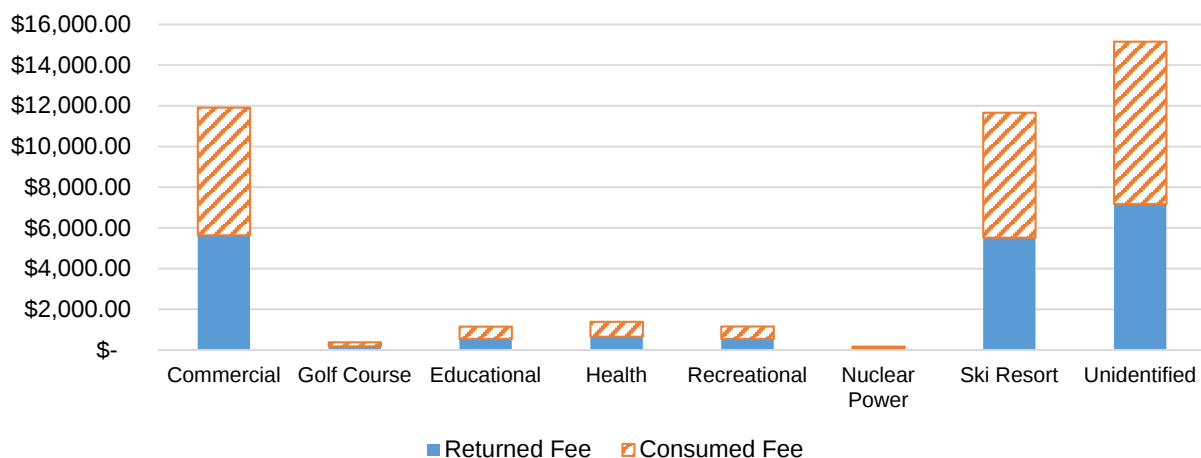
Commercial & Institutional Sector Fees
CY 2015

Facility	Total Withdrawal	Coefficient	Water Used & Returned	Water Consumed	Returned Fee	Consumed Fee	Total Fees
Commercial	571,240,681	0.1	514,116,613	57,124,068	\$5,645	\$6,272	\$11,917
Golf Course	18,424,412	0.1	16,581,971	1,842,441	182	202	384
Educational	55,239,099	0.1	49,715,189	5,523,910	546	607	1,152
Health	66,453,236	0.1	59,807,912	6,645,324	657	730	1,386
Recreational	55,641,724	0.1	50,077,552	5,564,172	550	611	1,161
Nuclear Power	8,035,558	0.1	7,232,002	803,556	79	88	168
Ski Resort	559,199,056	0.1	503,279,150	55,919,906	5,526	6,140	11,666
Unidentified	726,388,739	0.1	653,749,865	72,638,874	7,178	7,976	15,154

Source: Developed by LBFC staff using data provided by DEP.

Exhibit 65

Commercial & Institutional Sector Fees
CY 2015



Source: Developed by LBFC staff using data provided by DEP.

The impact on other sectors, if the Commercial & Institutional sector were to be exempt, is shown in Table 53 and Exhibit 66. The Hydroelectric sector would see the most significant increase in fees, at \$37 million.

Table 53

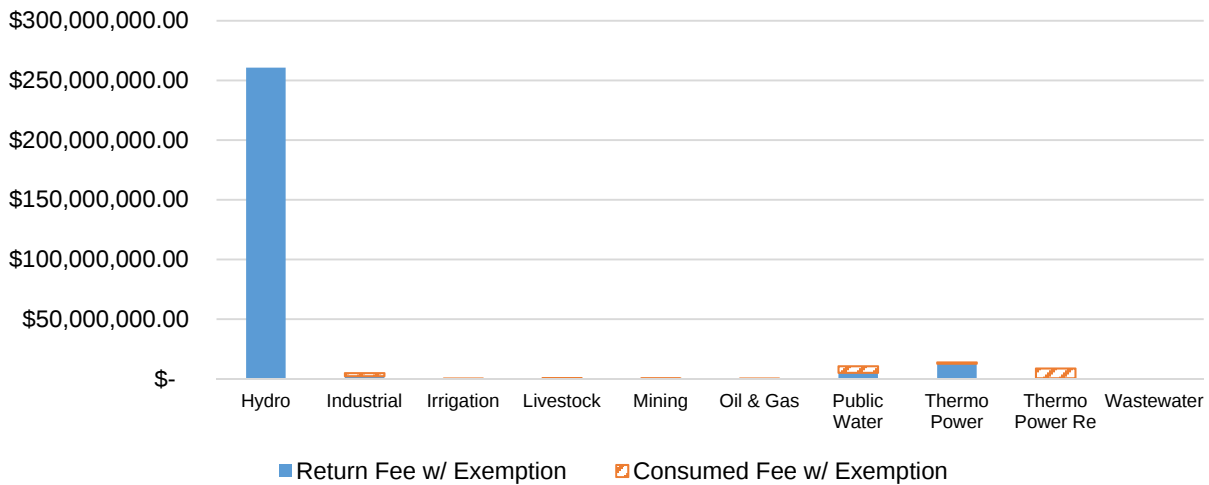
**All Sector Fees With Commercial & Institutional Exempt
CY 2015**

Facility	Returned Fee	Consumed Fee	Total Fees	Return Fee w/ Exemption	Consumed Fee w/ Exemption	Total Fees	Change
Commercial & Institutional	\$ 20,363	\$ 22,625	\$ 42,988	\$ 0	\$ 0	\$ 0	\$ 0
Hydroelectric	260,685,593	0	260,685,593	260,722,953	0	260,722,953	37,360
Industrial	2,269,683	2,521,870	4,791,553	2,270,008	2,522,231	4,792,239	687
Irrigation	2,560	230,431	232,992	2,561	230,464	233,025	33
Livestock	302,429	253,628	556,058	302,473	253,664	556,137	80
Mining	155,491	172,768	328,259	155,513	172,793	328,306	47
Oil & Gas	29	285,796	285,825	29	285,837	285,866	41
Public Water Supply	5,027,564	5,586,182	10,613,746	5,028,285	5,586,983	10,615,268	1,521
Thermoelectric Power	12,721,450	1,081,840	13,803,290	12,723,273	1,081,995	13,805,269	1,978
Thermoelectric Power Re	479,140	8,179,933	8,659,073	479,209	8,181,105	8,660,314	1,241
Wastewater Collection and Treatment	623	0	623	623	0	623	0

Source: Developed by LBFC staff using data provided by DEP.

Exhibit 66

**All Sector Fees With Commercial & Institutional Exempt
CY 2015**



Source: Developed by LBFC staff using data provided by DEP.

The Hydroelectric Sector

The Hydroelectric sector, under a scenario designed to collect \$300 million in fees, would pay \$261 million, or nearly 87 percent of the total, based on 2015 data.

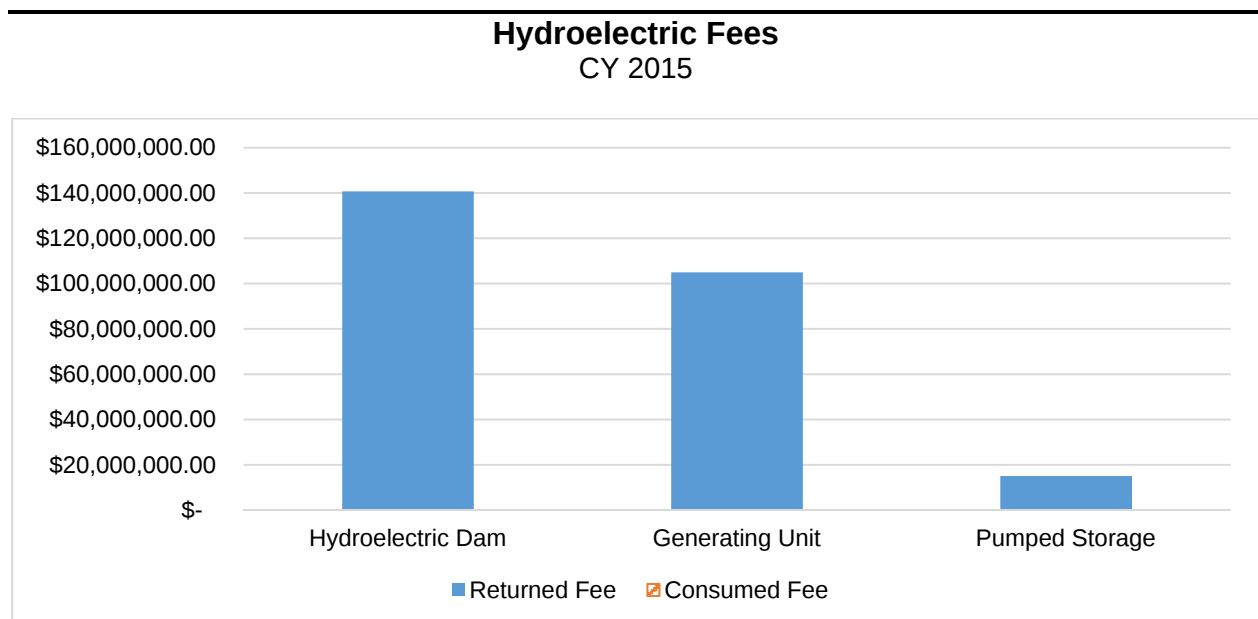
The total water withdrawn by this sector for the same period was just under 24 trillion gallons, with no water consumed. The fees are shown in Table 54 and Exhibit 67.

Table 54

Hydroelectric Fees							
CY 2015							
Facility	Total Withdrawal	Coefficient	Water Used & Returned	Water Consumed	Returned Fee	Consumed Fee	Total Fees
Hydroelectric Dam	12,814,796,805,635	0	12,814,796,805,635	0	\$140,704,528	0	\$140,704,528
Generating Unit	9,559,549,672,178	0	9,559,549,672,178	0	104,962,407	0	104,962,407
Pumped Storage	1,367,838,428,046	0	1,367,838,428,046	0	15,018,659	0	15,018,659

Source: Developed by LBFC staff using data provided by DEP.

Exhibit 67



Source: Developed by LBFC staff using data provided by DEP.

Exempting hydroelectric power would have a significant impact on other industries. Thermoelectric power would pay \$149 million in additional fees and the Public Water Supply Sector would pay an additional \$70 million in fees. Together, these sectors would pay 84 percent of the additional fees if the Hydroelectric sector were to be exempt. The impact on the remaining sectors is shown in Table 55 and Exhibit 68.

Table 55

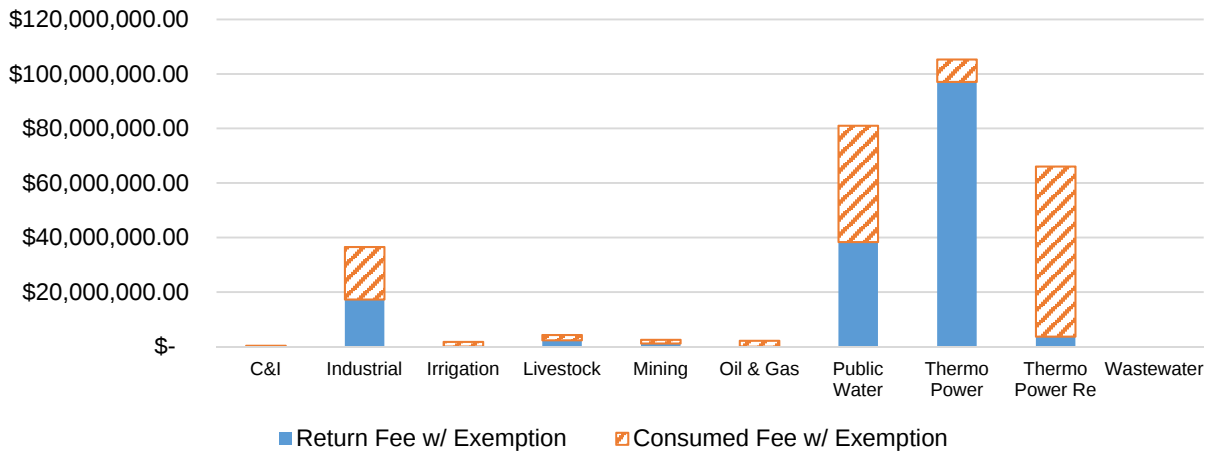
**All Sector With Hydroelectric Exempt
CY 2015**

Facility	Returned Fee	Consumed Fee	Total Fees	Return Fee w/ Exemption	Consumed Fee w/ Exemption	Total Fees	Change
Commercial & Institutional	\$ 20,363	\$ 22,625	\$ 42,988	\$ \$155,384	\$ 172,649	\$ 328,033	\$ 285,045
Hydroelectric	260,685,593	0	260,685,593	0	0	0	0
Industrial	2,269,683	2,521,870	4,791,553	17,319,474	19,243,860	36,563,334	31,771,781
Irrigation	2,560	230,431	232,992	19,537	1,758,373	1,777,910	1,544,919
Livestock	302,429	253,628	556,058	2,307,776	1,935,383	4,243,159	3,687,101
Mining	155,491	172,768	328,259	1,186,519	1,318,355	2,504,874	2,176,615
Oil & Gas	29	285,796	285,825	218	2,180,852	2,181,070	1,895,245
Public Water Supply	5,027,564	5,586,182	10,613,746	38,364,288	42,626,987	80,991,275	70,377,529
Thermoelectric Power	12,721,450	1,081,840	13,803,290	97,074,721	8,255,296	105,330,017	91,526,726
Thermoelectric Power Re	479,140	8,179,933	8,659,073	3,656,216	62,419,355	66,075,571	57,416,498
Wastewater Collection and Treatment	623	0	623	4,756	0	4,756	4,133

Source: Developed by LBFC staff using data provided by DEP.

Exhibit 68

**All Sector With Hydroelectric Exempt
CY 2015**



Source: Developed by LBFC staff using data provided by DEP.

The Industrial Sector

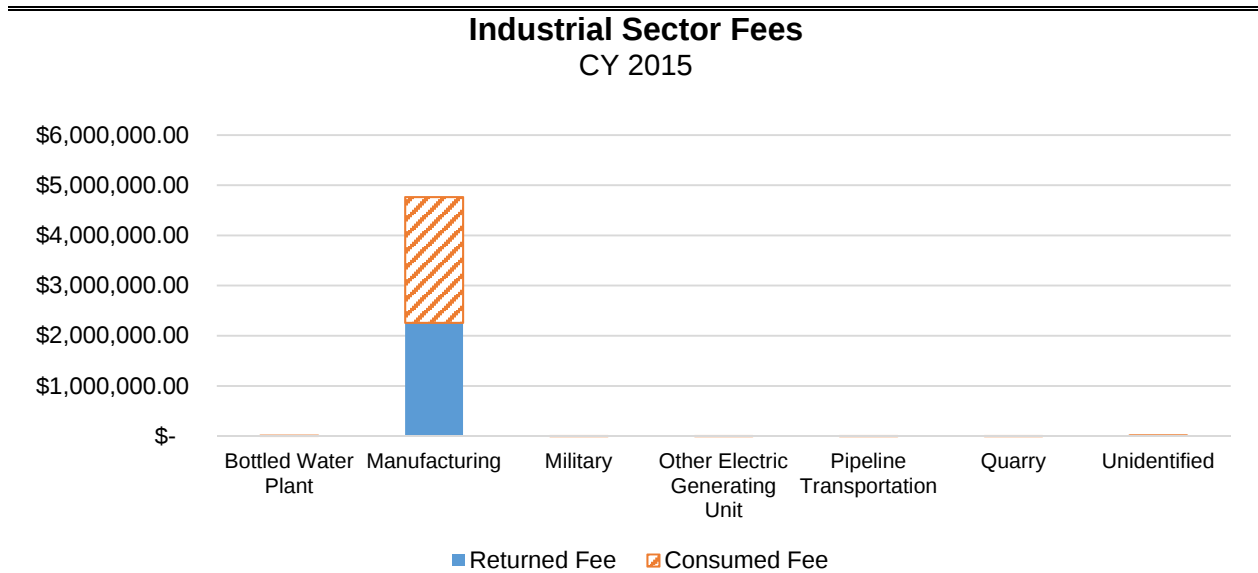
The Industrial sector would pay nearly \$5 million in fees under this scenario. Total water withdrawals were 230 billion gallons. Manufacturing accounts for over 99 percent of the total in this sector. The fees are shown in Table 56 and Exhibit 69.

Table 56

Industrial Sector Fees							
CY 2015							
Facility	Total Withdrawal	Coefficient	Water Used & Returned	Water Consumed	Returned Fee	Consumed Fee	Total Fees
Bottled Water Plant	442,323,419	0.1	398,091,077	44,232,342	\$ 4,371	\$ 4,857	\$ 9,228
Manufacturing	228,444,021,213	0.1	205,599,619,092	22,844,402,121	2,257,453	2,508,281	4,765,733
Military	3,522,600	0.1	3,170,340	352,260	35	39	73
Other Electric Generating Unit	5,473,537	0.1	4,926,183	547,354	54	60	114
Pipeline Transportation	2,998,050	0.1	2,698,245	299,805	30	33	63
Quarry	122,383,000	0.1	110,144,700	12,238,300	1,209	1,344	2,553
Unidentified	660,932,913	0.1	594,839,622	66,093,291	6,531	7,257	13,788

Source: Developed by LBFC staff using data provided by DEP.

Exhibit 69



Source: Developed by LBFC staff using data provided by DEP.

Exempting the industrial sector would require an increase of just over \$4 million in fees paid by the hydroelectric sector. If all power producing entities were combined, the increase would be just over \$4.6 million. The change in fees is shown in Table 57 and Exhibit 70.

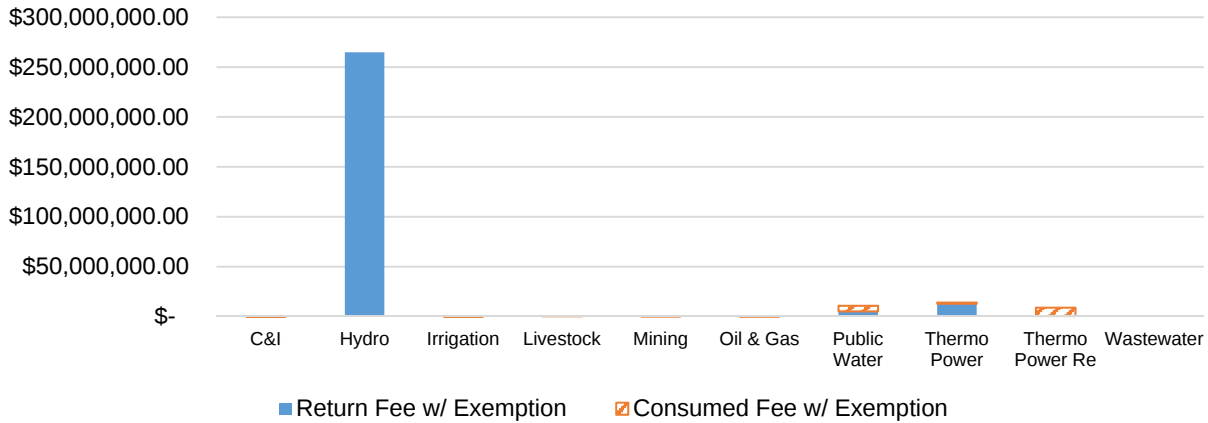
Table 57

All Sector Fees With Industrial Exempt CY 2015							
Facility	Returned Fee	Consumed Fee	Total Fees	Return Fee w/ Exemption	Consumed Fee w/ Exemption	Total Fees	Change
Commercial & Institutional	\$ 20,363	\$ 22,625	\$ 42,988	\$ 20,693	\$ 22,993	\$ 43,686	\$ 698
Hydroelectric	260,685,593	0	260,685,593	264,916,803	0	264,916,803	4,231,209
Industrial	2,269,683	2,521,870	4,791,553	0	0	0	0
Irrigation	2,560	230,431	232,992	2,602	234,171	236,773	3,782
Livestock	302,429	253,628	556,058	307,338	257,745	565,083	9,025
Mining	155,491	172,768	328,259	158,015	175,572	333,587	5,328
Oil & Gas	29	285,796	285,825	29	290,435	290,464	4,639
Public Water Supply	5,027,564	5,586,182	10,613,746	5,109,167	5,676,852	10,786,019	172,273
Thermoelectric Power	12,721,450	1,081,840	13,803,290	12,927,933	1,099,400	14,027,333	224,042
Thermoelectric Power Re	479,140	8,179,933	8,659,073	486,917	8,312,702	8,799,619	140,546
Wastewater Collection and Treatment	623	0	623	633	0	633	10

Source: Developed by LBFC staff using data provided by DEP.

Exhibit 70

All Sector Fees With Industrial Exempt
CY 2015



Source: Developed by LBFC staff using data provided by DEP.

The Irrigation Sector

Based on 2015 data, the Irrigation sector would pay \$233,000 in fees under a scenario designed to generate \$300 million in total revenue. Golf courses would pay 86 percent of the fees associated with the Irrigation Sector, consuming 1.8 billion gallons per year. Facilities in this sector withdrew 2.3 billion gallons of water in 2015, consuming 90 percent of that total. The fees for this sector are shown in Table 58 and Exhibit 71.

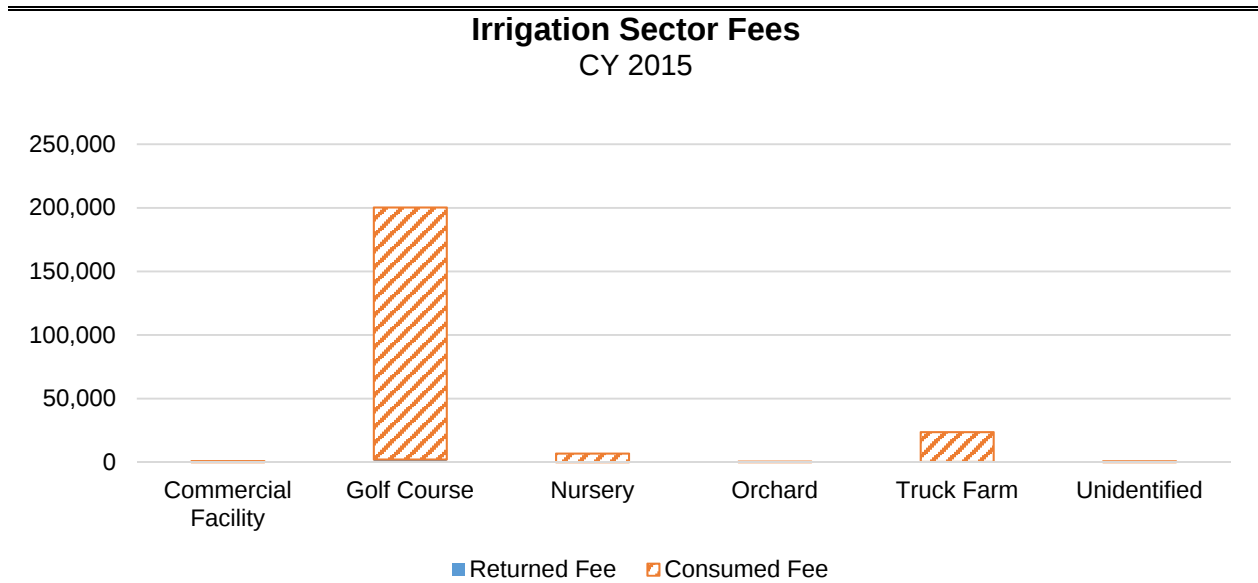
Table 58

Irrigation Sector Fees
CY 2015

Facility	Total Withdrawal	Coefficient	Water Used & Returned	Water Consumed	Re-turned Fee	Con-sumed Fee	Total Fees
Commer- cial Facility	9,413,708	0.9	941,371	8,472,337	\$ 10	\$ 930	\$ 941
Golf Course	2,004,227,893	0.9	200,422,789	1,803,805,104	2,201	198,055	200,256
Nursery	68,013,548	0.9	6,801,355	61,212,193	75	6,721	6,796
Orchard	5,741,440	0.9	574,144	5,167,296	6	567	574
Truck Farm	237,100,976	0.9	23,710,098	213,390,878	260	23,430	23,690
Unidenti- fied	7,363,247	0.9	736,325	6,626,922	8	728	736

Source: Developed by LBFC staff using data provided by DEP.

Exhibit 71



Source: Developed by LBFC staff using data provided by DEP.

The impact on other sectors, if the Irrigation Sector were to be exempted from a fee, is shown in Table 59 and Exhibit 72.

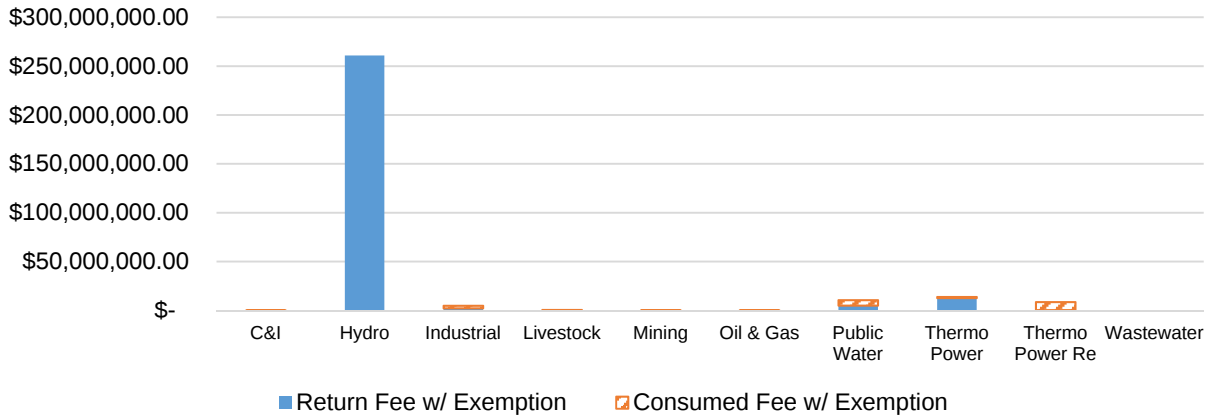
Table 59

All Sector Fees With Irrigation Exempt CY 2015							
Facility	Return Fee	Consumed Fee	Total Fees	Return Fee w/ Exemption	Consumed Fee w/ Exemption	Total Fees	Change
Commercial & Institutional	\$ 20,363	\$ 22,625	\$ 42,988	\$ 20,379	\$ 22,643	\$ 43,022	\$ 33
Hydroelectric	260,685,593	0	260,685,593	260,888,209	0	260,888,209	202,616
Industrial	2,269,683	2,521,870	4,791,553	2,271,447	2,523,830	4,795,277	3,724
Irrigation	2,560	230,431	232,992	0	0	0	0
Livestock	302,429	253,628	556,058	302,664	253,825	556,490	432
Mining	155,491	172,768	328,259	155,612	172,902	328,514	255
Oil & Gas	29	285,796	285,825	29	286,018	286,047	222
Public Water Supply	5,027,564	5,586,182	10,613,746	5,031,472	5,590,524	10,621,996	8,249
Thermoelectric Power	12,721,450	1,081,840	13,803,290	12,731,338	1,082,681	13,814,019	10,729
Thermoelectric Power Re	479,140	8,179,933	8,659,073	479,512	8,186,291	8,665,803	6,730
Wastewater Collection and Treatment	623	0	623	624	0	624	0

Source: Developed by LBFC staff using data provided by DEP.

Exhibit 72

All Sector Fees With Irrigation Exempt
CY 2015



Source: Developed by LBFC staff using data provided by DEP.

The Livestock Sector

The Livestock sector would pay \$556,000 in fees under this scenario. In 2015, total water withdrawn was just under 30 billion gallons. Water returned was approximately 27 billion gallons, or 90 percent of the total. The fees are shown in Table 60 and Exhibit 73.

Table 60

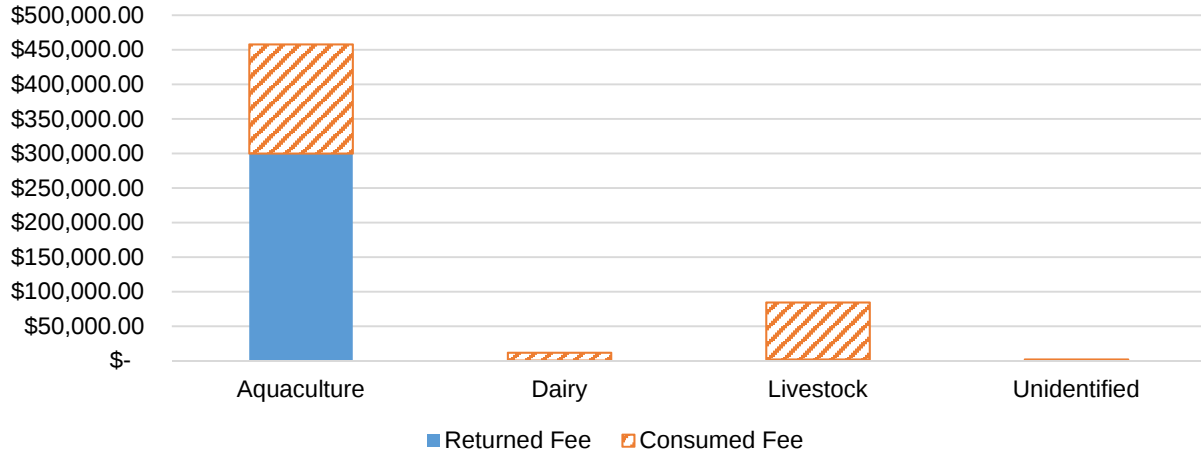
Livestock Sector Fees
CY 2015

Facility	Total Withdrawal	Coef-ficient	Water Used & Returned	Water Consumed	Returned Fee	Con-sumed Fee	Total Fees
Aquacul-ture	28,764,329,337	0.05	27,326,112,870	1,438,216,467	\$300,037	\$157,914	\$457,951
Dairy	130,123,700	0.8	26,024,740	104,098,960	286	11,430	11,716
Live-stock	938,508,507	0.8	187,701,701	750,806,806	2,061	82,437	84,498
Unidenti-fied	21,024,780	0.8	4,204,956	16,819,824	46	1,847	1,893

Source: Developed by LBFC staff using data provided by DEP.

Exhibit 73

Livestock Sector Fees
CY 2015



Source: Developed by LBFC staff using data provided by DEP.

Exempting the Livestock sector would have the following impact, shown in Table 61 and Exhibit 74.

Table 61

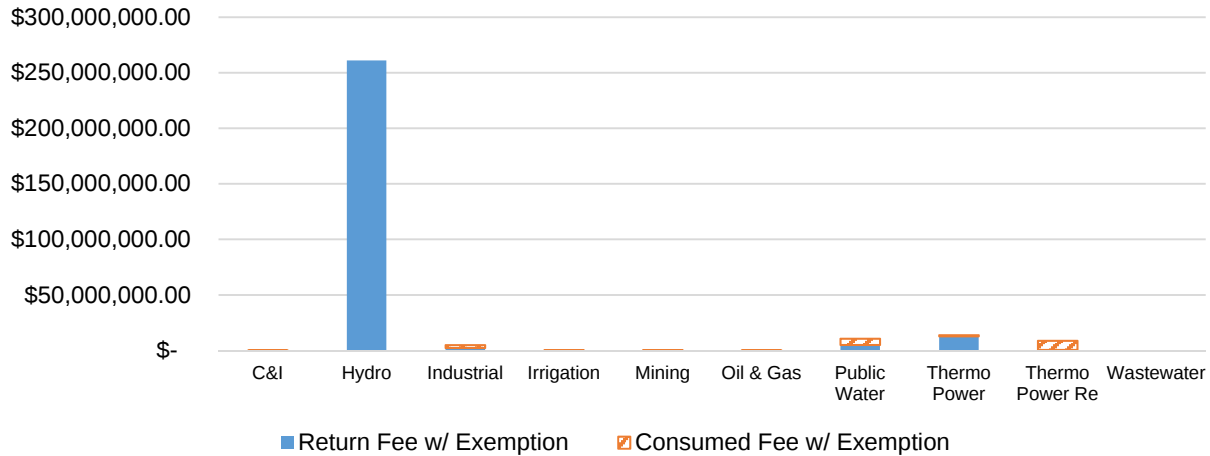
All Sector Fees With Livestock Exempt
CY 2015

Facility	Return Fee	Consumed Fee	Total Fees	Return Fee w/ Exemption	Consumed Fee w/ Exemption	Total Fees	Change
Commercial & Institutional	\$ 20,363	\$ 22,625	\$ 42,988	\$ 20,401	\$ 22,667	\$ 43,068	\$ 80
Hydroelectric	260,685,593	0	260,685,593	261,169,678	0	261,169,678	484,085
Industrial	2,269,683	2,521,870	4,791,553	2,273,898	2,526,553	4,800,450	8,898
Irrigation	2,560	230,431	232,992	2,565	230,859	233,424	433
Livestock	302,429	253,628	556,058	0	0	0	0
Mining	155,491	172,768	328,259	155,780	173,089	328,868	610
Oil & Gas	29	285,796	285,825	29	286,327	286,356	531
Public Water Supply	5,027,564	5,586,182	10,613,746	5,036,900	5,596,556	10,633,456	19,709
Thermoelectric Power	12,721,450	1,081,840	13,803,290	12,745,073	1,083,849	13,828,923	25,632
Thermoelectric Power Re	479,140	8,179,933	8,659,073	480,030	8,195,123	8,675,152	16,080
Wastewater Collection and Treatment	623	0	623	624	0	624	1

Source: Developed by LBFC staff using data provided by DEP.

Exhibit 74

**All Sector Fees With Livestock Exempt
CY 2015**



Source: Developed by LBFC staff using data provided by DEP.

The Mining Sector

Entities in the Mining sector, in a scenario designed to collect \$300 million in fees, would pay \$328,000 on 15.7 billion gallons of water withdrawn. Of that, 14.1 billion gallons were returned. Quarries, deep mines, and acid mine drainage treatment facilities accounted for 84 percent of the total. The fees are shown in Table 62 and Exhibit 75.

Table 62

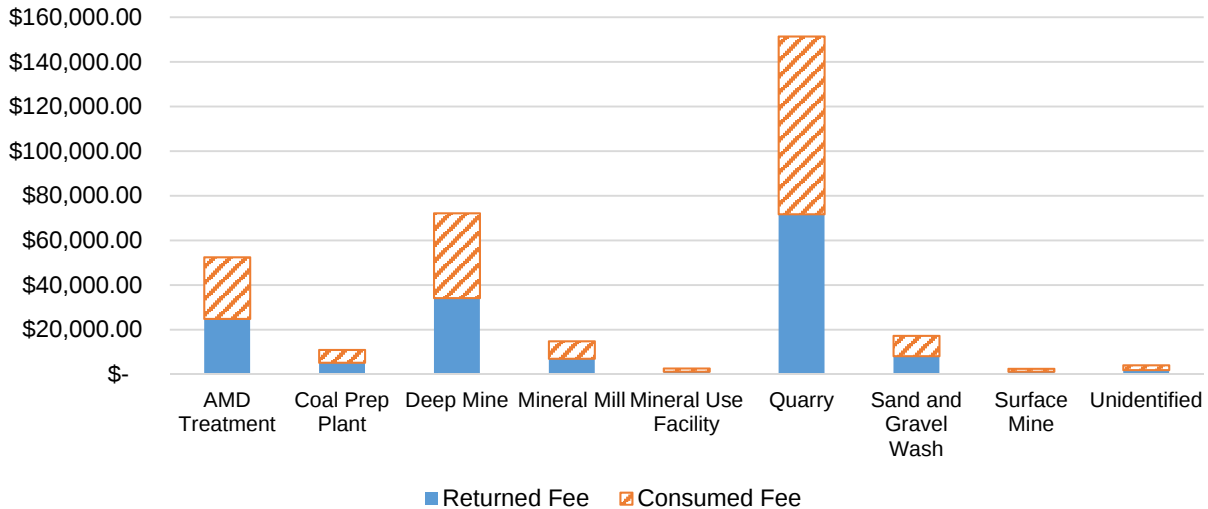
**Mining Sector Fees
CY 2015**

Facility	Total Withdrawal	Coefficient	Water Used & Returned	Water Consumed	Returned Fee	Consumed Fee	Total Fees
AMD Treatment	2,513,160,000	0.1	2,261,844,000	251,316,000	\$24,835	\$27,594	\$ 52,429
Coal Prep Plant	525,926,805	0.1	473,334,125	52,592,681	5,197	5,775	10,972
Deep Mine	3,459,325,161	0.1	3,113,392,645	345,932,516	34,185	37,983	72,167
Mineral Mill	710,764,950	0.1	639,688,455	71,076,495	7,024	7,804	14,828
Mineral Use Facility	124,953,256	0.1	112,457,930	12,495,326	1,235	1,372	2,607
Quarry	7,257,331,295	0.1	6,531,598,166	725,733,130	71,716	79,684	151,400
Sand and Gravel Wash	828,501,804	0.1	745,651,624	82,850,180	8,187	9,097	17,284
Surface Mine	120,431,340	0.1	108,388,206	12,043,134	1,190	1,322	2,512
Unidentified	194,593,320	0.1	175,133,988	19,459,332	1,923	2,137	4,060

Source: Developed by LBFC staff using data provided by DEP.

Exhibit 75

Mining Sector Fees
CY 2015



Source: Developed by LBFC staff using data provided by DEP.

Exempting the Mining sector, while continuing to maintain \$300 million in fee revenue would require the other sectors to increase their contributions, the largest of which, \$286,000, would fall on the Hydroelectric sector. The impact on those sectors other than Mining is shown in Table 63 and Exhibit 76.

Table 63

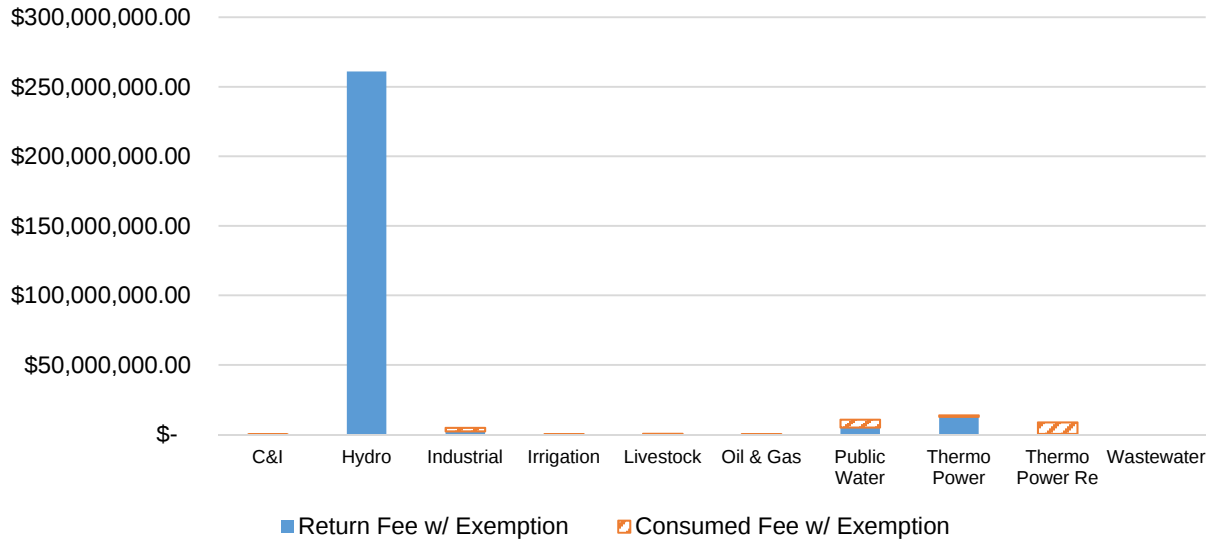
All Sector Fees With Mining Exempt
CY 2015

Facility	Return Fee	Consumed Fee	Total Fees	Return Fee w/ Exemption	Consumed Fee w/ Exemption	Total Fees	Change
Commercial & Institutional	\$ 20,363	\$ 22,625	\$ 42,988	\$ 20,385	\$ 22,650	\$ 43,035	\$ 47
Hydroelectric	260,685,593	0	260,685,593	260,971,147	0	260,971,147	285,554
Industrial	2,269,683	2,521,870	4,791,553	2,272,169	2,524,632	4,796,801	5,249
Irrigation	2,560	230,431	232,992	2,563	230,684	233,247	255
Livestock	302,429	253,628	556,058	302,761	253,906	556,667	609
Mining	155,491	172,768	328,259	0	0	0	0
Oil & Gas	29	285,796	285,825	29	286,109	286,138	313
Public Water Supply	5,027,564	5,586,182	10,613,746	5,033,071	5,592,301	10,625,373	11,626
Thermoelectric Power	12,721,450	1,081,840	13,803,290	12,735,385	1,083,025	13,818,410	15,120
Thermoelectric Power Re	479,140	8,179,933	8,659,073	479,665	8,188,893	8,668,558	9,485
Wastewater Collection and Treatment	623	0	623	624	0	624	1

Source: Developed by LBFC staff using data provided by DEP.

Exhibit 76

All Sector Fees With Mining Exempt
CY 2015



Source: Developed by LBFC staff using data provided by DEP.

The Oil & Gas Sector

The Oil & Gas sector would be required to pay \$286,000 in fees based on 2.6 billion gallons of water withdrawn, of which, nearly 100 percent is consumed. The fees are shown in Table 64 and Exhibit 77.

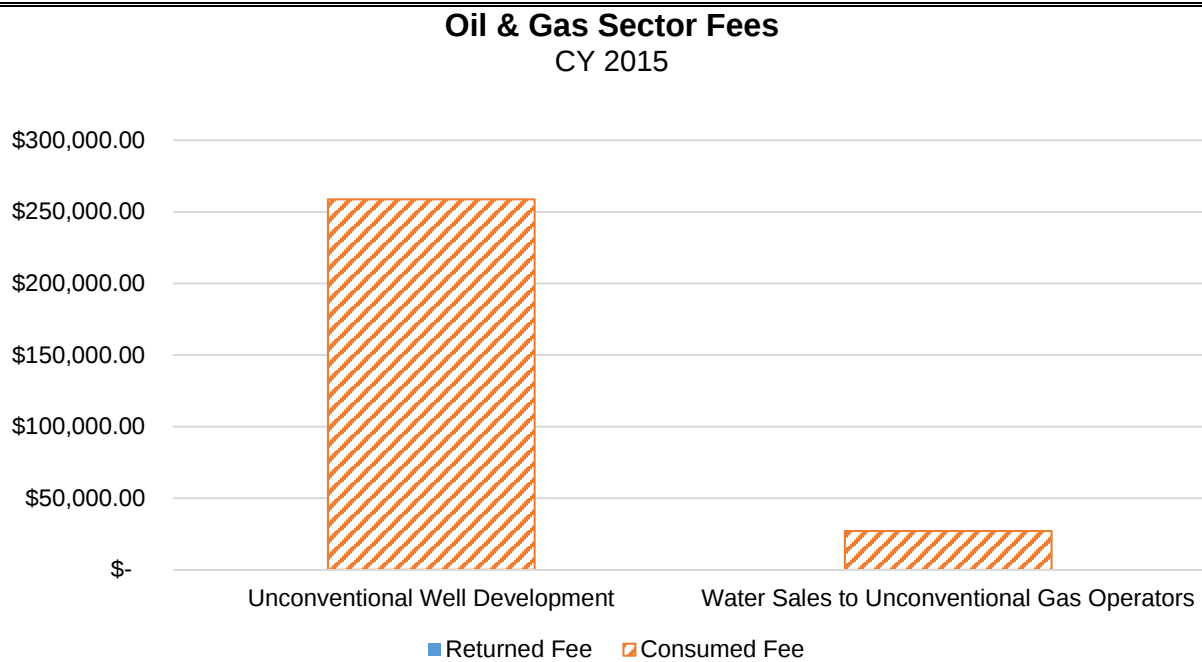
Table 64

Oil & Gas Sector Fees
CY 2015

Facility	Total Withdrawal	Coefficient	Water Used & Returned	Water Consumed	Returned Fee	Consumed Fee	Total Fees
Unconventional Well Development	2,358,483,031	0.999	2,358,483	2,356,124,548	\$26	\$258,699	\$258,725
Water Sales to Unconventional Gas Operators	247,039,086	0.999	247,039	246,792,047	3	27,097	27,100

Source: Developed by LBFC staff using data provided by DEP.

Exhibit 77



Source: Developed by LBFC staff using data provided by DEP.

Exempting the Oil & Gas sector would have the following impact, shown in Table 65 and Exhibit 78.

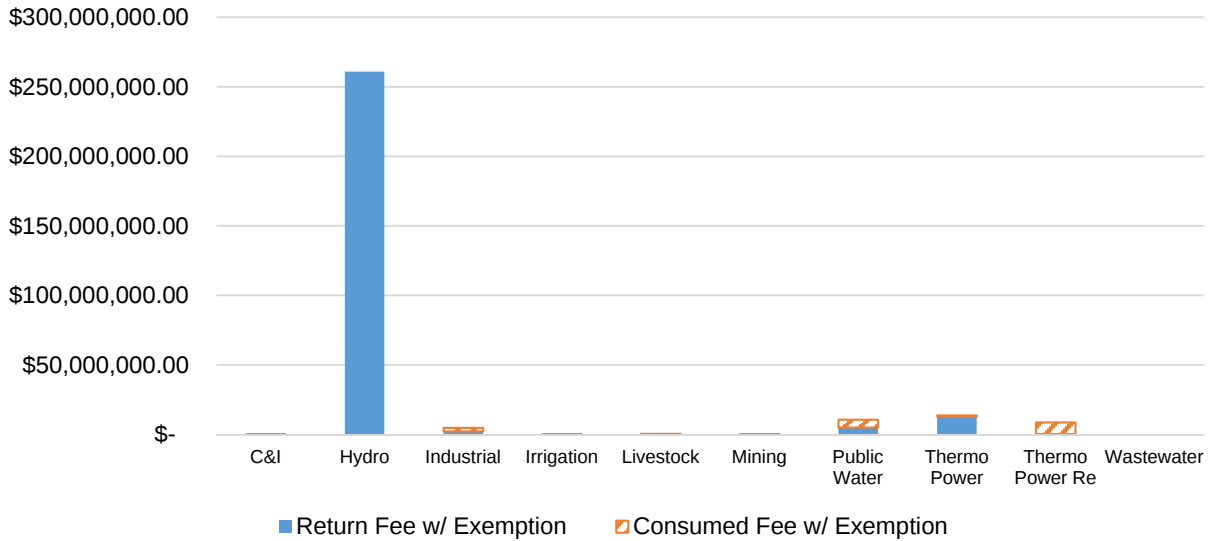
Table 65

All Sector Fees With Oil & Gas Exempt							
CY 2015							
Facility	Return Fee	Consumed Fee	Total Fees	Return Fee w/ Exemption	Consumed Fee w/ Exemption	Total Fees	Change
Commercial & Institutional	\$ 20,363	\$ 22,625	\$ 42,988	\$ 20,382	\$ 22,647	\$ 43,029	\$ 41
Hydroelectric	260,685,593	0	260,685,593	260,934,198	-	260,934,198	248,605
Industrial	2,269,683	2,521,870	4,791,553	2,271,847	2,524,275	4,796,122	4,570
Irrigation	2,560	230,431	232,992	2,563	230,651	233,214	222
Livestock	302,429	253,628	556,058	302,718	253,870	556,588	530
Mining	155,491	172,768	328,259	155,639	172,933	328,572	313
Oil & Gas	29	285,796	285,825	0	0	0	0
Public Water Supply	5,027,564	5,586,182	10,613,746	5,032,359	5,591,510	10,623,868	10,122
Thermoelectric Power	12,721,450	1,081,840	13,803,290	12,733,582	1,082,872	13,816,454	13,164
Thermoelectric Power Re	479,140	8,179,933	8,659,073	479,597	8,187,734	8,667,331	8,258
Wastewater Collection and Treatment	623	0	623	624	0	624	1

Source: Developed by LBFC staff using data provided by DEP.

Exhibit 78

**All Sector Fees With Oil & Gas Exempt
CY 2015**



Source: Developed by LBFC staff using data provided by DEP.

The Public Water Supply Sector

The Public Water Supply sector would pay \$11 million in fees under this scenario, based on 2015 data. Total water withdrawn was just over 508 billion gallons, of which, 458 billion gallons were returned. The fees are shown in Table 66 and Exhibit 79.

Table 66

**Public Water Supply Sector Fees
CY 2015**

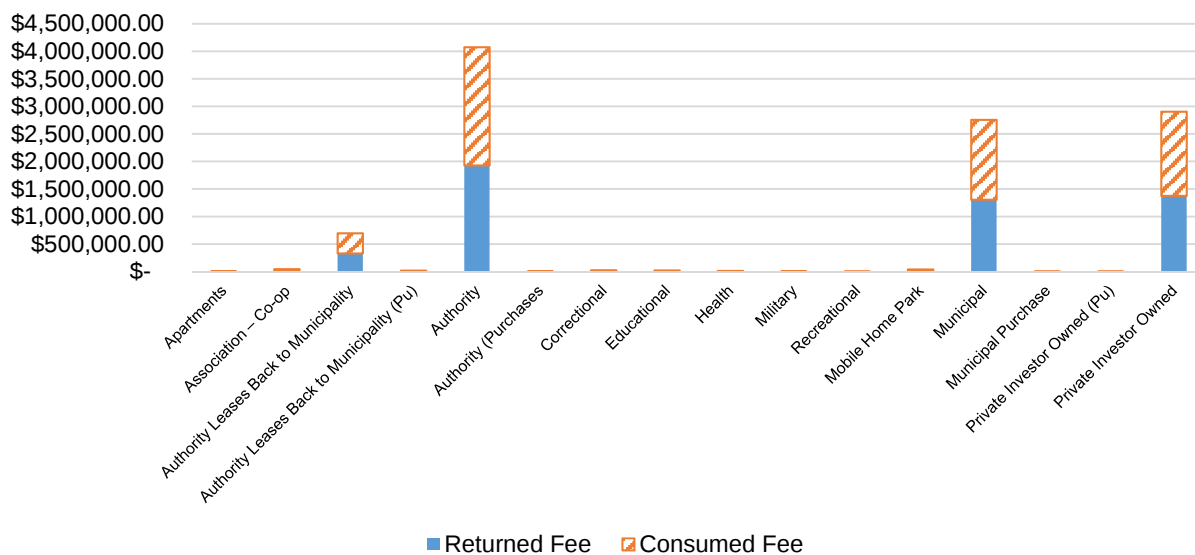
Facility	Total Withdrawal	Coef-ficient	Water Used & Returned	Water Consumed	Returned Fee	Consumed Fee	Total Fees
Apartments	154,442,866	0.1	138,998,579	15,444,287	\$1,526	\$1,696	\$3,222
Association – Co-op	2,154,262,181	0.1	1,938,835,963	215,426,218	21,288	23,653	44,942
Authority Leases Back to Municipal-ity	33,400,572,068	0.1	30,060,514,861	3,340,057,207	330,060	366,733	696,793
Authority Leases Back to Municipal-ity (Pu)	1,015,167,389	0.1	913,650,650	101,516,739	10,032	11,146	21,178
Authority	195,280,507,100	0.1	175,752,456,390	19,528,050,710	1,929,735	2,144,150	4,073,886
Authority (Purchases)	278,897,447	0.1	251,007,702	27,889,745	2,756	3,062	5,818
Correctional	1,238,982,136	0.1	1,115,083,922	123,898,214	12,243	13,604	25,847

Facility	Total Withdrawal	Coef- ficient	Water Used & Returned	Water Consumed	Returned Fee	Consumed Fee	Total Fees
Educational	1,055,017,813	0.1	949,516,032	105,501,781	10,426	11,584	22,009
Health	663,230,595	0.1	596,907,536	66,323,060	6,554	7,282	13,836
Military	127,917,322	0.1	115,125,590	12,791,732	1,264	1,405	2,669
Recreational	61,417,300	0.1	55,275,570	6,141,730	607	674	1,281
Mobile Home Park	1,951,083,803	0.1	1,755,975,423	195,108,380	19,280	21,423	40,703
Municipal	132,089,949,297	0.1	118,880,954,367	13,208,994,930	1,305,295	1,450,328	2,755,623
Municipal Purchase	98,967,000	0.1	89,070,300	9,896,700	978	1,087	2,065
Private In- vestor Owned (Pu)	42,231,800	0.1	38,008,620	4,223,180	417	464	881
Private In- vestor Owned	139,154,149,325	0.1	125,238,734,393	13,915,414,933	1,375,102	1,527,891	2,902,994

Source: Developed by LBFC staff using data provided by DEP.

Exhibit 79

Public Water Supply Sector Fees CY 2015



Source: Developed by LBFC staff using data provided by DEP.

Exempting the Public Water Supply sector would have a significant impact on other industries. For example, the Hydroelectric sector would see an increase in fees of nearly \$10 million, and the combined Thermoelectric sectors would see an increase of \$800,000. The impact on all other sectors is shown in Table 67 and Exhibit 80.

Table 67

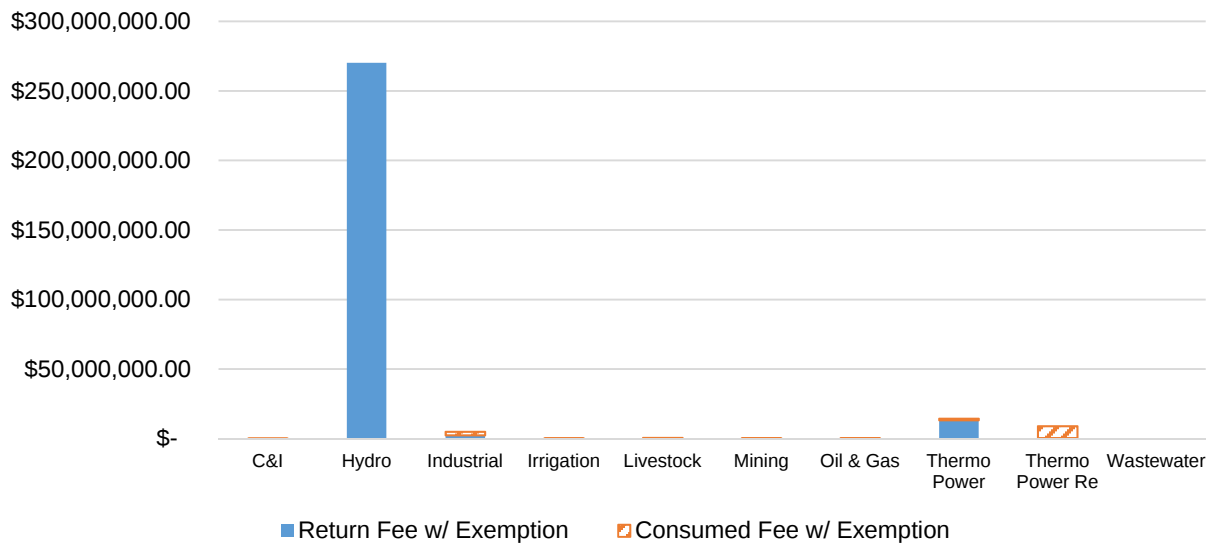
**All Sector Fees With Public Water Supply Exempt
CY 2015**

Facility	Return Fee	Con- sumed Fee	Total Fees	Return Fee w/ Exemption	Con- sumed Fee w/ Exemption	Total Fees	Change
Commercial & Institutional	\$ 20,363	\$ 22,625	\$ 42,988	\$ 21,110	\$ 23,455	\$ 44,565	\$ 1,577
Hydroelectric	260,685,593	0	260,685,593	270,246,693	0	270,246,693	9,561,100
Industrial	2,269,683	2,521,870	4,791,553	2,352,927	2,614,364	4,967,291	175,739
Irrigation	2,560	230,431	232,992	2,654	238,883	241,537	8,545
Livestock	302,429	253,628	556,058	313,522	262,930	576,452	20,394
Mining	155,491	172,768	328,259	161,194	179,104	340,298	12,039
Oil & Gas	29	285,796	285,825	30	296,278	296,308	10,483
Public Water Supply	5,027,564	5,586,182	10,613,746	0	0	0	0
Thermoelec- tric Power	12,721,450	1,081,840	13,803,290	13,188,032	1,121,519	14,309,550	506,260
Thermoelec- tric Power Re	479,140	8,179,933	8,659,073	496,713	8,479,946	8,976,660	317,587
Wastewater Collection and Treatment	623	0	623	646	0	646	23

Source: Developed by LBFC staff using data provided by DEP.

Exhibit 80

**All Sector Fees With Public Water Supply Exempt
CY 2015**



Source: Developed by LBFC staff using data provided by DEP.

The Thermoelectric Sector

The Thermoelectric sector would pay \$22 million in fees under the \$300 million scenario, equaling 7.5 percent of the total. Total water withdrawals for the period were 1.3 trillion gallons, of which 1.2 trillion gallons were returned after its use. Nuclear power accounts for 42 percent of the total for this sector. The fees are shown in Table 68 and Exhibit 81.

Table 68

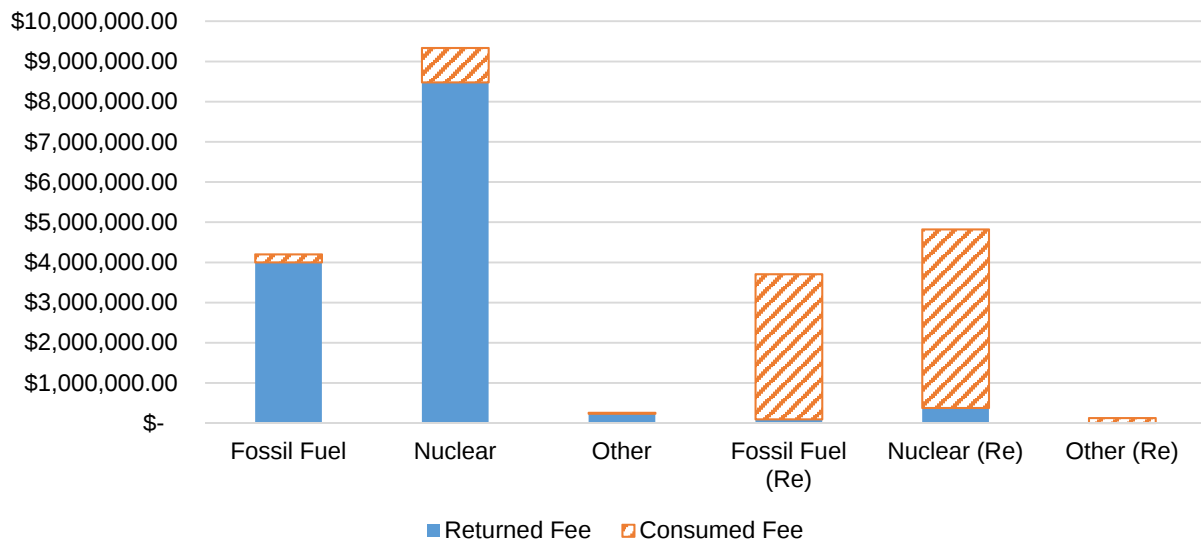
Thermoelectric Power Sector Fees CY 2015

Facility	Total Withdrawal	Coefficient	Water Used & Returned	Water Consumed	Returned Fee	Consumed Fee	Total Fees
Fossil Fuel	366,349,706,096	0.005	364,517,957,566	1,831,748,530	\$4,002,352	\$ 201,123	\$4,203,475
Nuclear	780,272,418,116	0.01	772,469,693,935	7,802,724,181	8,481,600	856,727	9,338,328
Other	21,848,839,630	0.01	21,630,351,234	218,488,396	237,498	23,990	261,488
Fossil Fuel (Re)	41,634,373,075	0.79	8,743,218,346	32,891,154,729	95,999	3,611,399	3,707,398
Nuclear (Re)	74,942,198,017	0.54	34,473,411,088	40,468,786,929	378,513	4,443,411	4,821,924
Other (Re)	1,561,048,500	0.73	421,483,095	1,139,565,405	4,628	125,123	129,750

Source: Developed by LBFC staff using data provided by DEP.

Exhibit 81

Thermoelectric Power Sector Fees CY 2015



Source: Developed by LBFC staff using data provided by DEP.

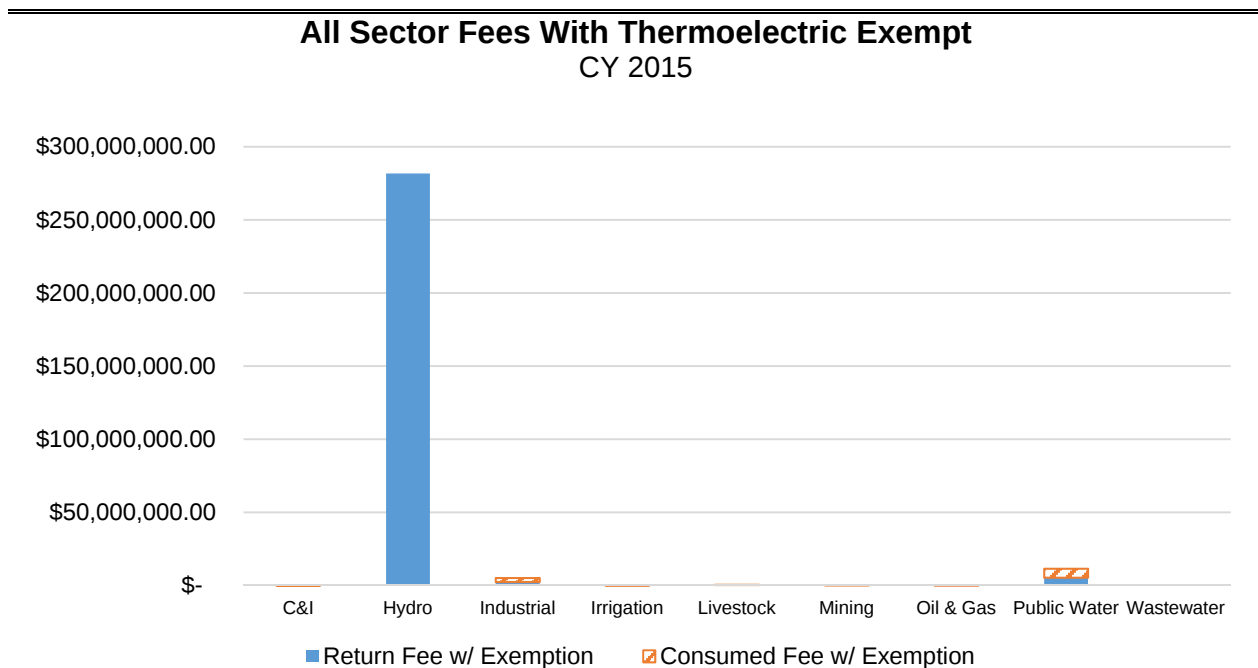
Exempting the Thermoelectric sector would have the following impact, shown in Table 69 and Exhibit 82.

Table 69

All Sector Fees With Thermoelectric Sector Exempt CY 2015							
Facility	Return Fee	Con- sumed Fee	Total Fees	Return Fee w/ Exemp- tion	Consumed Fee w/ Exemption	Total Fees	Change
Commercial & Institutional	\$ 20,363	\$ 22,625	\$ 42,988	\$ 22,011	\$ 24,456	\$ 46,467	\$ 3,479
Hydroelectric	260,685,593	0	260,685,593	281,784,045	0	281,784,045	21,098,452
Industrial	2,269,683	2,521,870	4,791,553	2,453,378	2,725,976	5,179,354	387,802
Irrigation	2,560	230,431	232,992	2,768	249,081	251,849	18,857
Livestock	302,429	253,628	556,058	326,906	274,155	601,062	45,004
Mining	155,491	172,768	328,259	168,076	186,751	354,826	26,567
Oil & Gas	29	285,796	285,825	31	308,927	308,958	23,133
Public Water Supply	5,027,564	5,586,182	10,613,746	5,434,467	6,038,297	11,472,764	859,018
Thermoelec- tric Power	12,721,450	1,081,840	13,803,290	0	0	0	0
Thermoelec- tric Power Re	479,140	8,179,933	8,659,073	0	0	0	0
Wastewater Collection and Treat- ment	623	0	623	674	0	674	50

Source: Developed by LBFC staff using data provided by DEP.

Exhibit 82



Source: Developed by LBFC staff using data provided by DEP.

The Wastewater Sector

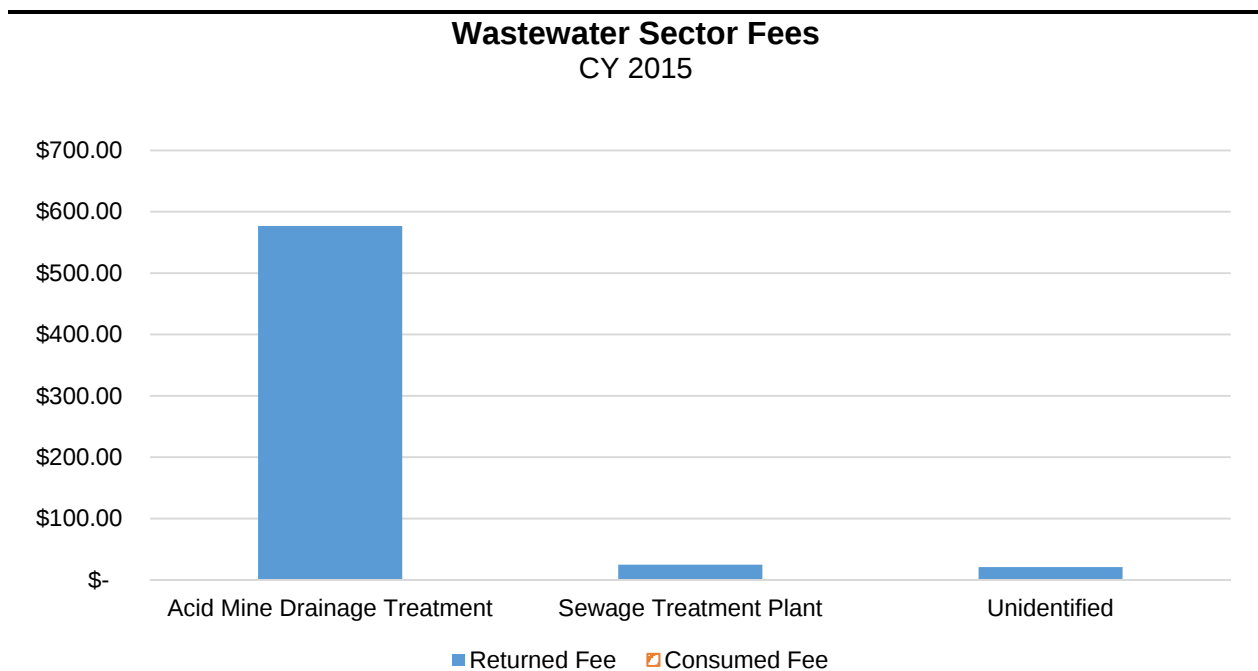
The Wastewater sector would pay \$600 in fees under this scenario. Total water withdrawals for the period were 57 million gallons and all water was returned. Acid mine drainage treatment accounts for 93 percent of the fees in this category. Fees are shown in Table 70 and Exhibit 83.

Table 70

Wastewater Sector Fees							
CY 2015							
Facility	Total Withdrawal	Coefficient	Water Used & Returned	Water Consumed	Returned Fee	Consumed Fee	Total Fees
Acid Mine Drainage Treatment	52,574,550	0	52,574,550	0	\$577	\$0	\$577
Sewage Treatment Plant	2,296,633	0	2,296,633	0	25	0	25
Unidentified	1,898,000	0	1,898,000	0	21	0	21

Source: Developed by LBFC staff using data provided by DEP.

Exhibit 83



Source: Developed by LBFC staff using data provided by DEP.

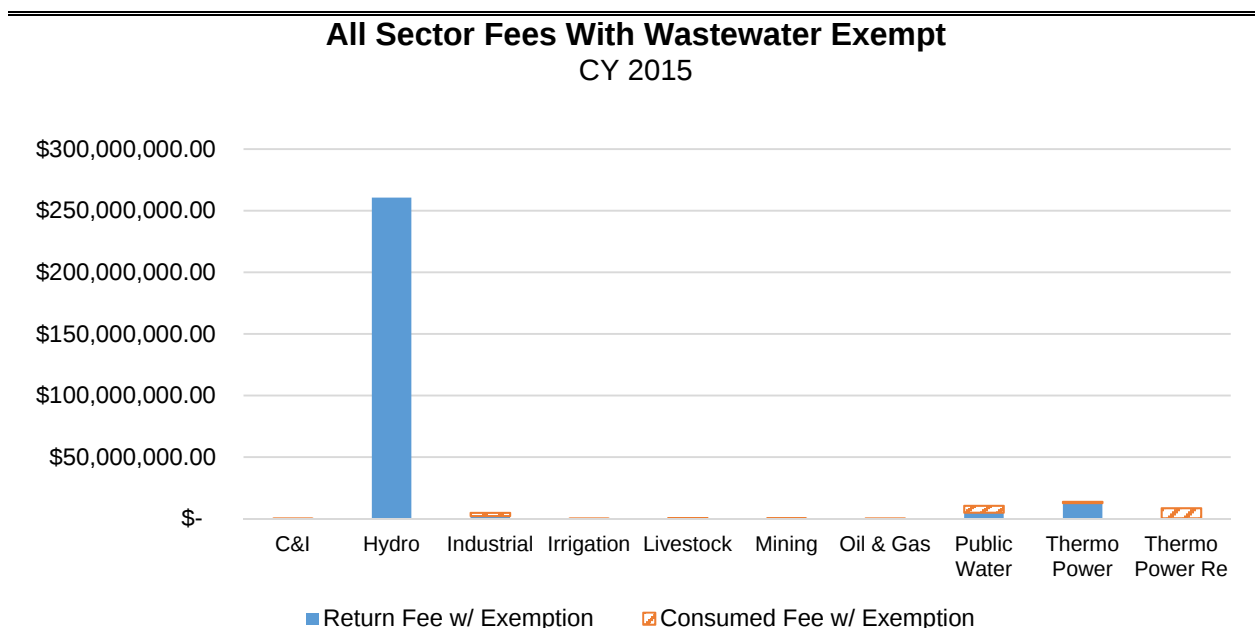
Exempting the Wastewater sector would have a minor impact on the other sectors. That impact is shown in Table 71 and Exhibit 84.

Table 71

All Sector Fees With Wastewater Exempt CY 2015							
Facility	Return Fee	Consumed Fee	Total Fees	Return Fee w/ Exemption	Consumed Fee w/ Exemption	Total Fees	Change
Commercial & Institutional	\$ 20,363	\$ 22,625	\$ 42,988	\$ 20,363	\$ 22,625	\$ 42,988	\$ 0
Hydroelectric	260,685,593	0	260,685,593	260,686,135	0	260,686,135	542
Industrial	2,269,683	2,521,870	4,791,553	2,269,688	2,521,875	4,791,563	10
Irrigation	2,560	230,431	232,992	2,560	230,432	232,992	0
Livestock	302,429	253,628	556,058	302,430	253,629	556,059	1
Mining	155,491	172,768	328,259	155,491	172,768	328,259	1
Oil & Gas	29	285,796	285,825	29	285,797	285,826	1
Public Water Supply	5,027,564	5,586,182	10,613,746	5,027,575	5,586,194	10,613,768	22
Thermoelectric Power	12,721,450	1,081,840	13,803,290	12,721,477	1,081,842	13,803,319	29
Thermoelectric Power Re	479,140	8,179,933	8,659,073	479,141	8,179,950	8,659,091	18
Wastewater Collection and Treatment	623	0	623	0	0	0	0

Source: Developed by LBFC staff using data provided by DEP.

Exhibit 84



Source: Developed by LBFC staff using data provided by DEP.

Exempting All Agriculture Facilities

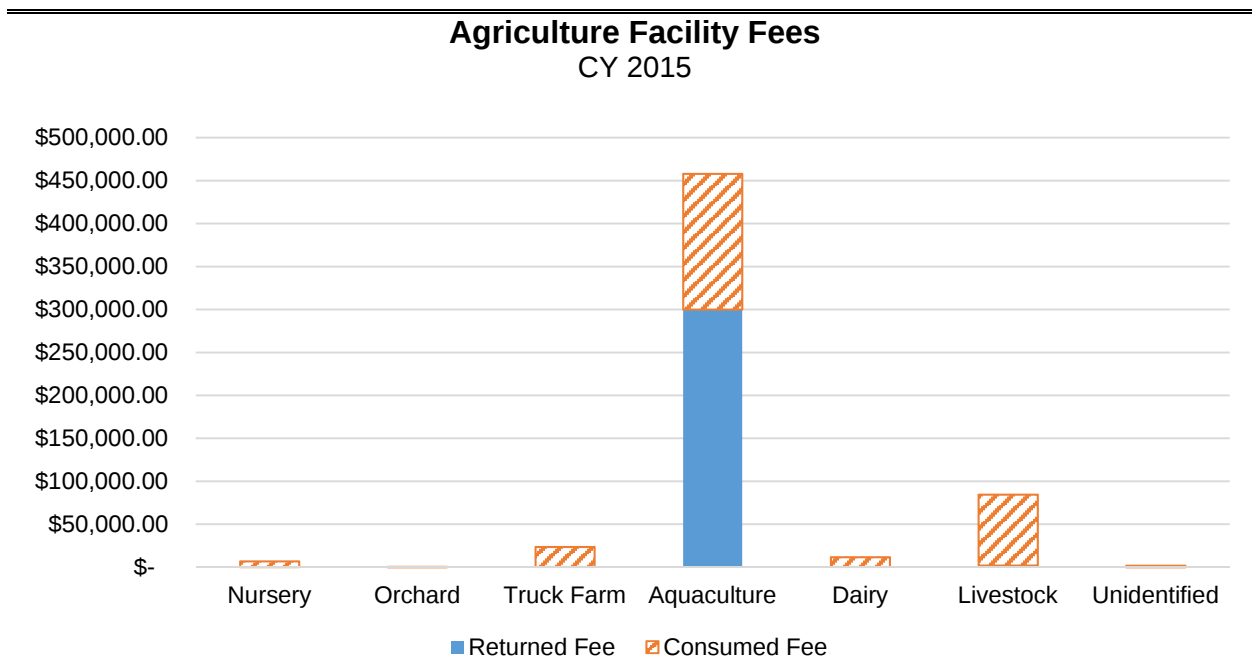
Exempting all facilities associated with the Agriculture sector, including nurseries, orchards, truck farms, aquaculture, dairies, and livestock, would reduce fee revenue by nearly \$600,000. Over 75 percent of that total would come from aquaculture facilities. The exemptions by facility type are shown in Table 72 and Exhibit 85.

Table 72

Agriculture Facility Fees CY 2015							
Facility	Total Withdrawal	Coef- fi- cient	Water Used & Returned	Water Consumed	Returned Fee	Con- sumed Fee	Total Fees
Nursery	68,013,548	0.9	6,801,355	61,212,193	\$ 75	\$ 6,721	\$ 6,796
Orchard	5,741,440	0.9	574,144	5,167,296	6	567	574
Truck Farm	237,100,976	0.9	23,710,098	213,390,878	260	23,430	23,690
Aquacul- ture	28,764,329,337	0.05	27,326,112,870	1,438,216,467	300,037	157,914	457,951
Dairy	130,123,700	0.8	26,024,740	104,098,960	286	11,430	11,716
Livestock	938,508,507	0.8	187,701,701	750,806,806	2,061	82,437	84,498
Unidenti- fied	21,024,780	0.8	4,204,956	16,819,824	46	1,847	1,893

Source: Developed by LBFC staff using data provided by DEP.

Exhibit 85



Source: Developed by LBFC staff using data provided by DEP.

If all agriculture facilities were exempt from the fee, the remaining sectors would see an increase in their fees by an equal amount in order to maintain \$300 million in total revenue. The increases are shown, by sector, in Table 73 and Exhibit 86.

Table 73

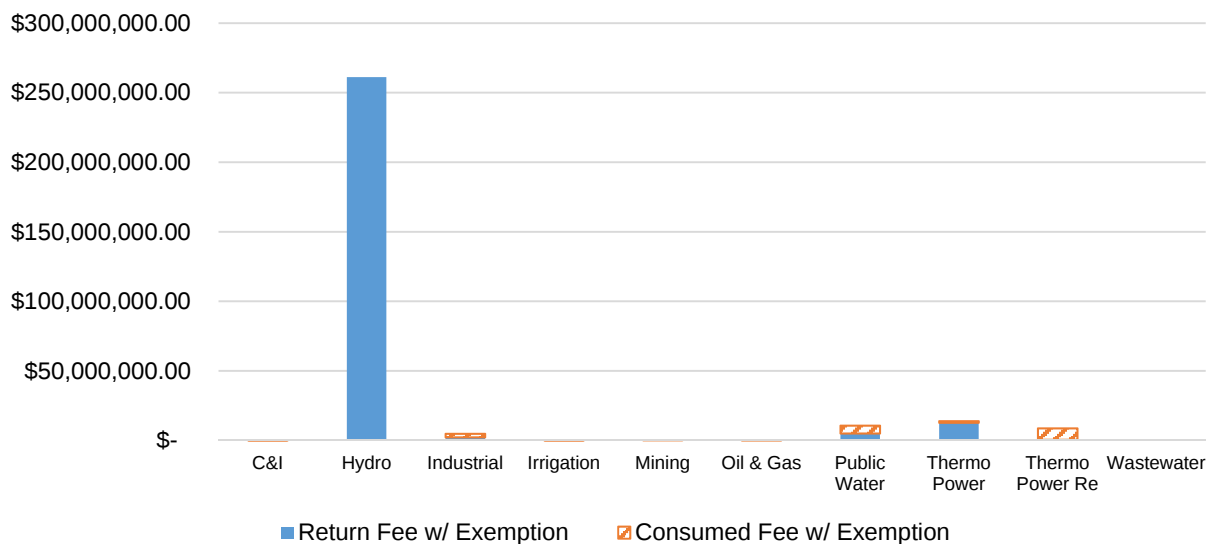
**All Sector Fees With Agriculture Sector Exempt
CY 2015**

Facility	Return Fee	Consumed Fee	Total Fees	Return Fee w/ Exemption	Consumed Fee w/ Exemption	Total Fees	Change
Commercial & Institutional	\$ 20,363	\$ 22,625	\$ 42,988	\$ 20,403	\$ 22,670	\$ 43,072	\$ 84
Hydroelectric	260,685,593	0	260,685,593	261,196,771	0	261,196,771	511,177
Industrial	2,269,683	2,521,870	4,791,553	2,274,133	2,526,815	4,800,948	9,396
Irrigation	2,219	199,713	201,932	2,223	200,105	202,328	396
Mining	155,491	172,768	328,259	155,796	173,107	328,902	644
Oil & Gas	29	285,796	285,825	29	286,357	286,385	560
Public Water Supply	5,027,564	5,586,182	10,613,746	5,037,423	5,597,136	10,634,559	20,812
Thermoelectric Power	12,721,450	1,081,840	13,803,290	12,746,396	1,083,962	13,830,357	27,067
Thermoelectric Power Re	479,140	8,179,933	8,659,073	480,079	8,195,973	8,676,052	16,980
Wastewater Collection and Treatment	623	0	623	625	0	625	1

Source: Developed by LBFC staff using data provided by DEP.

Exhibit 86

**All Sector Fees With Agriculture Sector Exempt
CY 2015**



Source: Developed by LBFC staff using data provided by DEP.

Exempting All Power Generation

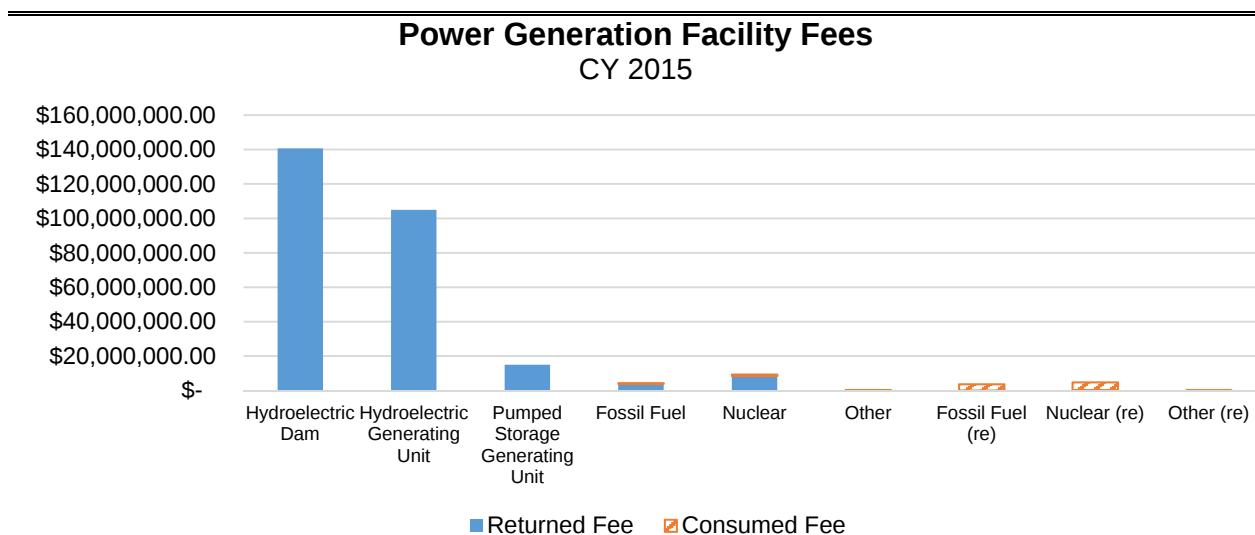
Exempting all power generation facilities (hydroelectric and thermoelectric) would decrease fee revenue by just over \$280 million. Of that, nearly 50 percent, or \$141 million, would come from hydroelectric dams. Power generation withdrew 25 trillion gallons of water in 2015 (97 percent of all water withdrawn), however, only 84 billion gallons was consumed. The exemptions by facility type are shown in Table 74 and Exhibit 87.

Table 74

Power Generation Facility Fees CY 2015							
Facility	Total Withdrawal	Coefficient	Water Used & Returned	Water Consumed	Returned Fee	Consumed Fee	Total Fees
Hydroelectric Dam	12,814,796,805,635	0	12,814,796,805,635	0	\$140,704,528	\$ 0	\$140,704,528
Hydroelectric Generating Unit	9,559,549,672,178	0	9,559,549,672,178	0	104,962,407	0	104,962,407
Pumped Storage Generating Unit	1,367,838,428,046	0	1,367,838,428,046	0	15,018,659	0	15,018,659
Fossil Fuel	366,349,706,096	0.005	364,517,957,566	1,831,748,530	4,002,352	201,123	4,203,475
Nuclear	780,272,418,116	0.01	772,469,693,935	7,802,724,181	8,481,600	856,727	9,338,328
Other	21,848,839,630	0.01	21,630,351,234	218,488,396	237,498	23,990	261,488
Fossil Fuel (re)	41,634,373,075	0.79	8,743,218,346	32,891,154,729	95,999	3,611,399	3,707,398
Nuclear (re)	74,942,198,017	0.54	34,473,411,088	40,468,786,929	378,513	4,443,411	4,821,924
Other (re)	1,561,048,500	0.73	421,483,095	1,139,565,405	4,628	125,123	129,750

Source: Developed by LBFC staff using data provided by DEP.

Exhibit 87



Source: Developed by LBFC staff using data provided by DEP.

If all power generation facilities were exempt from the fee, the remaining sectors would see an increase in their fees of the same amount in order to maintain \$300 million in total fee revenue. The Public Water Supply sector would realize the largest increase in fees, totaling \$178 million. The increases are shown, by sector, in Table 75 and Exhibit 88.

Table 75

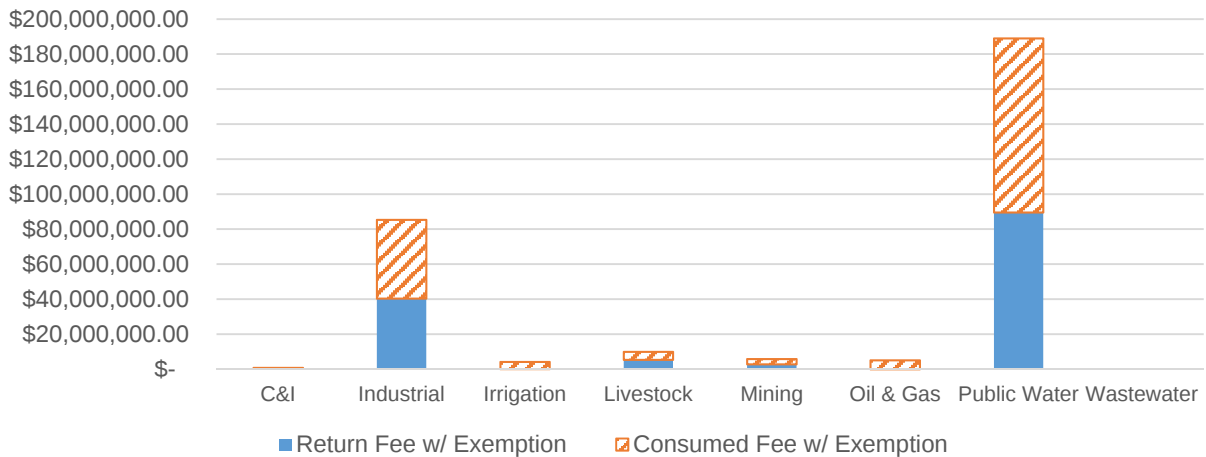
**All Sector Fees With Power Generation Sector Exempt
CY 2015**

Facility	Return Fee	Consumed Fee	Total Fees	Return Fee w/ Exemption	Consumed Fee w/ Exemption	Total Fees	Change
Commercial & Institutional	\$ 20,363	\$ 22,625	\$ 42,988	\$ 362,498	\$ 402,776	\$ 765,274	\$ 722,286
Industrial	2,269,683	2,521,870	4,791,553	40,404,883	44,894,314	85,299,197	80,507,645
Irrigation	2,560	230,431	232,992	45,579	4,102,137	4,147,716	3,914,725
Livestock	302,429	253,628	556,058	5,383,847	4,515,087	9,898,934	9,342,877
Mining	155,491	172,768	328,259	2,768,050	3,075,611	5,843,661	5,515,403
Oil & Gas	29	285,796	285,825	509	5,087,744	5,088,254	4,802,429
Public Water Supply	5,027,564	5,586,182	10,613,746	89,500,674	99,445,193	188,945,866	178,332,120
Wastewater Collection and Treatment	623	0	623	11,096	0	11,096	10,473

Source: Developed by LBFC staff using data provided by DEP.

Exhibit 88

**All Sector Fees With Power Generation Sector Exempt
CY 2015**



Source: Developed by LBFC staff using data provided by DEP.

E. A water use fee of \$0.0000036 per gallon of water withdrawn and returned and \$0.000036 per gallon of water withdrawn and consumed would generate \$100 million in fees if there were no exemption to the fee.⁵

Calculating the Fee

To determine the water use fee to apply to water that is withdrawn and returned and water that is consumed, we followed the same calculations used in previous sections of this report. As shown earlier, the fee for water that is consumed (WC) is ten times greater than the fee for water that is withdrawn and returned (WR). In this section, we calculate water use fees to reach revenues of \$100 million. The simplified formula is as follows:

$$F = \frac{DR}{WR + 10(WC)}$$

Where DR = \$300,000,000; WR = 25,652,897,280,725; and WC = 166,988,407,615 we find the following:

F	=	$\frac{\$100,000,000}{25,652,897,280,725 + 10(166,988,407,615)}$
F	=	0.00000365995
10F	=	0.00003659950

These numbers are based on 25.8 trillion gallons of water used in CY 2015. Of that, 25.7 trillion gallons of water was withdrawn and returned while 167 billion was consumed. The hydroelectric sector would pay the vast majority of the proposed fee—just under 87 percent. The three power generating sectors combined—hydroelectric, thermoelectric, and thermoelectric recirculated—would pay just over 94 percent of the fees needed to reach \$100 million in revenue. The fees are shown in Table 76 and Exhibit 89.

⁵ We used data provided by the DEP; however, the 2015 DEP water withdrawal amounts for the Oil and Gas sector are limited to the Ohio River Basin and, therefore, our calculations do not include water withdrawal amounts for the Oil and Gas sector in the Susquehanna River Basin or the subsequent fees related to them. In 2015 the SRBC reported 1.3 billion gallons of water used for natural gas extraction (approximately 0.0005 percent of the total withdrawn that year); the impact on the fee calculations would be minimal.

Table 76

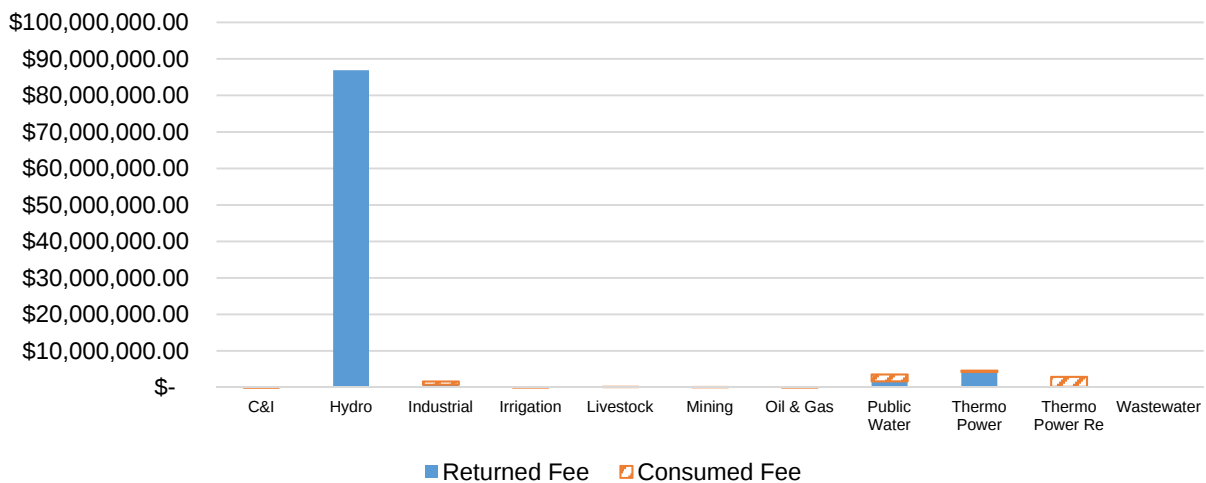
All Sector Fees CY 2015

Facility	Total Withdrawal	Water Used & Returned	Water Consumed	Returned Fee	Consumed Fee	Total Fees
Commercial & Institutional	2,060,622,505	1,854,560,255	206,062,251	\$ 6,788	\$ 7,542	\$ 14,329
Hydroelectric	23,742,184,905,859	23,742,184,905,859	0	86,895,198	0	86,895,198
Industrial	229,681,654,732	206,713,489,259	22,968,165,473	756,561	840,623	1,597,184
Irrigation	2,331,860,812	233,186,081	2,098,674,731	853	76,810	77,664
Livestock	29,853,986,324	27,544,044,268	2,309,942,056	100,810	84,543	185,353
Mining	15,734,987,931	14,161,489,138	1,573,498,793	51,830	57,589	109,420
Oil & Gas	2,605,522,117	2,605,522	2,602,916,595	10	95,265	95,275
Public Water Supply	508,766,795,442	457,890,115,898	50,876,679,544	1,675,855	1,862,061	3,537,915
Thermoelectric Power	1,168,470,963,842	1,158,618,002,734	9,852,961,108	4,240,483	360,613	4,601,097
Thermoelectric Power Re	118,137,619,592	43,638,112,529	74,499,507,063	159,713	2,726,644	2,886,358
Wastewater Collection and Treatment	56,769,183.00	56,769,183.00	0	208	0	208

Source: Developed by LBFC staff using data provided by DEP.

Exhibit 89

All Sector Fees CY 2015



Source: Developed by LBFC staff using data provided by DEP.

The Commercial & Institutional Sector

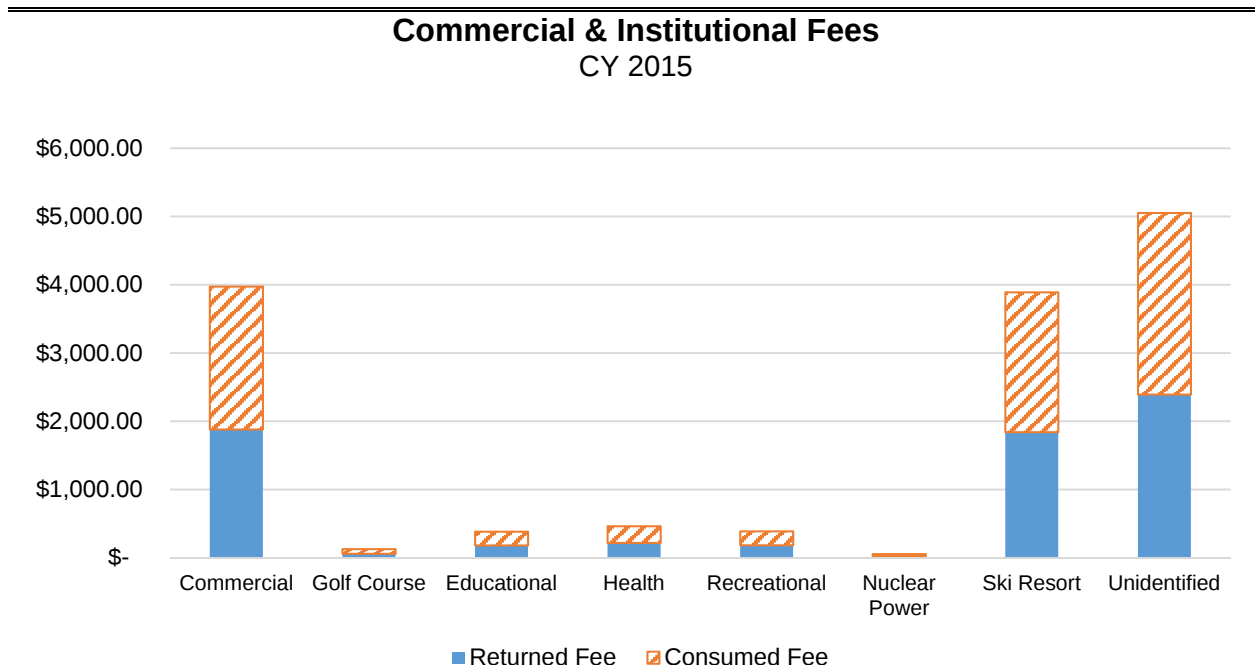
The Commercial & Institutional sector would pay \$14,000 in fees under this scenario, based on 2015 data. Commercial facilities and ski resorts would account for 55 percent of total fees. Total water withdrawn in CY 2015 was just over 2 billion gallons, with 1.8 billion gallons returned and 206 million gallons consumed. The fees for this scenario are shown in Table 77 and Exhibit 90.

Table 77

Commercial & Institutional Sector Fees							
CY 2015							
Facility	Total Withdrawal	Coefficient	Water Used & Returned	Water Consumed	Returned Fee	Consumed Fee	Total Fees
Commercial	571,240,681	0.1	514,116,613	57,124,068	\$1,882	\$2,091	\$3,972
Golf Course	18,424,412	0.1	16,581,971	1,842,441	61	67	128
Educational	55,239,099	0.1	49,715,189	5,523,910	182	202	384
Health	66,453,236	0.1	59,807,912	6,645,324	219	243	462
Recreational	55,641,724	0.1	50,077,552	5,564,172	183	204	387
Nuclear Power	8,035,558	0.1	7,232,002	803,556	26	29	56
Ski Resort	559,199,056	0.1	503,279,150	55,919,906	1,842	2,047	3,889
Unidentified	726,388,739	0.1	653,749,865	72,638,874	2,393	2,659	5,051

Source: Developed by LBFC staff using data provided by DEP.

Exhibit 90



Source: Developed by LBFC staff using data provided by DEP.

Exempting the Commercial sector from a fee would impact the remaining sectors as shown in Table 78 and Exhibit 91. The Hydroelectric sector would see the most significant increase in fees, \$12,000.

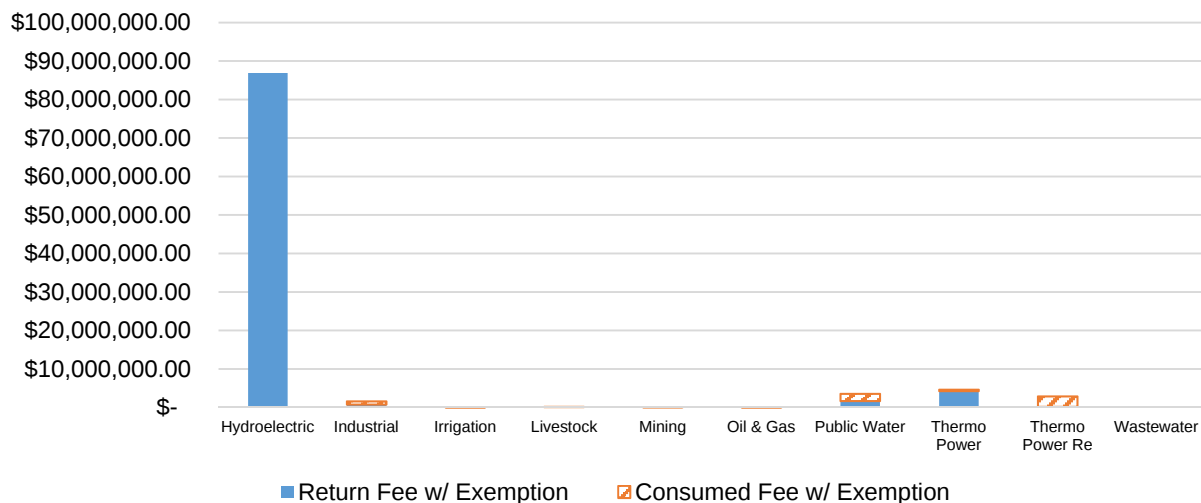
Table 78

All Sector Fees With Commercial & Institutional Sectors Exempt							
CY 2015							
Facility	Returned Fee	Consumed Fee	Total Fees	Return Fee w/ Exemption	Consumed Fee w/ Exemption	Total Fees	Change
Commercial & Institutional	\$ 33,938	\$ 37,709	\$ 71,647	\$ 0	\$ 0	\$ 0	\$ 0
Hydroelectric	86,895,198	0	86,895,198	86,907,651	0	86,907,651	12,453
Industrial	756,561	840,623	1,597,184	756,669	840,744	1,597,413	229
Irrigation	853	76,810	77,664	854	76,821	77,675	11
Livestock	100,810	84,543	185,353	100,824	84,555	185,379	27
Mining	51,830	57,589	109,420	51,838	57,598	109,435	16
Oil & Gas	10	95,265	95,275	10	95,279	95,289	14
Public Water Supply	1,675,855	1,862,061	3,537,915	1,676,095	1,862,328	3,538,423	507
Thermoelectric Power	4,240,483	360,613	4,601,097	4,241,091	360,665	4,601,756	659
Thermoelectric Power Re	159,713	2,726,644	2,886,358	159,736	2,727,035	2,886,771	414
Wastewater Collection and Treatment	208	0	208	208	0	208	0

Source: Developed by LBFC staff using data provided by DEP.

Exhibit 91

Commercial & Institutional Fees CY 2015



Source: Developed by LBFC staff using data provided by DEP.

The Hydroelectric Sector

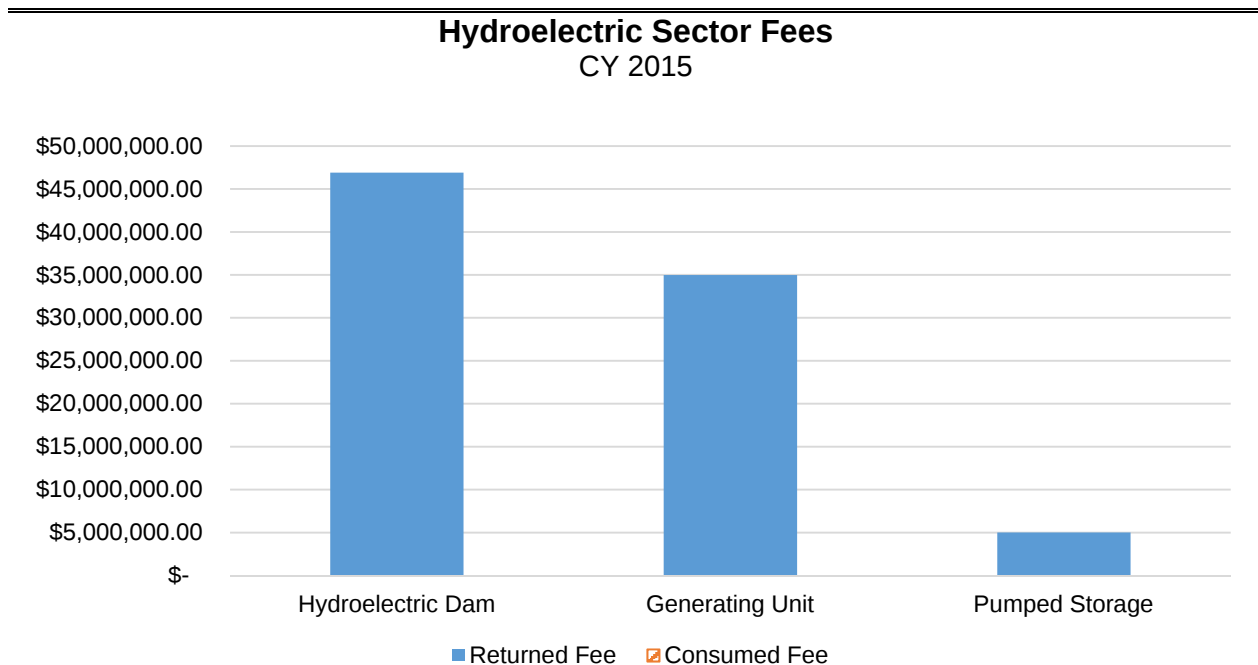
Under a scenario designed to collect \$100 million in fees, the Hydroelectric sector would pay \$87 million based on 2015 data. The total water withdrawn by this sector for the same period was just under 24 trillion gallons. As noted earlier, none of the water in the Hydroelectric sector is consumed. The fees are shown in Table 79 and Exhibit 92.

Table 79

Hydroelectric Sector Fees CY 2015							
Facility	Total Withdrawal	Coef- fi- cient	Water Used & Returned	Water Consumed	Returned Fee	Con- sumed Fee	Total Fees
Hydroe- lectric Dam	12,814,796,805,635	0	12,814,796,805,635	0	\$46,901,509	\$0	\$46,901,509
Generat- ing Unit	9,559,549,672,178	0	9,559,549,672,178	0	34,987,469	0	34,987,469
Pumped Storage	1,367,838,428,046	0	1,367,838,428,046	0	5,006,220	0	5,006,220

Source: Developed by LBFC staff using data provided by DEP.

Exhibit 92



Source: Developed by LBFC staff using data provided by DEP.

Exempting hydroelectric power would have a significant impact on other industries. Thermoelectric power would pay \$50 million in additional fees and the Public Water Supply sector would pay an additional \$23 million in fees. Together, these sectors would pay 84 percent of the additional fees if hydroelectric were exempt. The impact on all other sectors is shown in Table 80 and Exhibit 93.

Table 80

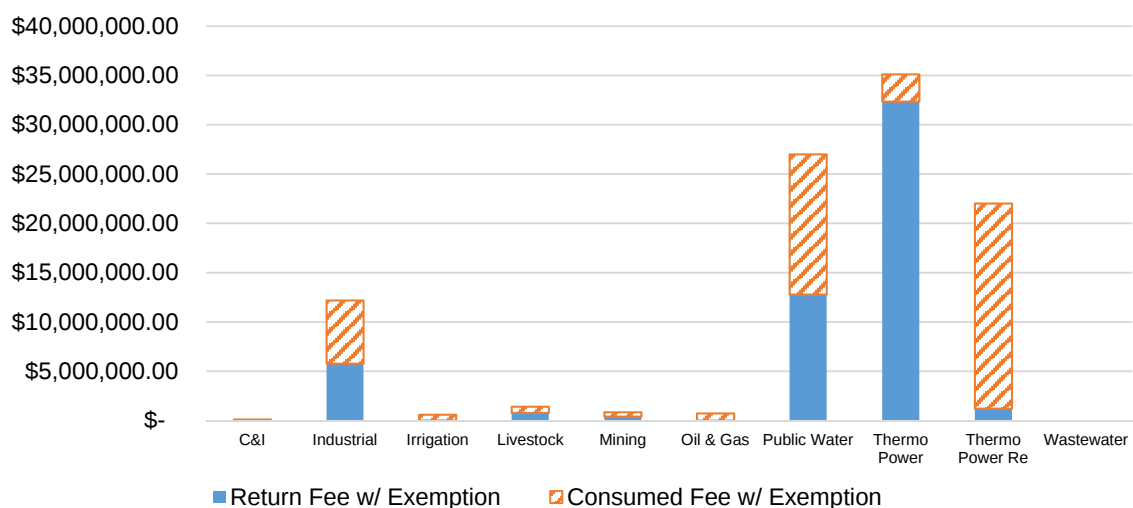
**All Sector Fees With Hydroelectric Sector Exempt
CY 2015**

Facility	Returned Fee	Consumed Fee	Total Fees	Return Fee w/ Exemption	Consumed Fee w/ Exemption	Total Fees	Change
Commercial & Institutional	\$ 6,788	\$ 7,542	\$ 14,329	\$ 51,795	\$ 57,550	\$109,344	\$ 95,015
Hydroelectric	434,475,989	0	434,475,989	0	0	0	0
Industrial	756,561	840,623	1,597,184	5,773,158	6,414,620	12,187,778	10,590,594
Irrigation	853	76,810	77,664	6,512	586,124	592,637	514,973
Livestock	100,810	84,543	185,353	769,259	645,128	1,414,386	1,229,034
Mining	51,830	57,589	109,420	395,506	439,452	834,958	725,538
Oil & Gas	10	95,265	95,275	73	726,951	727,023	631,748
Public Water Supply	1,675,855	1,862,061	3,537,915	12,788,096	14,208,996	26,997,092	23,459,176
Thermoelectric Power	4,240,483	360,613	4,601,097	32,358,240	2,751,765	35,110,006	30,508,909
Thermoelectric Power Re	159,713	2,726,644	2,886,358	1,218,739	20,806,452	22,025,190	19,138,833
Wastewater Collection and Treatment	208	0	208	1,585	0	1,585	1,378

Source: Developed by LBFC staff using data provided by DEP.

Exhibit 93

**All Sector Fees With Hydroelectric Sector Exempt
CY 2015**



Source: Developed by LBFC staff using data provided by DEP.

The Industrial Sector

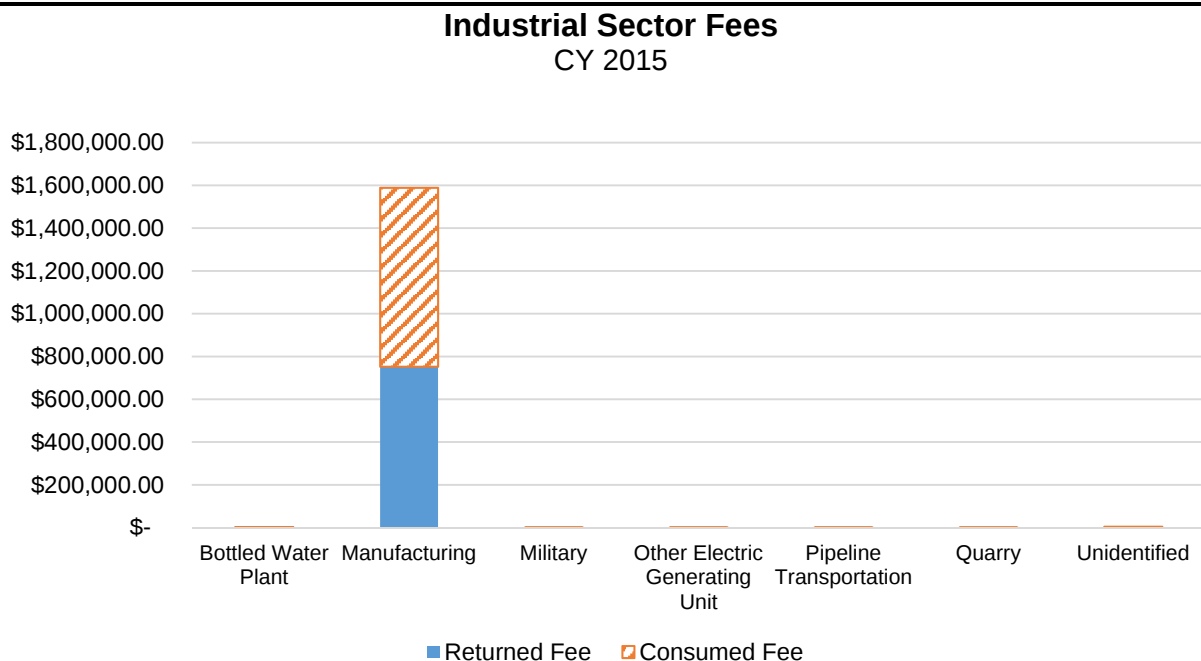
The Industrial sector would pay \$1.6 million in fees under this scenario, based on 2015 data. Total water withdrawals were 230 billion gallons. Water returned was 207 billion gallons and water consumed was 23 billion gallons. Manufacturing accounts for over 99 percent of the total in this sector. The fees are shown in Table 81 and Exhibit 94.

Table 81

Industrial Sector Fees							
CY 2015							
Facility	Total Withdrawal	Coefficient	Water Used & Returned	Water Consumed	Returned Fee	Consumed Fee	Total Fees
Bottled Water Plant	442,323,419	0.1	398,091,077	44,232,342	\$ 1,457	\$ 1,619	\$ 3,076
Manufacturing	228,444,021,213	0.1	205,599,619,092	22,844,402,121	752,484	836,094	1,588,578
Military	3,522,600	0.1	3,170,340	352,260	12	13	24
Other Electric Generating Unit	5,473,537	0.1	4,926,183	547,354	18	20	38
Pipeline Transportation	2,998,050	0.1	2,698,245	299,805	10	11	21
Quarry	122,383,000	0.1	110,144,700	12,238,300	403	448	851
Unidentified	660,932,913	0.1	594,839,622	66,093,291	2,177	2,419	4,596

Source: Developed by LBFC staff using data provided by DEP.

Exhibit 94



Source: Developed by LBFC staff using data provided by DEP.

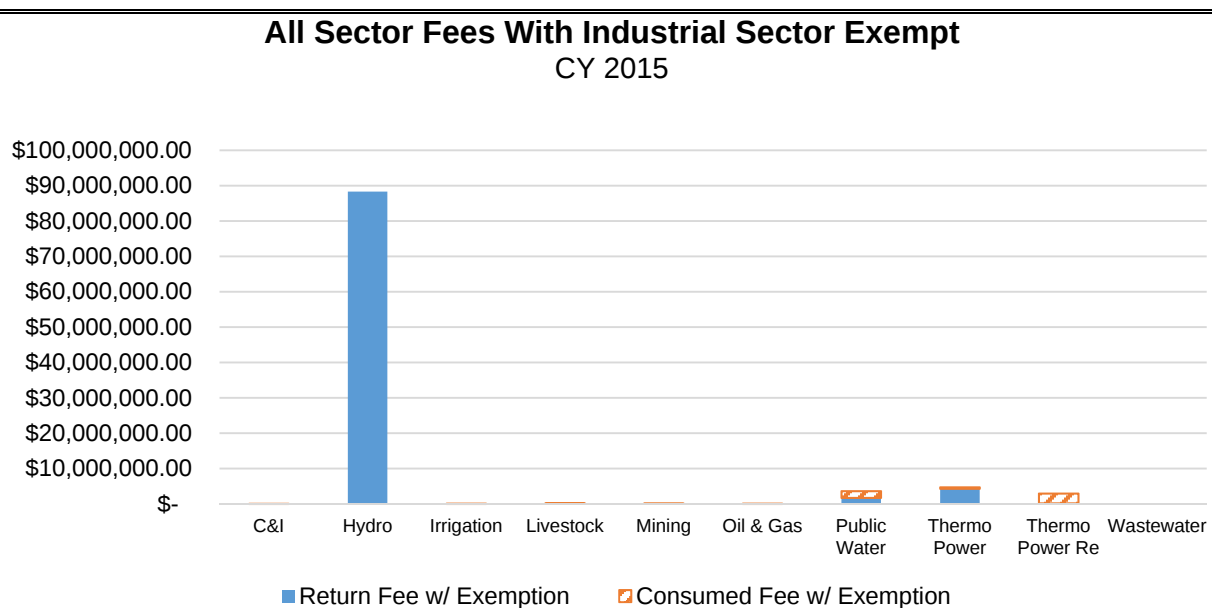
Exempting the Industrial sector would require an increase of \$1.4 million in fees by the Hydroelectric sector. If all power producing sectors were combined, the increase would be just over \$1.6 million. The increase in fees are shown in Table 82 and Exhibit 95.

Table 82

All Sector Fees With Industrial Sector Exempt CY 2015							
Facility	Returned Fee	Consumed Fee	Total Fees	Return Fee w/ Exemption	Consumed Fee w/ Exemption	Total Fees	Change
Commercial & Institutional	\$ 6,788	\$ 7,542	\$ 14,329	\$ 6,898	\$ 7,664	\$ 14,562	\$ 233
Hydroelectric	86,895,198	0	86,895,198	88,305,601	0	88,305,601	1,410,403
Industrial	3,782,805	4,203,116	7,985,921	0	0	0	0
Irrigation	853	76,810	77,664	867	78,057	78,924	1,261
Livestock	100,810	84,543	185,353	102,446	85,915	188,361	3,008
Mining	51,830	57,589	109,420	52,672	58,524	111,196	1,776
Oil & Gas	10	95,265	95,275	10	96,812	96,821	1,546
Public Water Supply	1,675,855	1,862,061	3,537,915	1,703,056	1,892,284	3,595,340	57,424
Thermoelectric Power	4,240,483	360,613	4,601,097	4,309,311	366,467	4,675,778	74,681
Thermoelectric Power Re	159,713	2,726,644	2,886,358	162,306	2,770,901	2,933,206	46,849
Wastewater Collection and Treatment	208	0	208	211	0	211	3

Source: Developed by LBFC staff using data provided by DEP.

Exhibit 95



Source: Developed by LBFC staff using data provided by DEP.

The Irrigation Sector

Based on 2015 data, the Irrigation sector would pay \$78,000 in fees designed to generate \$100 million in revenue. Golf courses would pay 86 percent of the fees associated with the Irrigation sector. The fees are shown in Table 78 and Exhibit 96.

Table 83

Irrigation Sector Fees CY 2015

Facility	Total Withdrawal	Coefficient	Water Used & Returned	Water Consumed	Returned Fee	Consumed Fee	Total Fees
Commercial Facility	9,413,708	0.9	941,371	8,472,337	\$ 3	\$ 310	\$ 314
Golf Course	2,004,227,893	0.9	200,422,789	1,803,805,104	734	66,018	66,752
Nursery	68,013,548	0.9	6,801,355	61,212,193	25	2,240	2,265
Orchard	5,741,440	0.9	574,144	5,167,296	2	189	191
Truck Farm	237,100,976	0.9	23,710,098	213,390,878	87	7,810	7,897
Unidentified	7,363,247	0.9	736,325	6,626,922	3	243	245

Source: Developed by LBFC staff using data provided by DEP.

Exhibit 96

Irrigation Sector Fees CY 2015



Source: Developed by LBFC staff using data provided by DEP.

The impact on other sectors, if the Irrigation sector were to be exempt, is shown in Table 84 and Exhibit 97.

Table 84

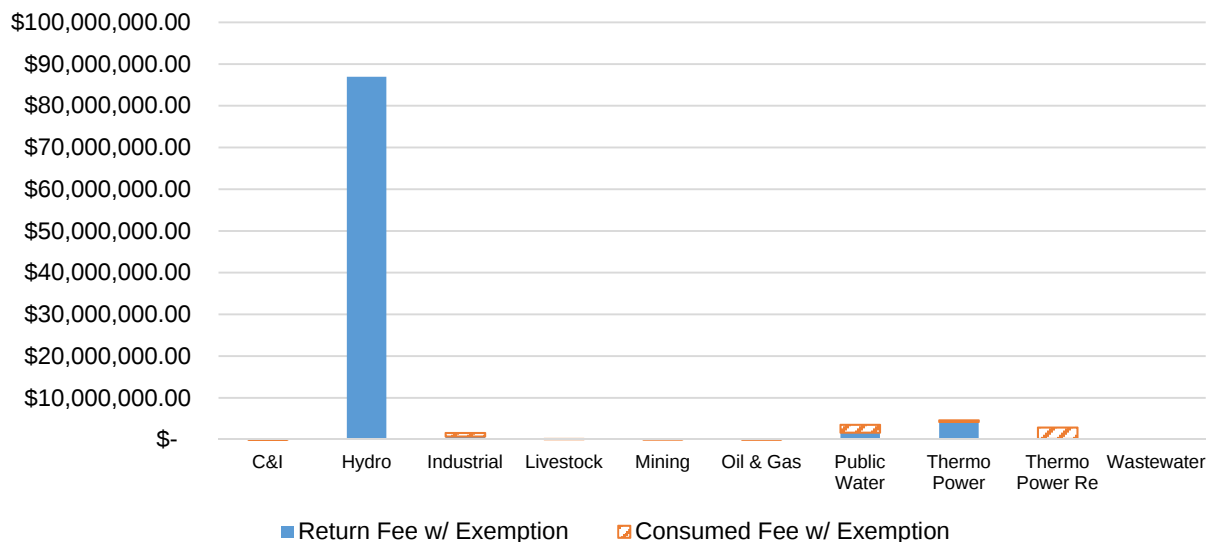
**All Sector Fees With Irrigation Sector Exempt
CY 2015**

Facility	Return Fee	Consumed Fee	Total Fees	Return Fee w/ Exemption	Consumed Fee w/ Exemption	Total Fees	Change
Commercial & Institutional	\$ 6,788	\$ 7,542	\$ 14,329	\$ 6,793	\$ 7,548	\$ 14,341	\$ 11
Hydroelectric	86,895,198	0	86,895,198	86,962,736	0	86,962,736	67,539
Industrial	756,561	840,623	1,597,184	757,149	841,277	1,598,426	1,241
Irrigation	4,267	384,052	388,319	0	0	0	0
Livestock	100,810	84,543	185,353	100,888	84,608	185,497	144
Mining	51,830	57,589	109,420	51,871	57,634	109,505	85
Oil & Gas	10	95,265	95,275	10	95,339	95,349	74
Public Water Supply	1,675,855	1,862,061	3,537,915	1,677,157	1,863,508	3,540,665	2,750
Thermoelectric Power	4,240,483	360,613	4,601,097	4,243,779	360,894	4,604,673	3,576
Thermoelectric Power Re	159,713	2,726,644	2,886,358	159,837	2,728,764	2,888,601	2,243
Wastewater Collection and Treatment	208	0	208	208	0	208	0

Source: Developed by LBFC staff using data provided by DEP.

Exhibit 97

**All Sector Fees With Irrigation Sector Exempt
CY 2015**



Source: Developed by LBFC staff using data provided by DEP.

The Livestock Sector

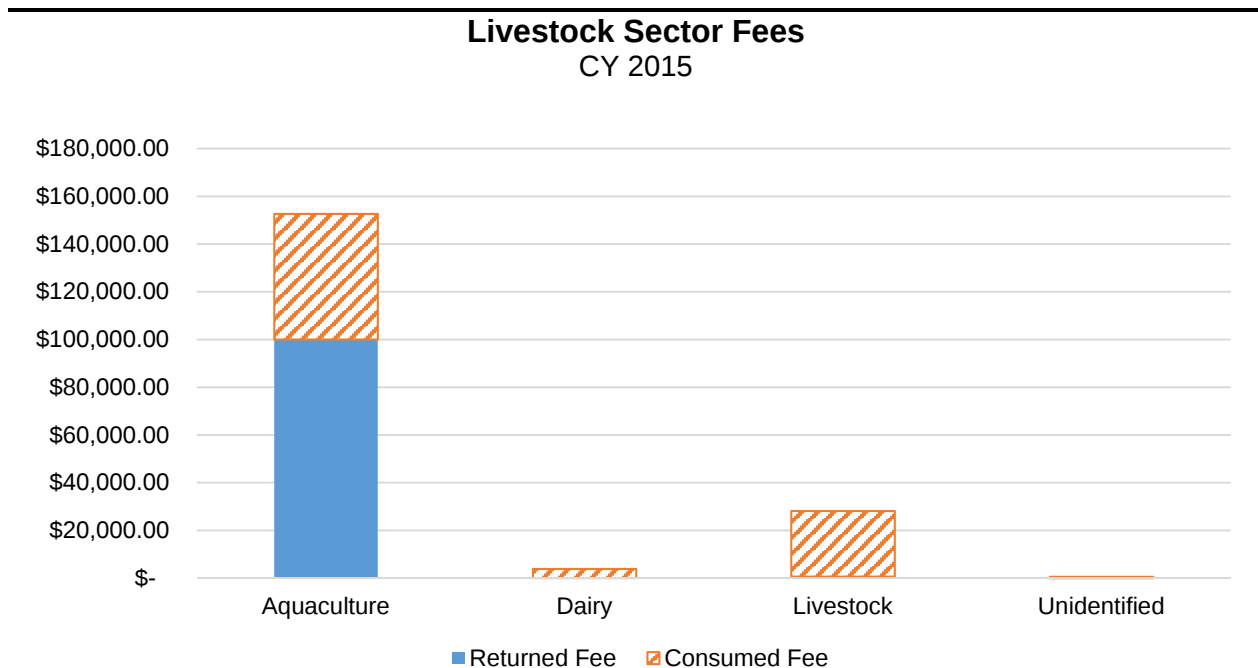
The Livestock sector would pay \$185,000 in fees under this scenario. In 2015, the sector withdrew just under 30 billion gallons, with 28 billion gallons returned and just over 2 billion gallons consumed. Aquaculture comprised 82 percent of the fees for the sector and would pay \$153,000 in the \$100 million scenario. The fees are shown in Table 85 and Exhibit 98.

Table 85

Livestock Sector Fees							
CY 2015							
Facility	Total Withdrawal	Coef- ficient	Water Used & Returned	Water Consumed	Returned Fee	Con- sumed Fee	Total Fees
Aquaculture	28,764,329,337	0.05	27,326,112,870	1,438,216,467	\$100,012	\$52,638	\$152,650
Dairy	130,123,700	0.8	26,024,740	104,098,960	95	3,810	3,905
Livestock	938,508,507	0.8	187,701,701	750,806,806	687	27,479	28,166
Unidentified	21,024,780	0.8	4,204,956	16,819,824	15	616	631

Source: Developed by LBFC staff using data provided by DEP.

Exhibit 98



Source: Developed by LBFC staff using data provided by DEP.

Exempting the Livestock sector would have the following impact, shown in Table 86 and Exhibit 99.

Table 86

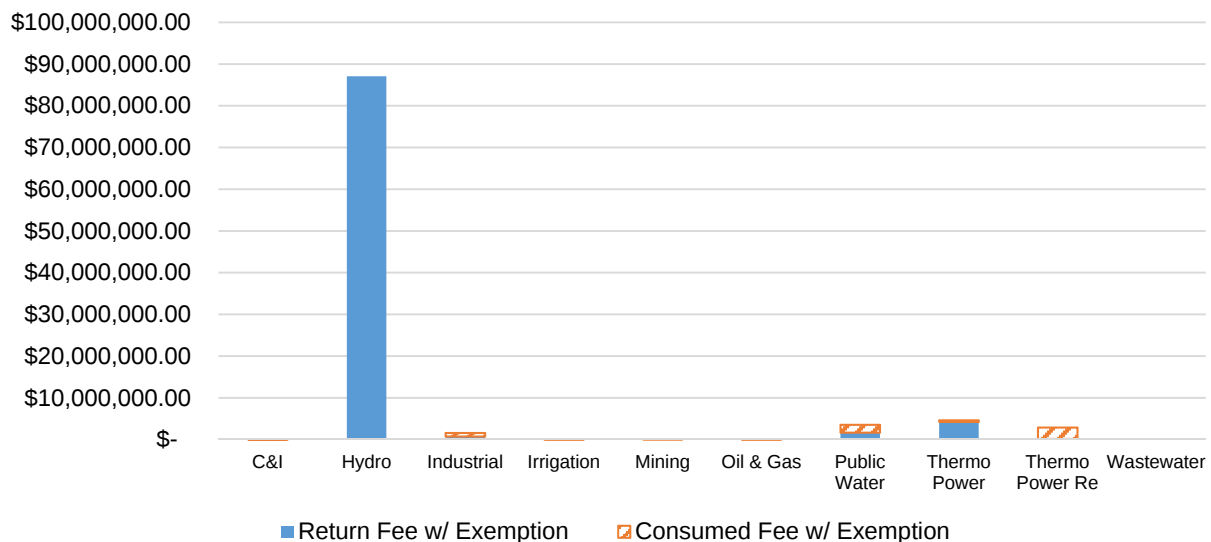
**All Sector Fees With Livestock Sector Exempt
CY 2015**

Facility	Return Fee	Consumed Fee	Total Fees	Return Fee w/ Exemption	Consumed Fee w/ Exemption	Total Fees	Change
Commercial & Institutional	\$ 6,788	\$ 7,542	\$ 14,329	\$ 6,800	\$ 7,556	\$ 14,356	\$ 27
Hydroelectric	86,895,198	0	86,895,198	87,056,559	0	87,056,559	161,362
Industrial	756,561	840,623	1,597,184	757,966	842,184	1,600,150	2,966
Irrigation	853	76,810	77,664	855	76,953	77,808	144
Livestock	504,049	422,714	926,763	0	0	0	0
Mining	51,830	57,589	109,420	51,927	57,696	109,623	203
Oil & Gas	10	95,265	95,275	10	95,442	95,452	177
Public Water Supply	1,675,855	1,862,061	3,537,915	1,678,967	1,865,519	3,544,485	6,570
Thermoelectric Power	4,240,483	360,613	4,601,097	4,248,358	361,283	4,609,641	8,544
Thermoelectric Power Re	159,713	2,726,644	2,886,358	160,010	2,731,708	2,891,717	5,360
Wastewater Collection and Treatment	208	0	208	208	0	208	0

Source: Developed by LBFC staff using data provided by DEP.

Exhibit 99

**All Sector Fees With Livestock Sector Exempt
CY 2015**



Source: Developed by LBFC staff using data provided by DEP.

The Mining Sector

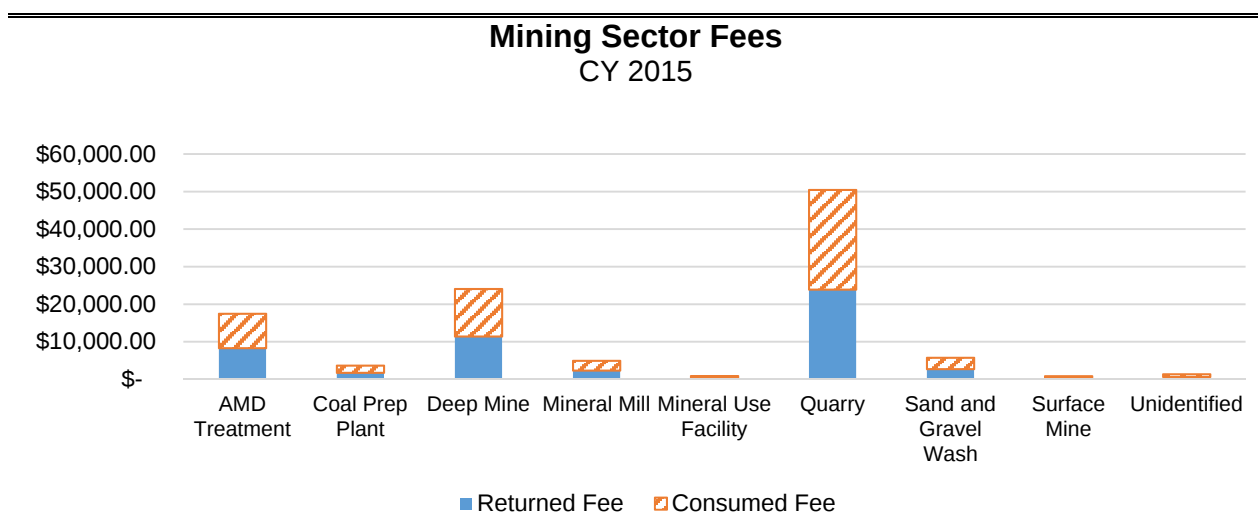
The Mining sector would generate just under \$110,000 in fees under a scenario designed to collect \$100 million. In 2015, mining concerns withdrew 15.7 billion gallons of water, with 14.1 billion gallons returned and 1.6 billion gallons consumed. Quarries, deep mines, and acid mine drainage treatment facilities accounted for 84 percent of the total. The fees collected in this scenario are shown in Table 87 and Exhibit 100.

Table 87

Mining Sector Fees CY 2015							
Facility	Total Withdrawal	Coefficient	Water Used & Returned	Water Consumed	Returned Fee	Consumed Fee	Total Fees
AMD Treatment	2,513,160,000	0.1	2,261,844,000	251,316,000	\$ 8,278	\$ 9,198	\$17,476
Coal Prep Plant	525,926,805	0.1	473,334,125	52,592,681	1,732	1,925	3,657
Deep Mine	3,459,325,161	0.1	3,113,392,645	345,932,516	11,395	12,661	24,056
Mineral Mill	710,764,950	0.1	639,688,455	71,076,495	2,341	2,601	4,943
Mineral Use Facility	124,953,256	0.1	112,457,930	12,495,326	412	457	869
Quarry	7,257,331,295	0.1	6,531,598,166	725,733,130	23,905	26,561	50,467
Sand and Gravel Wash	828,501,804	0.1	745,651,624	82,850,180	2,729	3,032	5,761
Surface Mine	120,431,340	0.1	108,388,206	12,043,134	397	441	837
Unidentified	194,593,320	0.1	175,133,988	19,459,332	641	712	1,353

Source: Developed by LBFC staff using data provided by DEP.

Exhibit 100



Source: Developed by LBFC staff using data provided by DEP.

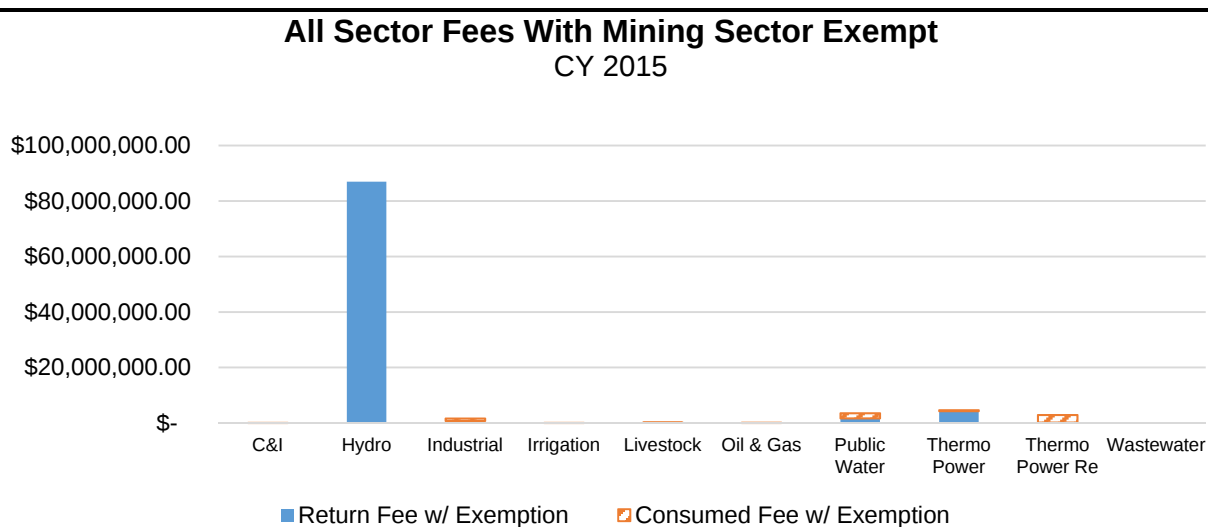
Exempting mining and maintaining \$100 million in revenues would require the other sectors to make up the difference. The largest increase would fall on the Hydroelectric sector at \$95,000. The impact on other sectors is shown in Table 88 and Exhibit 101.

Table 88

All Sector Fees With Mining Sector Exempt CY 2015							
Facility	Return Fee	Consumed Fee	Total Fees	Return Fee w/ Exemption	Consumed Fee w/ Exemption	Total Fees	Change
Commer- cial & Insti- tutional	\$ 6,788	\$ 7,542	\$ 14,329	\$ 6,795	\$ 7,550	\$ 14,345	\$ 16
Hydroelec- tric	86,895,198	0	86,895,198	86,990,382	0	86,990,382	95,185
Industrial	756,560.9	840,623.3	1,597,184.2	757,389.7	841,544.1	1,598,933.7	1,750
Irrigation	853.4	76,810.4	77,663.9	854.4	76,894.6	77,749.0	85
Livestock	100,810	84,543	185,353	100,920	84,635	185,556	203
Mining	259,152	287,946	547,098	0	0	0	
Oil & Gas	10	95,265	95,275	10	95,370	95,379	104
Public Wa- ter Supply	1,675,855	1,862,061	3,537,915	1,677,690	1,864,100	3,541,791	3,875
Thermoe- lectric Power	4,240,483	360,613	4,601,097	4,245,128	361,008	4,606,137	5,040
Thermoe- lectric Power Re	159,713	2,726,644	2,886,358	159,888	2,729,631	2,889,519	3,162
Wastewater Collection and Treat- ment	208	0	208	208	0	208	0

Source: Developed by LBFC staff using data provided by DEP.

Exhibit 101



Source: Developed by LBFC staff using data provided by DEP.

The Oil & Gas Sector

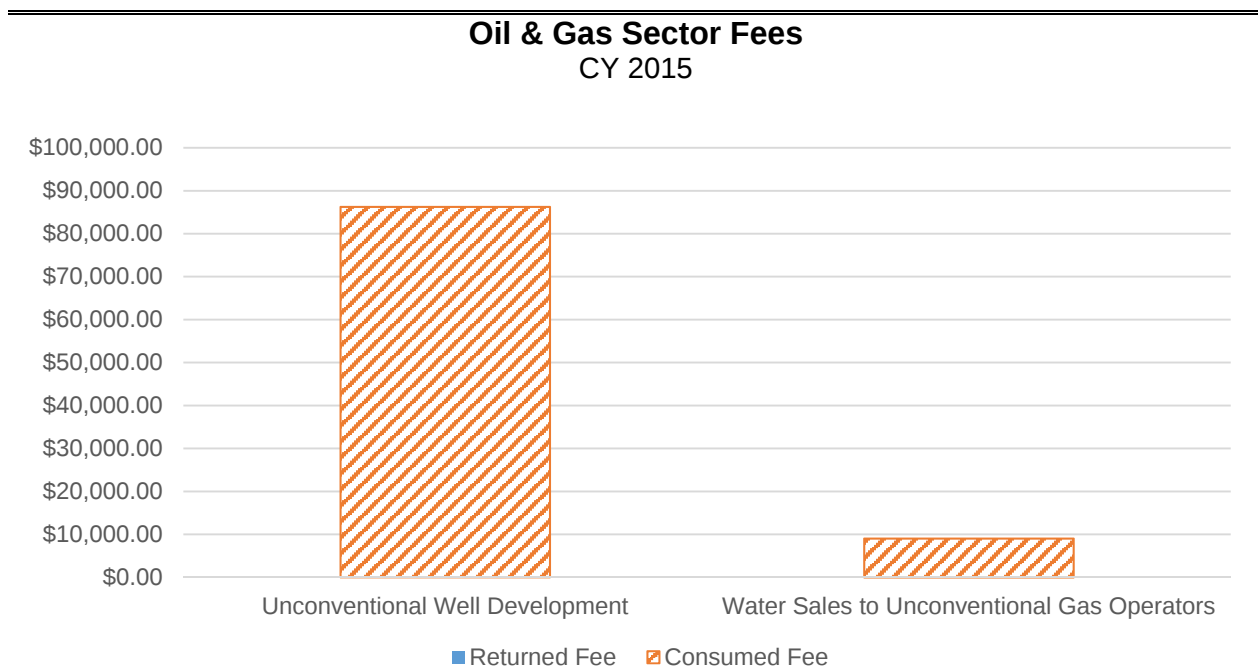
Oil & Gas companies would be required to pay \$95,000 in fees based on 2.6 billion gallons withdrawn, of which, nearly 100 percent is consumed. The fees are shown in Table 89 and Exhibit 102.

Table 89

Oil & Gas Sector Fees							
CY 2015							
Facility	Total Withdrawal	Coefficient	Water Used & Returned	Water Consumed	Returned Fee	Consumed Fee	Total Fees
Unconventional Well Development	2,358,483,031	0.999	2,358,483	2,356,124,548	\$9	\$86,233	\$86,242
Water Sales to Unconventional Gas Operators	247,039,086	0.999	247,039	246,792,047	1	9,032	9,033

Source: Developed by LBFC staff using data provided by DEP.

Exhibit 102



Source: Developed by LBFC staff using data provided by DEP.

Exempting the Oil & Gas sector would have the following impact on the remaining sectors, shown in Table 90 and Exhibit 103.

Table 90

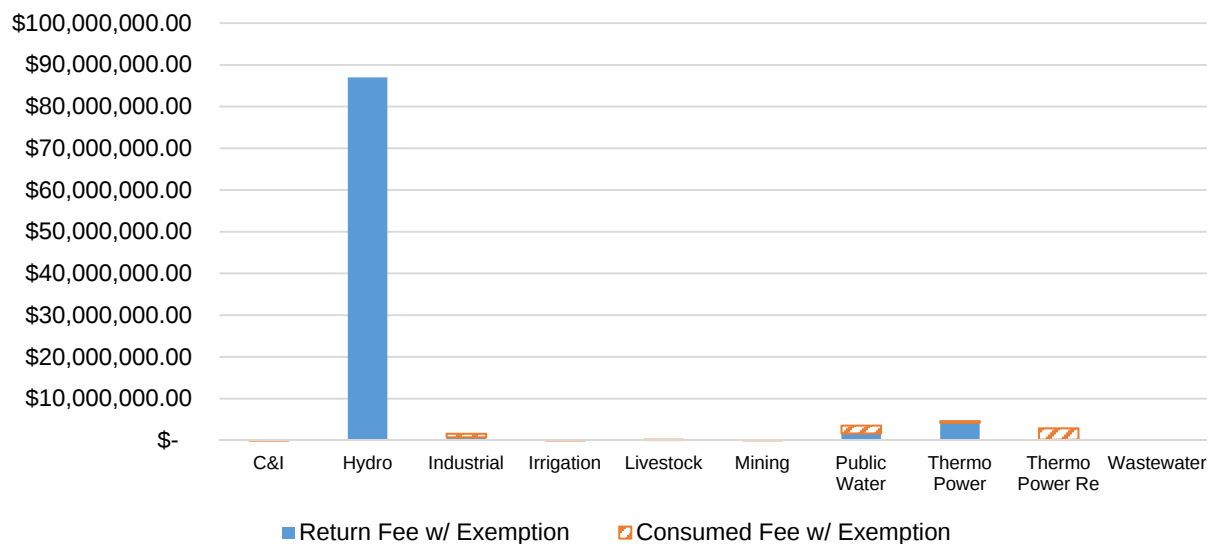
**All Sector Fees With Oil & Gas Sector Exempt
CY 2015**

Facility	Return Fee	Consumed Fee	Total Fees	Return Fee w/ Exemption	Consumed Fee w/ Exemption	Total Fees	Change
Commercial & Institutional	\$ 6,788	\$ 7,542	\$ 14,329	\$ 6,794	\$ 7,549	\$ 14,343	\$ 14
Hydroelectric	86,895,198	0	86,895,198	86,978,066	0	86,978,066	82,868
Industrial	756,561	840,623	1,597,184	757,282	841,425	1,598,707	1,523
Irrigation	853	76,810	77,664	854	76,884	77,738	74
Livestock	100,810	84,543	185,353	100,906	84,623	185,529	177
Mining	51,830	57,589	109,420	51,880	57,644	109,524	104
Oil & Gas	48	476,327	476,375	0	0	0	0
Public Water Supply	1,675,855	1,862,061	3,537,915	1,677,453	1,863,837	3,541,289	3,374
Thermoelectric Power	4,240,483	360,613	4,601,097	4,244,527	360,957	4,605,485	4,388
Thermoelectric Power Re	159,713	2,726,644	2,886,358	159,866	2,729,245	2,889,110	2,753
Wastewater Collection and Treatment	208	0	208	208	0	208	0

Source: Developed by LBFC staff using data provided by DEP.

Exhibit 103

**All Sector Fees With Oil & Gas Sector Exempt
CY 2015**



Source: Developed by LBFC staff using data provided by DEP.

The Public Water Supply Sector

The Public Water Supply sector would pay \$3.5 million in fees under this scenario, based on 2015 data. Total water withdrawn was just over 508 billion gallons, with 458 billion gallons returned and 51 billion gallons consumed. Three entities—authorities, municipal water, and privately owned water companies—accounted for 92 percent of the fees paid by this sector. The fees are shown in Table 91 and Exhibit 104.

Table 91

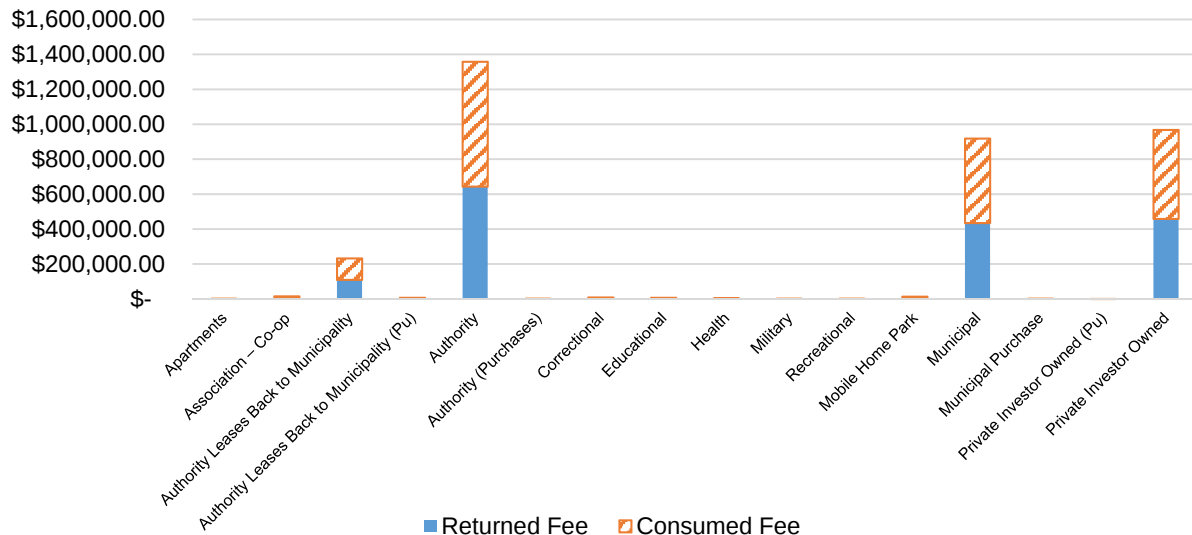
Public Water Supply Sector Fees CY 2015

Facility	Total Withdrawal	Coef- fi- cient	Water Used & Returned	Water Consumed	Returned Fee	Con- sumed Fee	Total Fees
Apartments	154,442,866	0.1	138,998,579	15,444,287	\$ 509	\$ 565	\$ 1,074
Association – Co-op	2,154,262,181	0.1	1,938,835,963	215,426,218	7,096	7,884	14,981
Authority Leases Back to Mu- nicipality	33,400,572,068	0.1	30,060,514,861	3,340,057,207	110,020	122,244	232,264
Authority Leases Back to Mu- nicipality (Pu)	1,015,167,389	0.1	913,650,650	101,516,739	3,344	3,715	7,059
Authority	195,280,507,100	0.1	175,752,456,390	19,528,050,710	643,245	714,717	1,357,962
Authority (Purchases	278,897,447	0.1	251,007,702	27,889,745	919	1,021	1,939
Correc- tional	1,238,982,136	0.1	1,115,083,922	123,898,214	4,081	4,535	8,616
Educational	1,055,017,813	0.1	949,516,032	105,501,781	3,475	3,861	7,336
Health	663,230,595	0.1	596,907,536	66,323,060	2,185	2,427	4,612
Military	127,917,322	0.1	115,125,590	12,791,732	421	468	890
Recrea- tional	61,417,300	0.1	55,275,570	6,141,730	202	225	427
Mobile Home Park	1,951,083,803	0.1	1,755,975,423	195,108,380	6,427	7,141	13,568
Municipal	132,089,949,297	0.1	118,880,954,367	13,208,994,930	435,098	483,443	918,541
Municipal Purchase	98,967,000	0.1	89,070,300	9,896,700	326	362	688
Private In- vestor Owned (Pu)	42,231,800	0.1	38,008,620	4,223,180	139	155	294
Private In- vestor Owned	139,154,149,325	0.1	125,238,734,393	13,915,414,933	458,367	509,297	967,665

Source: Developed by LBFC staff using data provided by DEP.

Exhibit 104

Public Water Supply Sector Fees CY 2015



Source: Developed by LBFC staff using data provided by DEP.

Exempting the Public Water supply sector would have a significant impact on other industries. For example, the Hydroelectric sector would see a fee increase of \$3 million, and the combined Thermoelectric sectors would see an increase of \$275,000. The impact on other sectors is shown in Table 92 and Exhibit 105.

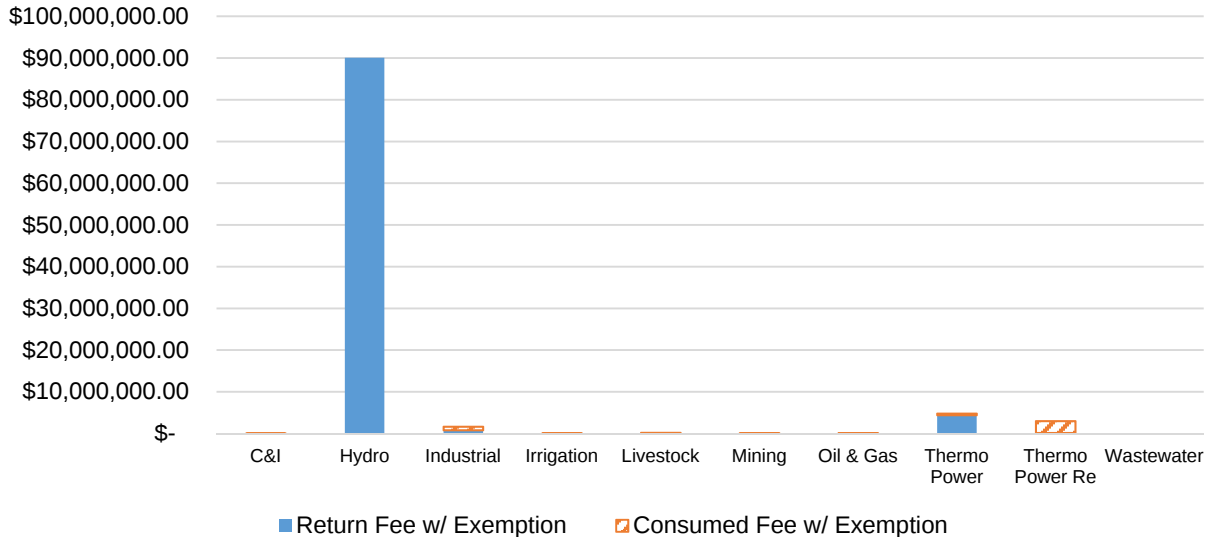
Table 92

All Sector Fees With Public Water Sector Exempt CY 2015

Facility	Return Fee	Consumed Fee	Total Fees	Return Fee w/ Exemption	Consumed Fee w/ Exemption	Total Fees	Change
Commercial & Institutional	\$ 6,788	\$ 7,542	\$ 14,329	\$ 7,037	\$ 7,818	\$ 14,855	\$ 526
Hydroelectric	86,895,198	0	86,895,198	90,082,231	0	90,082,231	3,187,033
Industrial	756,561	840,623	1,597,184	784,309	871,455	1,655,764	58,580
Irrigation	853	76,810	77,664	885	79,628	80,512	2,848
Livestock	100,810	84,543	185,353	104,507	87,643	192,151	6,798
Mining	51,830	57,589	109,420	53,731	59,701	113,433	4,013
Oil & Gas	10	95,265	95,275	10	98,759	98,769	3,494
Public Water Supply	8,379,274	9,310,304	17,689,577	0	0	0	0
Thermoelectric Power	4,240,483	360,613	4,601,097	4,396,011	373,840	4,769,850	168,753
Thermoelectric Power Re	159,713	2,726,644	2,886,358	165,571	2,826,649	2,992,220	105,862
Wastewater Collection and Treatment	208	0	208	215	0	215	8

Source: Developed by LBFC staff using data provided by DEP.

All Sector Fees With Public Water Supply Sector Exempt CY 2015



Source: Developed by LBFC staff using data provided by DEP.

The Thermoelectric Sector

The Thermoelectric sector will pay \$7.5 million under the \$100 million scenario, based on 2015 data. Total water withdrawals were 1.3 trillion gallons, with 1.2 trillion gallons returned and 84 billion gallons consumed. Nuclear power accounted for 42 percent of the total for this sector. The fees are shown in Table 93 and Exhibit 106.

Table 93

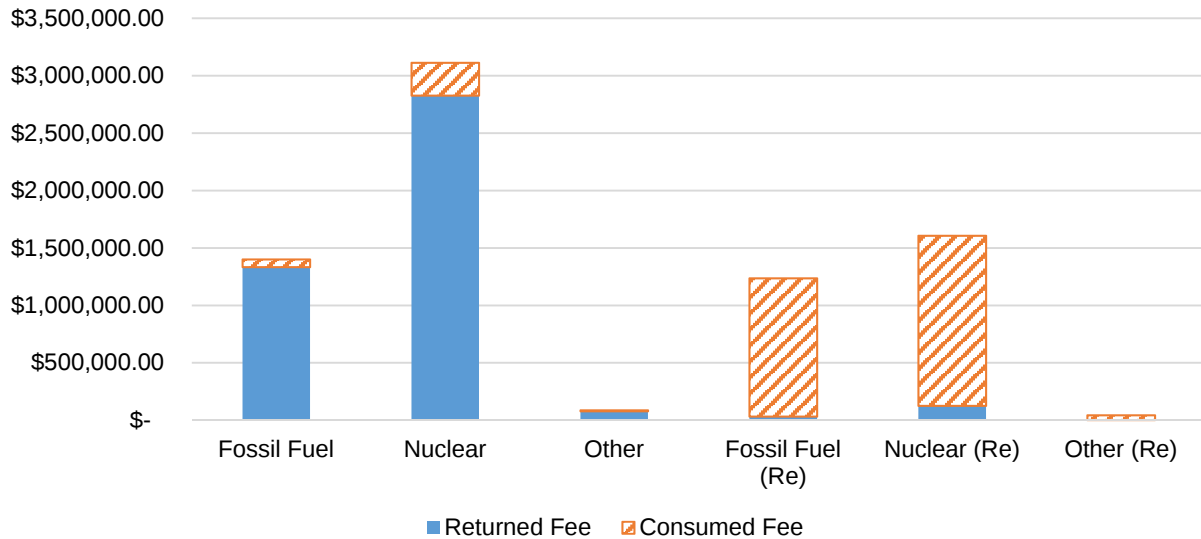
Thermoelectric Power Sector Fees CY 2015

Facility	Total Withdrawal	Coefficient	Water Used & Returned	Water Consumed	Returned Fee	Consumed Fee	Total Fees
Fossil Fuel	366,349,706,096	0.005	364,517,957,566	1,831,748,530	\$1,334,117	\$ 67,041	\$1,401,158
Nuclear	780,272,418,116	0.01	772,469,693,935	7,802,724,181	2,827,200	285,576	3,112,776
Other	21,848,839,630	0.01	21,630,351,234	218,488,396	79,166	7,997	87,163
Fossil Fuel (Re)	41,634,373,075	0.79	8,743,218,346	32,891,154,729	32,000	1,203,800	1,235,799
Nuclear (Re)	74,942,198,017	0.54	34,473,411,088	40,468,786,929	126,171	1,481,137	1,607,308
Other (Re)	1,561,048,500	0.73	421,483,095	1,139,565,405	1,543	41,708	43,250

Source: Developed by LBFC staff using data provided by DEP.

Exhibit 106

Thermoelectric Power Sector Fees CY 2015



Source: Developed by LBFC staff using data provided by DEP.

Exempting the Thermoelectric sector would have the following impact, shown in Table 94 and Exhibit 107.

Table 94

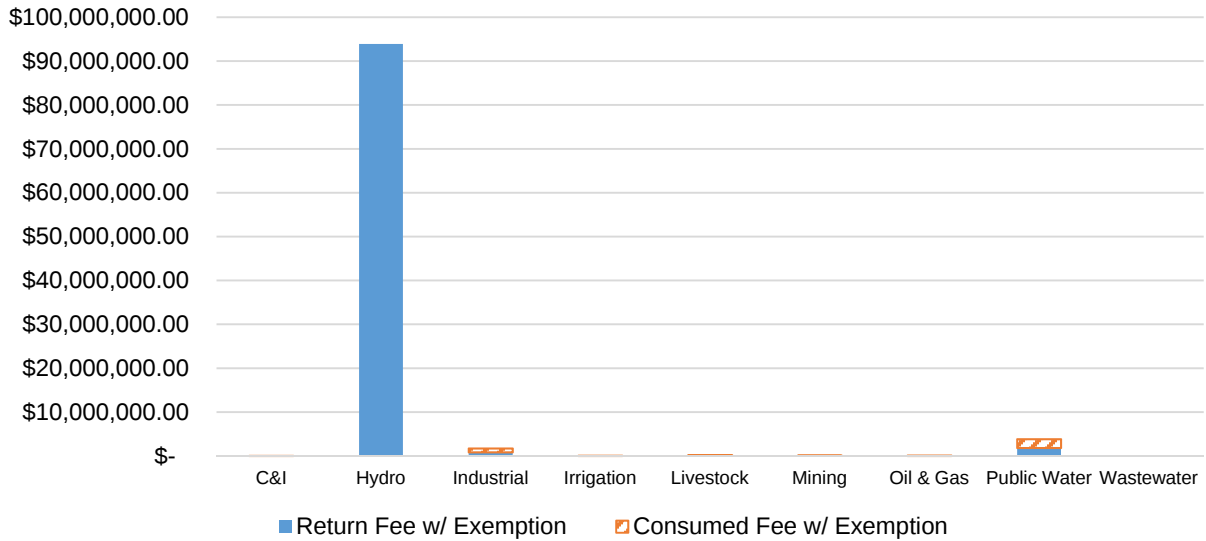
All Sector Fees With Thermoelectric Power Sector Exempt CY 2015

Facility	Return Fee	Consumed Fee	Total Fees	Return Fee w/ Exemption	Consumed Fee w/ Exemption	Total Fees	Change
Commercial & Institutional	\$ 6,788	\$ 7,542	\$ 14,329	\$ 7,337	\$ 8,152	\$ 15,489	\$ 1,160
Hydroelectric	86,895,198	0	86,895,198	93,928,015	0	93,928,015	7,032,817
Industrial	756,561	840,623	1,597,184	817,793	908,659	1,726,451	129,267
Irrigation	853	76,810	77,664	923	83,027	83,950	6,286
Livestock	100,810	84,543	185,353	108,969	91,385	200,354	15,001
Mining	51,830	57,589	109,420	56,025	62,250	118,275	8,856
Oil & Gas	10	95,265	95,275	10	102,976	102,986	7,711
Public Water Supply	1,675,855	1,862,061	3,537,915	1,811,489	2,012,766	3,824,255	286,339
Thermoelectric Power	21,202,417	1,803,067	23,005,484	0	0	0	0
Thermoelectric Power Re	798,566	13,633,222	14,431,788	0	0	0	0
Wastewater Collection and Treatment	208	0	208	225	0	225	17

Source: Developed by LBFC staff using data provided by DEP.

Exhibit 107

All Sector Fees With Thermoelectric Power Sector Exempt CY 2015



Source: Developed by LBFC staff using data provided by DEP.

The Wastewater Sector

The Wastewater sector would pay \$200 in fees in a scenario designed to collect \$100 million. In 2015, total water withdrawals for the year were 57 million gallons, all of which was returned. Acid mine drainage treatment accounts for 92.6 percent of the fees in this category. Fees are shown in Table 95 and Exhibit 108.

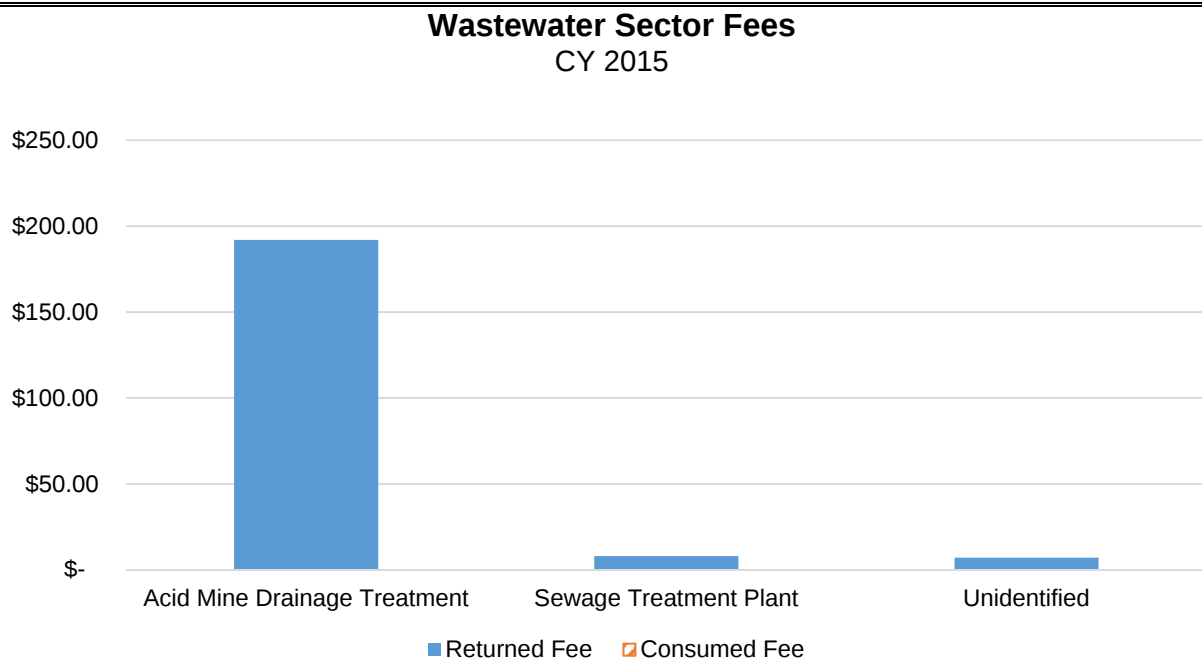
Table 95

Wastewater Sector Fees CY 2015

Facility	Total Withdrawal	Coefficient	Water Used & Returned	Water Consumed	Returned Fee	Consumed Fee	Total Fees
Acid Mine Drainage Treatment	52,574,550	0	52,574,550	0	\$192	\$0	\$192
Sewage Treatment Plant	2,296,633	0	2,296,633	0	8	0	8
Unidentified	1,898,000	0	1,898,000	0	7	0	7

Source: Developed by LBFC staff using data provided by DEP.

Exhibit 108



Source: Developed by LBFC staff using data provided by DEP.

Exempting the Wastewater sector would have the following impact, shown in Table 96 and Exhibit 109.

Table 96

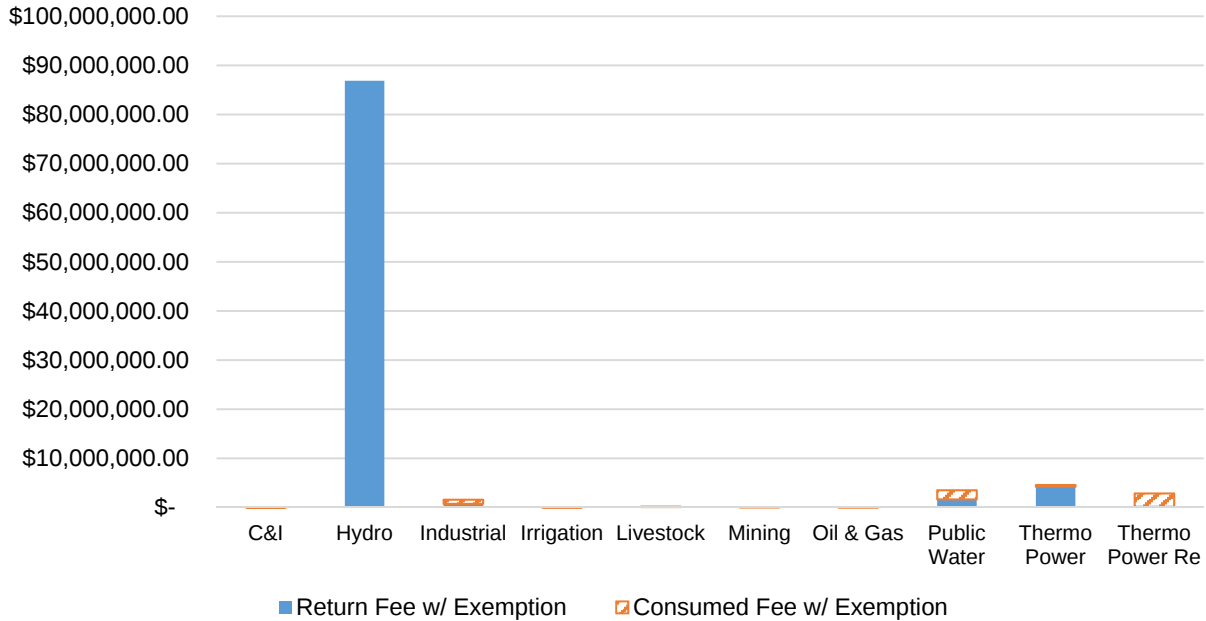
All Sector Fees With Wastewater Sector Exempt
CY 2015

Facility	Return Fee	Consumed Fee	Total Fees	Return Fee w/ Exemption	Consumed Fee w/ Exemption	Total Fees	Change
Commercial & Institutional	\$ 6,788	\$ 7,542	\$ 14,329	\$ 6,788	\$ 7,542	\$ 14,329	\$ 0
Hydroelectric	86,895,198	0	86,895,198	86,895,378	0	86,895,378	181
Industrial	756,561	840,623	1,597,184	756,563	840,625	1,597,188	3
Irrigation	853	76,810	77,664	853	76,811	77,664	0
Livestock	100,810	84,543	185,353	100,810	84,543	185,353	0
Mining	51,830	57,589	109,420	51,830	57,589	109,420	0
Oil & Gas	10	95,265	95,275	10	95,266	95,275	0
Public Water Supply	1,675,855	1,862,061	3,537,915	1,675,858	1,862,065	3,537,923	7
Thermoelectric Power	4,240,483	360,613	4,601,097	4,240,492	360,614	4,601,106	10
Thermoelectric Power Re	159,713	2,726,644	2,886,358	159,714	2,726,650	2,886,364	6
Wastewater Collection and Treatment	1,039	0	1,039	0	0	0	0

Source: Developed by LBFC staff using data provided by DEP.

Exhibit 109

All Sector Fees With Wastewater Sector Exempt CY 2015



Source: Developed by LBFC staff using data provided by DEP.

Exempting All Agriculture Sector Facilities

Exempting all facilities associated with the Agriculture sector would reduce fee revenue by nearly \$200,000, of which 78 percent would come from aquaculture facilities. The fees by facility type are shown in Table 97 and Exhibit 110.

Table 97

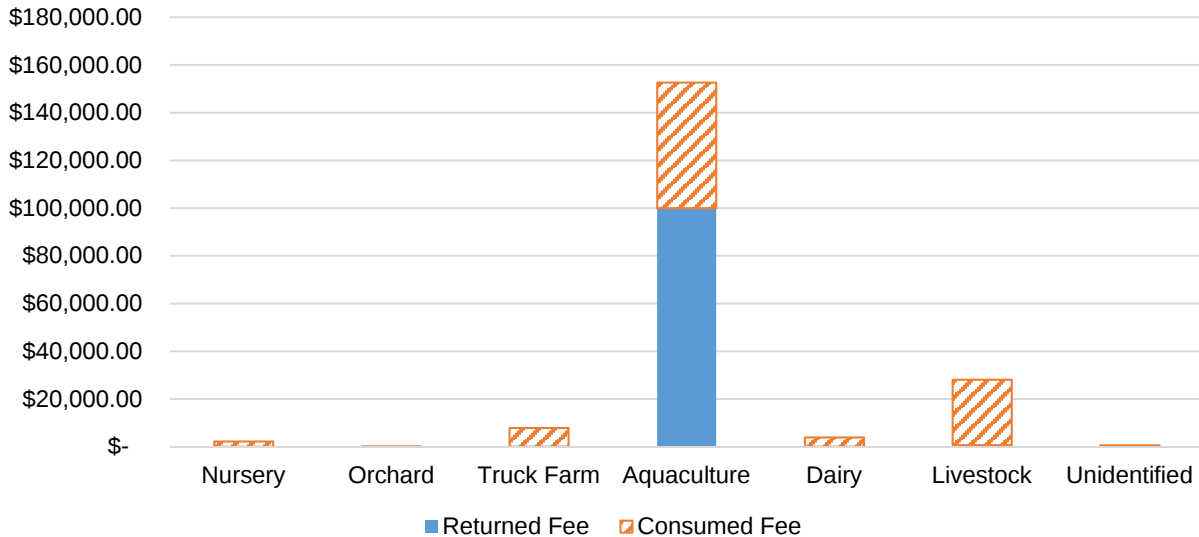
Agriculture Sector Facility Fees CY 2015

Facility	Total Withdrawal	Coefficient	Water Used & Returned	Water Consumed	Returned Fee	Consumed Fee	Total Fees
Nursery	68,013,548	0.9	6,801,355	61,212,193	\$ 25	\$ 2,240	\$ 2,265
Orchard	5,741,440	0.9	574,144	5,167,296	2	189	191
Truck Farm	237,100,976	0.9	23,710,098	213,390,878	87	7,810	7,897
Aquaculture	28,764,329,337	0.05	27,326,112,870	1,438,216,467	100,012	52,638	152,650
Dairy	130,123,700	0.8	26,024,740	104,098,960	95	3,810	3,905
Livestock	938,508,507	0.8	187,701,701	750,806,806	687	27,479	28,166
Unidentified	21,024,780	0.8	4,204,956	16,819,824	15	616	631

Source: Developed by LBFC staff using data provided by DEP.

Exhibit 110

Agriculture Sector Facility Fees CY 2015



Source: Developed by LBFC staff using data provided by DEP.

If all agriculture facilities were exempt from a fee, the remaining entities fees would increase by an equal amount in order to maintain \$100 million in total revenue. The increases are shown, by sector, in Table 98 and Exhibit 111.

Table 98

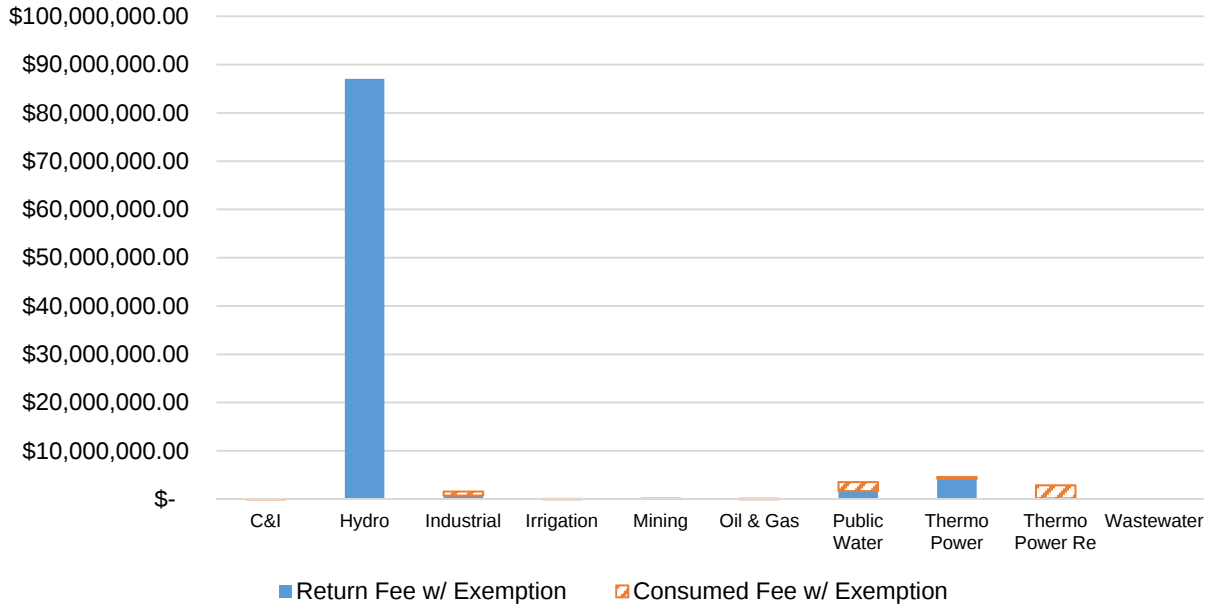
All Sector Fees With Agriculture Sector Facilities Exempt CY 2015

Facility	Return Fee	Consumed Fee	Total Fees	Return Fee w/ Exemption	Consumed Fee w/ Exemption	Total Fees	Change
Commercial & Institutional	\$ 6,788	\$ 7,542	\$ 14,329	\$ 6,801	\$ 7,557	\$ 14,357	\$ 28
Hydroelectric	86,895,198	0	86,895,198	87,065,590	0	87,065,590	170,392
Industrial	756,561	840,623	1,597,184	758,044	842,272	1,600,316	3,132
Irrigation	740	66,571	67,311	741	66,702	67,443	132
Livestock	504,049	422,714	926,763	0	0	0	0
Mining	51,830	57,589	109,420	51,932	57,702	109,634	215
Oil & Gas	10	95,265	95,275	10	95,452	95,462	187
Public Water Supply	1,675,855	1,862,061	3,537,915	1,679,141	1,865,712	3,544,853	6,937
Thermoelectric Power	4,240,483	360,613	4,601,097	4,248,799	361,321	4,610,119	9,022
Thermoelectric Power Re	159,713	2,726,644	2,886,358	160,026	2,731,991	2,892,017	5,660
Wastewater Collection and Treatment	208	0	208	208	0	208	0

Source: Developed by LBFC staff using data provided by DEP.

Exhibit 111

All Sector Fees With Agriculture Sector Facilities Exempt CY 2015



Source: Developed by LBFC staff using data provided by DEP.

Exempting All Power Generation

Exempting all power generation facilities (hydroelectric and thermoelectric) would decrease fee revenue by \$94 million. Of that, 50 percent, or \$47 million would come from hydroelectric dams. Power generation withdrew 25 trillion gallons of water in 2015, of which about 84 billion gallons was consumed. Exemptions by facility type are shown in Table 99 and Exhibit 112.

Table 99

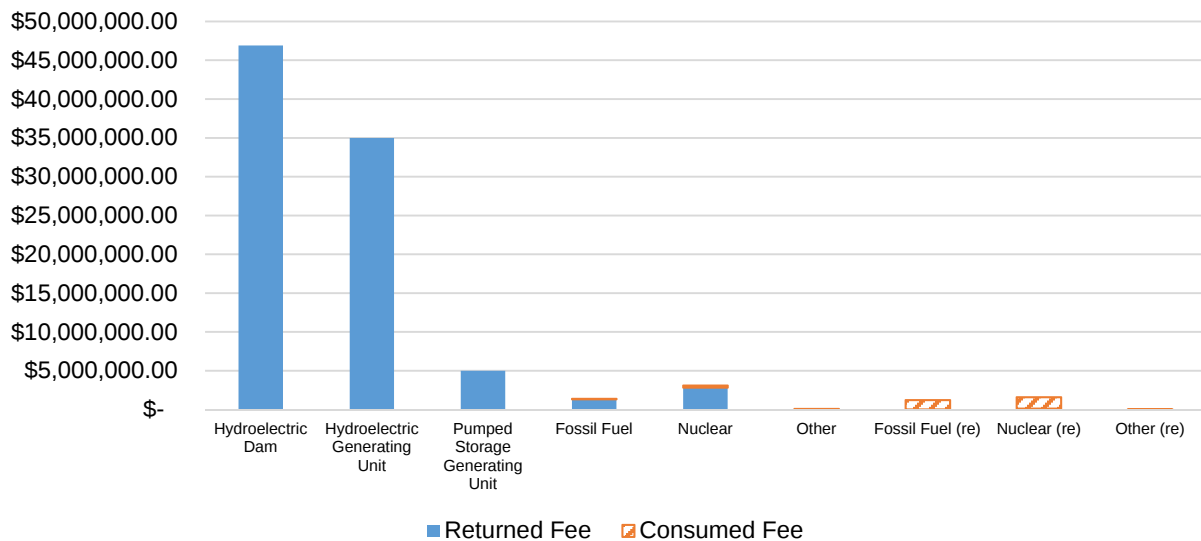
Power Generation Facility Fees
CY 2015

Facility	Total Withdrawal	Coefficient	Water Used & Returned	Water Consumed	Returned Fee	Consumed Fee	Total Fees
Hydroelectric Dam	12,814,796,805,635	0	12,814,796,805,635	0	\$46,901,509	\$ 0	\$46,901,509
Hydroelectric Generating Unit	9,559,549,672,178	0	9,559,549,672,178	0	34,987,469	0	34,987,469
Pumped Storage Generating Unit	1,367,838,428,046	0	1,367,838,428,046	0	5,006,220	0	5,006,220
Fossil Fuel	366,349,706,096	0.005	364,517,957,566	1,831,748,530	1,334,117	67,041	1,401,158
Nuclear	780,272,418,116	0.01	772,469,693,935	7,802,724,181	2,827,200	285,576	3,112,776
Other	21,848,839,630	0.01	21,630,351,234	218,488,396	79,166	7,997	87,163
Fossil Fuel (re)	41,634,373,075	0.79	8,743,218,346	32,891,154,729	32,000	1,203,800	1,235,799
Nuclear (re)	74,942,198,017	0.54	34,473,411,088	40,468,786,929	126,171	1,481,137	1,607,308
Other (re)	1,561,048,500	0.73	421,483,095	1,139,565,405	1,543	41,708	43,250

Source: Developed by LBFC staff using data provided by DEP.

Exhibit 112

Power Generation Facility Fees
CY 2015



Source: Developed by LBFC staff using data provided by DEP.

As with all other exemptions, if power generation facilities were exempted from the fee, the remaining sectors would be required to make up the difference in order to maintain \$100 million in revenues. The Public Water Supply sector would see the largest increase in fees, \$60 million. The increases are shown by sector in Table 100 and Exhibit 113.

Table 100

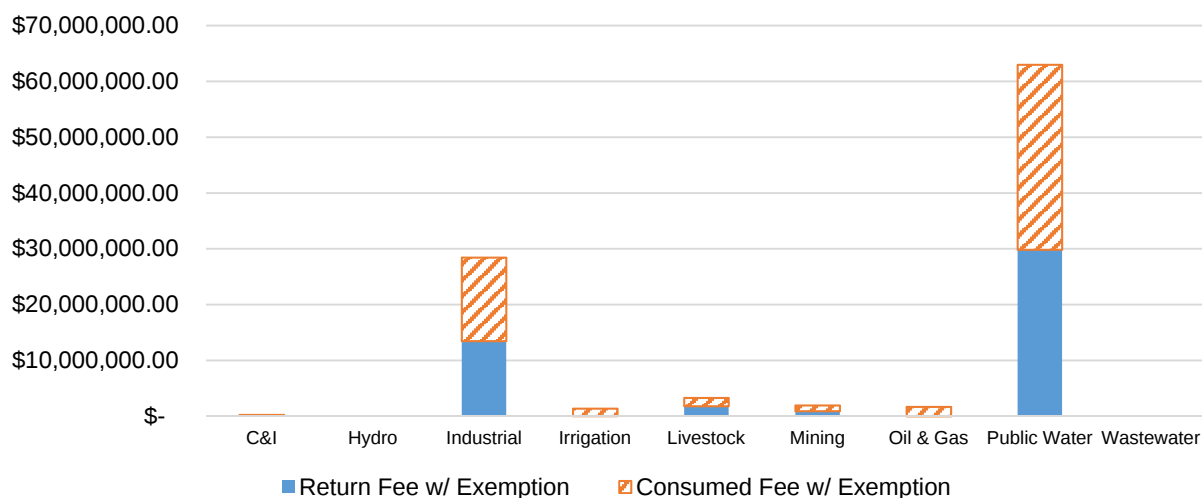
All Sector Fees With Power Generation Sector Exempt
CY 2015

Facility	Return Fee	Consumed Fee	Total Fees	Return Fee w/ Exemption	Consumed Fee w/ Exemption	Total Fees	Change
Commercial & Institutional	\$ 6,788	\$ 7,542	\$ 14,329	\$ 120,833	\$ 134,259	\$ 255,091	\$ 240,762
Hydroelectric	434,475,989	0	434,475,989	0	0	0	0
Industrial	756,561	840,623	1,597,184	13,468,294	14,964,771	28,433,066	26,835,882
Irrigation	853	76,810	77,664	15,193	1,367,379	1,382,572	1,304,908
Livestock	100,810	84,543	185,353	1,794,616	1,505,029	3,299,645	3,114,292
Mining	51,830	57,589	109,420	922,683	1,025,204	1,947,887	1,838,468
Oil & Gas	10	95,265	95,275	170	1,695,915	1,696,085	1,600,810
Public Water Supply	1,675,855	1,862,061	3,537,915	29,833,558	33,148,398	62,981,955	59,444,040
Thermoelectric Power	21,202,417	1,803,067	23,005,484	0	0	0	0
Thermoelectric Power Re	798,566	13,633,222	14,431,788	0	0	0	0
Wastewater Collection and Treatment	208	0	208	3,699	0	3,699	3,491

Source: Developed by LBFC staff using data provided by DEP.

Exhibit 113

Power Generation Facility Fees
CY 2015



Source: Developed by LBFC staff using data provided by DEP.

F. The Susquehanna Watershed would generate \$336 million in fees under a scenario designed to collect \$500 million.⁶

The Susquehanna Watershed would generate just under \$336 million in fees under a scenario designed to collect \$500 million in total fees. This represents 67 percent of all fees collected. Eighteen trillion gallons of water were withdrawn in CY 2015—representing 69 percent of all water withdrawals. The Hydroelectric sector would contribute \$306 million in fees, or 91 percent of the total for the watershed.

Data for the remaining watersheds is shown in Table 101 and Exhibit 114.

Table 101

Watershed Fees by Sector and Total Revenue					
Watershed	Sector	Total Withdrawn	\$500 million	\$300 million	\$100 million
Delaware		504 billion	\$16,866,330	\$10,119,799	\$3,373,265
	Commercial & Institutional	649,367,054	22,578	13,547	4,516
	Hydroelectric	57,291,467,459	1,048,419	629,052	209,684
	Industrial	74,233,152,896	2,581,051	1,548,631	516,210
	Irrigation	930,940,896	155,027	93,016	31,005
	Livestock	2,158,590,009	62,162	37,297	12,432
	Mining	3,667,761,568	127,526	76,516	25,505
	Oil & Gas	0	0	0	0
	Public Water Supply	215,887,408,580	7,506,302	4,503,781	1,501,260
	Thermoelectric	123,586,700,630	2,381,370	1,428,822	576,274
	Thermoelectric Re	25,439,803,619	2,981,853	1,789,112	596,371
	Wastewater	2,296,633	42	25	8
Erie		13 billion	\$472,466	\$283,480	\$94,493
	Commercial & Institutional	1,236,000	43	26	9
	Hydroelectric	0	0	0	0
	Industrial	1,122,572,739	39,031	23,419	7,806
	Irrigation	131,161,203	21,842	13,105	4,368
	Livestock	803,245,680	21,314	12,788	4,263
	Mining	0	0	0	0
	Oil & Gas	0	0	0	0
	Public Water Supply	11,223,515,745	390,236	234,142	78,047
	Thermoelectric	0	0	0	0
	Thermoelectric Re	0	0	0	0
	Wastewater	0	0	0	0
Genesee		64,427,122	\$2,275	\$1,365	\$455
	Commercial & Institutional	0	0	0	0
	Hydroelectric	0	0	0	0
	Industrial	0	0	0	0
	Irrigation	0	0	0	0
	Livestock	0	0	0	0
	Mining	0	0	0	0
	Oil & Gas	0	0	0	0
	Public Water Supply	64,427,122	2,275	1,365	455
	Thermoelectric	0	0	0	0
	Thermoelectric Re	0	0	0	0
	Wastewater	0	0	0	0

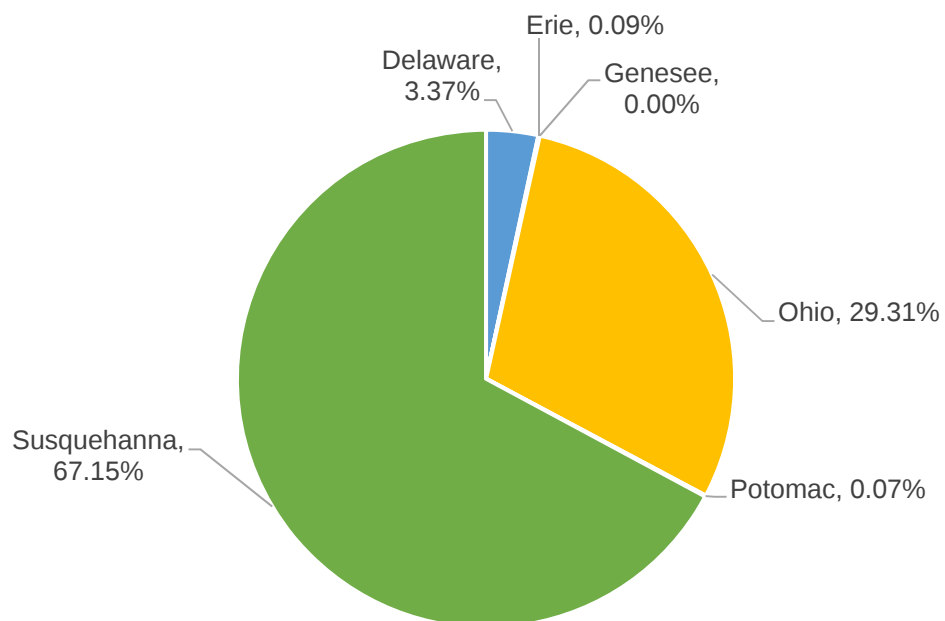
⁶ We used data provided by the DEP; however, the 2015 DEP water withdrawal amounts for the Oil and Gas sector are limited to the Ohio River Basin and, therefore, our calculations do not include water withdrawal amounts for the Oil and Gas sector in the Susquehanna River Basin or the subsequent fees related to them. In 2015 the SRBC reported 1.3 billion gallons of water used for natural gas extraction (approximately 0.0005 percent of the total withdrawn that year); the impact on the fee calculations would be minimal.

Table 101 (Continued)

Watershed	Sector	Total Withdrawn	\$500 million	\$300 million	\$100 million
Ohio		7.3 trillion	\$146,556,262	\$87,933,758	\$29,311,253
	Commercial & Institutional	125,295,726	4,356	2,614	871
	Hydroelectric	6,966,100,646,771	127,477,883	76,486,730	25,495,577
	Industrial	124,276,380,887	4,321,030	2,592,618	864,206
	Irrigation	411,842,447	68,583	41,150	13,717
	Livestock	6,664,383,060	261,373	156,824	52,275
	Mining	2,522,461,620	87,705	52,623	17,541
	Oil & Gas	2,590,746,822	473,673	284,204	94,735
	Public Water Supply	156,562,463,089	5,443,602	3,266,161	1,088,720
	Thermoelectric	67,411,328,855	1,289,123	773,474	257,825
	Thermoelectric Re	54,634,659,331	7,127,972	4,276,783	1,425,594
	Wastewater	52,574,550	962	577	192
Potomac		10 billion	\$358,759	\$215,254	\$71,752
	Commercial & Institutional	227,149,002	7,898	4,739	1,580
	Hydroelectric	0	0	0	0
	Industrial	61,363,726	2,134	1,280	427
	Irrigation	40,655,487	6,770	4,062	1,354
	Livestock	1,064,316,863	34,006	20,403	6,801
	Mining	1,201,499,612	41,776	25,065	8,355
	Oil & Gas	0	0	0	0
	Public Water Supply	7,540,730,169	262,188	157,313	52,438
	Thermoelectric	0	0	0	0
	Thermoelectric Re	26,866,142	3,987	2,392	797
	Wastewater	0	0	0	0
Susquehanna		17.9 trillion	\$335,743,847	\$201,446,309	\$67,148,768
	Commercial & Institutional	1,055,879,723	36,712	22,027	7,342
	Hydroelectric	16,718,792,791,629	305,949,687	183,569,812	61,189,937
	Industrial	29,988,184,484	1,042,675	625,605	208,535
	Irrigation	817,260,779	136,097	81,658	27,219
	Livestock	19,163,450,712	547,908	328,745	109,582
	Mining	8,343,265,131	290,091	174,055	58,018
	Oil & Gas	14,775,295	2,701	1,621	540
	Public Water Supply	117,487,250,737	4,084,975	2,450,985	816,995
	Thermoelectric	977,472,934,357	19,334,991	11,600,995	3,866,998
	Thermoelectric Re	38,036,290,500	4,317,975	2,590,785	863,595
	Wastewater	1,898,000	35	21	7

Source: Developed by LBFC staff using information provided by DEP.

Percent of Fees by Watershed
CY 2015



Source: Developed by LBFC staff using data provided by DEP.

IV. Water Use Fees in Other States

We reviewed water programs in 11 other states, most of which are in the eastern United States or those we found to have annual water use fees. We found three other states—Minnesota, New Jersey, and Wisconsin—that have annual water use fees. Other states we reviewed, with the exception of West Virginia, had some form of water withdrawal permit program. Many of these programs include fees for permits, but some do not charge any fees at all. See Exhibit 115 for information about various state fees. Most states include exemptions for their programs, both those with permitting programs, and those with annual fees. See Exhibit 117 in Chapter V of this report, for specific exemptions in each state.

Pennsylvania has several water permitting programs, administered by DEP. The first was established by the 1939 Water Rights Act, and was intended to regulate surface water withdrawals. This program requires any public water system that withdraws water from surface water sources for resale to acquire a permit. The fee, which has remained the same since 1939, is \$25.

Another permitting program, under the Safe Drinking Water Act, requires community water systems, defined as those that have at least 15 service connections or serve at least 25 people on a yearly basis, to obtain public water supply construction permits for their establishment, addition, or modification of the system. Such a permit is required if the particular system serves over 100 people and carries a fee of \$750. Users of water in Pennsylvania must register and report their water use to DEP on an annual basis if their total withdrawal or withdrawal use from one or more points of withdrawal exceeds an average rate of 10,000 gallons per day in a 30-day period.

We found three states that have annual water fees. Minnesota and Wisconsin have annual water use fees, while New Jersey has an annual permitting fee. Information on these three states is presented below.

A. States With Annual Use Fees

Minnesota

A water (appropriation) permit from Minnesota waters is required for all users withdrawing more than 10,000 gallons of water per day or 1,000,000 gallons per year. The program is administered by the Minnesota Department of Natural Resources. See Chapter V for exemptions specific to Minnesota.

The fee for a water appropriation permit is \$150. Minnesota also charges for annual water use, shown in Exhibit 115. Fees are based on annual reported use.

Annual fee revenues have generated approximately \$4.7 million for the past several fiscal years.

Agricultural irrigation permittees that did not appropriate any water during the year or had their permits suspended for more than seven days, pay a minimum fee of \$20 per permit. Other agricultural users have a maximum annual use fee of \$750. See Exhibit 115 for maximum annual use fees for all other large agricultural water users.

A separate annual water use fee schedule exists for once-through heating and cooling systems. Non-profit corporations and school districts pay \$200 per million gallons and all other entities with once-through heating and cooling systems pay \$420 per million gallons. There is no maximum fee for once-through systems.

A surcharge of \$30 per million gallons is applied to the volume of water used in each of the months of June, July, and August that exceeds the volume of water used in January of each year. The summer surcharge applies to municipal water use, irrigation of golf courses, and landscape irrigation. This is a surcharge in addition to the regular fee rate based on the yearly total volume used.

Minnesota has an annual reporting requirement for water permit holders. The collected data is used to evaluate impacts on water sources, water supply planning, and resolving water use conflicts.

New Jersey

New Jersey's water permitting program is administered by its Department of Environmental Protection (DEP). A Water Allocation Permit is required for the diversion of ground and/or surface water in excess of 100,000 gallons per day for a period of more than 30 days in a 365—consecutive—day period. This includes water diversions for: public water supply, industrial processing and cooling, irrigation, sand and gravel operations, remediation, power generation, dewatering diversions, and other uses. Exemptions from the permit requirement include agriculture, aquaculture, and horticulture.

The permit fee is based on the maximum monthly requested allocation, in million gallons per month (mgm), from all sources, based on their class of water use. See Exhibit 115 for water class categories and associated fees. An applicant with both surface and ground water sources is assessed at the ground water rate. New Jersey bills users on an annual basis. Revenues for 2015, 2016, and 2017 have remained steady at about \$5.1 million.

Other water allocation requirements in New Jersey include:

- Water Use Registration is required for any person with the capability to divert in excess of 100,000 gallons of water per day, but who withdraws less than this quantity. An initial fee of \$415 is charged for the registration and, thereafter, an annual fee of \$205.
- Short Term Permit-by-Rule must be filed for diversions in excess of 100,000 gallons of water per day that occur over a period of 30 days or less in a calendar year. There are no fees associated with this permit.
- Dewatering Permit-by-Rule must be filed for diversion in excess of 100,000 gallon per day for construction related dewatering or in excess of 100,000 gallons per day from a confined space such as a cofferdam¹. There are no fees associated with this Permit-by-Rule.
- Agricultural Water Use Certification or Agricultural Water Use Registration must be obtained from the county agricultural agent if a person has the ability to withdraw ground and/or surface water in excess of 100,000 gallons per day for agricultural, aquacultural, or horticultural purposes. These activities are exempt from any fees.

Permitted and registered water users in New Jersey must meter their diversion and report their water usage to the DEP. Permit holders report on a quarterly basis, while registration holders report annually. Agricultural, aquacultural, and horticultural certification and registration holders must report their estimated water usage annually.

Wisconsin

Wisconsin's water permitting programs are administered through its Department of Natural Resources (DNR). Annual Water Use Fees are required for all registered surface and groundwater withdrawals statewide. Water users are required to register their withdrawals with the DNR if they have the capacity to withdraw 100,000 gallons per day or more from groundwater or surface water.

An annual base fee of \$125 applies statewide and is assessed per property, not per individual well or water source. For example, if a property includes three high capacity wells and one surface water source the \$125 annual fee will be assessed once for the property. See Chapter V of this report for exemptions specific to Wisconsin.

¹ A watertight enclosure pumped dry to permit construction work below the waterline, as when building bridges or repairing a ship. *Merriam-Webster.com*. Merriam-Webster, n.d. Web. 2 Oct. 2017.

An additional annual fee is assessed for persons withdrawing more than 50 million gallons per year from surface or ground water from within the Great Lakes Basin. About one-third of Wisconsin water users are located in the basin, and of those, 300 to 400 pay an annual use fee.

The annual use fee is based on an increasing block structure. The Great Lakes Basin fee increases as the withdrawal amount increases. This fee is in addition to the base fee; according to the Wisconsin site calculator, a withdrawal of 100 million gallons would be \$200, which is the base fee of \$125 plus \$75 for the water from the lake. A 200 million gallon withdrawal would be a total of \$425, and a 500 million gallon withdrawal would be \$1,700. Exhibit 115 shows the fee structure.

Invoiced revenues for 2015, 2016, and 2017 were relatively stable at about \$1 million per year. Revenues from the use fees are used to:

- develop and maintain a statewide water resources inventory of water use and water availability throughout the state;
- document and monitor water use through registration and reporting requirements;
- monitor groundwater and surface water quantity;
- implement the Great Lakes Compact through water use permitting and regulating diversion of Great Lakes Basin waters;
- help communities plan water supply needs; and
- build a statewide water conservation and efficiency program.

Registered withdrawers are required to measure or estimate the volume of water they withdraw every month and report that information annually to DNR. Withdrawals may be reported by the property owner or by an authorized lessee, agent, or operator of the source.

Exhibit 115

Water Permit Fees and Water Use Fees in Other States

State and Program	Fees
Minnesota	
Permits	• \$150
Annual Water Use Rates	• 0 to 50 million gallons - \$140 minimum fee; • 50 to 100 million gallons - \$3.50 for each million; • 100 to 150 million gallons - \$4.00 for each million; • 150 to 200 million gallons - \$4.50 for each million; • 200 to 250 million gallons - \$5.00 for each million; • 250 to 300 million gallons - \$5.50 for each million; • 300 to 350 million gallons - \$6.00 for each million; • 350 to 400 million gallons - \$6.50 for each million; • 400 to 450 million gallons - \$7.00 for each million; • 450 to 500 million gallons - \$7.50 for each million; and • Above 500 million gallons - \$8.00 for each million. Maximum Annual Agricultural Water Use Fees: • \$750 for any single agricultural irrigation permit; • \$60,000 total for an entity with 3 or fewer permits; • \$90,000 total for an entity with 4 to 5 permits; • \$300,000 total for an entity with more than 5 permits; • \$250,000 total for a city of the first class; and • \$10,000 for a municipality that furnishes electric service and cogenerates steam for home heating. • A surcharge of \$30 per million gallons will be applied to the volume of water used in each of the months of June, July, and August that exceeds the volume of water used in January of each year. The summer surcharge applies to municipal water use, irrigation of golf courses, and landscape irrigation. This is a surcharge in addition to the regular fee rate based on the yearly total volume used.
Once-through Heating and Cooling Systems ^a	• A separate annual water use fee schedule exists for once-through heating and cooling (HVAC) systems. Non-profit corporations and school districts pay \$200 per million gallons and all other entities with once-through heating and cooling systems pay \$420 per million gallons. There is no maximum fee for once-through systems.
New Jersey	
Initial Permits	• Fees are determined by Class of User, Classes 1 – 6.^b • Surface Water Diversions: Class 1 – \$5,985 to Class 6 – \$17,765; • Ground Water Diversions: Class 1 – \$7,490 to Class 6 – \$21,790; and • Ground AND Surface Water diversions in which waters are returned undiminished to the source: Class 1 – \$3,570 to Class 6 – \$9,415.

Exhibit 115 (Continued)

State and Program	Fees	
New Jersey (Continued)		
Annual Fee – based on al- location, not actual use.	- Fees are determined by Class of User, Classes 1-6: See footnote b below for classes. - Surface Water Diversions: Class 1 – \$2,885 to Class 6 – \$15,540; - Ground Water Diversions: Class 1 – \$3,880 to Class 6 – \$18,045; - Ground AND Surface Water diversions in which waters are returned undiminished to the source: Class 1 – \$1265 to Class 6 – \$6,400. - A user must obtain a Short Term Permit-by-Rule for withdrawals in excess of 100,000 gallons per day that occur over a period of 30 days or less in a calendar year. - An Agricultural Water Usage Certification or Agricultural Water Use Registration must be obtained from the county agricultural agent if a user has the capacity to withdraw ground and/or surface water in ex- cess of 100,000 per day for agricultural, aquacultural, or horticultural purpose.	
Wisconsin		
Permits	No fee	
Annual Fee	\$125 for each property with capacity to withdraw 100,000 gallons per day or more.	
Great Lakes Basin With- drawal Fees	Total Water Withdrawn in Millions of Gallons Per Year (MGY)	Annual Fee in the Great Lakes Basin
	0-50	\$ 125.00
	50-100	126.50-200.00
	100-250	202.00-575.00
	251-500	578.50-1,700.00
	501-750	1,706.00-3,200.00
	751-1000	3,206.00-4,700.00
	1001-1250	4,706.00-6,200.00
	1251-1500	6,206.00-7,700.00
	1501-1750	7,706.00-9,200.00
	1751-1820	9,206.00-9,625.00
	>1820	>9,625.00

^a Once through systems are those that use a water's cooling or heating capacity a single time are called once-through. These systems use large volumes of water and typically discharge the once-through water directly to waste. Large volumes of water are necessary for even the smallest once-through systems; therefore, a plentiful water supply at a suitably low temperature is needed.

^b New Jersey Water Allocation Classes Based on Maximum Monthly Allocation in Million Gallons per Month: Class 1 - From 3.1 mgm to less than 15.5 mgm; Class 2 - From 15.5 mgm to less than 31 mgm; Class 3 - From 31 mgm to less than 62 mgm; Class 4 - From 62 mgm to less than 155 mgm; Class 5 - From 155 mgm to less than 310 mgm; and Class 6 - From 310 mgm and above.

Source: Developed by LBFC staff using data provided by Minnesota Dept. of Natural Resources, New Jersey Dept. of Environmental Protection, and Wisconsin Dept. of Natural Resources.

We determined the water use fees in the above three states can have little economic impact on any state's economy, given the amount of revenues raised from the fee, which range from \$1 million to \$5 million per year.

B. States With No Annual Fees

The other states we reviewed do not have annual use fees, but most have at least some similarities with Pennsylvania's current water programs. All states we reviewed have requirements for water use reporting.

Connecticut

The Bureau of Water Protection and Land Reuse, within the Department of Energy and Environmental Protection (DEEP) regulates activities which cause, allow, or result in the withdrawal from, or the alteration, modification, or diminution of the waters of the state. DEEP recognizes two types of diversions: consumptive and non-consumptive. Consumptive diversions, administered by the Water Planning and Management Division, withdraw ground or surface water for uses such as public water supply, irrigation, power generation, and industrial processing. Non-consumptive diversions, administered by the Land and Water Resources Division, involve the physical alteration or modification of surface water(s). In general, a diversion permit is required for (1) withdrawals of surface or ground water exceeding 50,000 gallons in any 24-hour period, or (2) to conduct activities which result in the modification or alteration of surface water. See Chapter VI for exemptions to Connecticut's permitting program.

Fees for consumptive use permits are based on the volume of water withdrawn and are shown in Exhibit 116. Municipalities receive a 50 percent discount.

Permits generally require an authorized diversion to be constructed and initiated within three years after issuance of the permit. The expiration date of the permit, which generally does not exceed five years, is established by DEEP based on its consideration of existing uses and allocations of the water resources within the watershed and specific project. Holders of consumptive diversion permits are required to file annual water diversion reports as a condition of their permits.

Delaware

Delaware's water permitting program is administered by the Delaware Department of Natural Resources and Environmental Control (DRBC). Water permits are required for major withdrawals, those that are greater than 50,000 gallons per day, and are required for both surface and ground water sources. Permits are

issued for a thirty—year duration except in cases of hydrologic complexity or uncertainty or where water quality or quantity considerations may require more frequent review.

The cost for a permit application in Delaware is \$375. An additional \$100 is charged for the required public notice for all new permits, permit modifications, or permit renewals.

All permits are subject to review at intervals of five years. The review of water withdrawal permits is coordinated with periodic analyses of water withdrawals and hydrologic conditions on an aquifer or drainage basin-wide basis where possible. See Chapter V for exemptions to Delaware’s permitting program.

If a withdrawal is in the jurisdiction of the DRBC and the withdrawal is more than 100,000 gallons per day over any 30—day period, a separate approval from the DRBC is also required. See Chapter V of this report for more information about the DRBC.

Delaware also has water reporting requirements, which it uses for resource management, agencies’ planning programs, controlling water in drought conditions, and managing industrial consumption and public water demand.

Florida

Florida has five water management districts overseeing water resources. They operate under the aegis of the state’s Department of Environmental Protection (DEP). Their responsibilities include: water supply, water quality, flood protection and floodplain management, and natural systems. They also issue consumptive use permits (CUPs) that authorize water use. The permits allow water to be withdrawn from surface and ground water sources for reasonable and beneficial uses such as public supply (drinking water), agricultural irrigation, industry, and power generation. See Chapter VI for exemptions to Florida’s permitting program.

The water management district in south Florida issues two types of water permits: a Standard General Permit and Individual Permits. General Notice Permits are for smaller water users—less than 100,000 gallons per day—and must meet various other allocation, source, and facility criteria. Permit fees are \$100 to apply online and \$350 to apply by paper hard copy.

All other users must obtain an individual permit, fees for which vary based on project specifics, maximum monthly allocation, and the duration of the water use permit. See Exhibit 116 for the South Florida Water Management District’s fees for individual water use permits. The five water management districts in Florida have

similar water use permitting programs. All are subject to water use reporting requirements.

Maryland

Maryland has a water Appropriation and Use Permit, administered by its Department of the Environment (MDE). This permit is required for any activity that withdraws water from the state's surface and/or ground waters unless exempted. This permit program is to conserve, protect, and use water resources in the best interests of the people and is intended to control the appropriation or use of surface and ground waters. Users must obtain permits if they use 5,000 gallons per day, averaged over a year. Chapter V of this report shows exemptions from Maryland's permitting program. There is no fee for a permit, which can remain valid for up to 12 years.

Maryland has a reporting requirement for its permittees, requiring semi-annual reporting from those who are using over 10,000 gallons per day. The department may require some users to report who use over 5,000 gallons per day. Agricultural users must report on an annual basis.

New York

New York's Department of Environmental Conservation (DEC) issues both water withdrawal permits and agricultural water withdrawal permits, neither of which has a fee.

Water Withdrawal Permits: Non-agricultural permits are required for any user, including public water systems, having the capacity to withdraw 100,000 gallons per day (gpd) or more of surface water, ground water, or combination thereof. The capacity is the total withdrawal of *all* sources for a facility. Capacity is determined by summing the maximum potential withdrawal of all the water source(s), not by the typical or actual withdrawal. See Chapter V for a list of exemptions from permits in New York.

Agricultural Withdrawal Permits: For purposes of water withdrawal regulations, New York defines agricultural facilities to include: farming for crops, plants, vines, and trees; the keeping, grazing, or feeding of livestock for sale of livestock or livestock products; and the on-farm processing of crops, livestock, and livestock products. Permits are not required for agricultural concerns, but they must register if a water withdrawal system was being operated for agricultural purposes on February 15, 2012, with a cumulative withdrawal equal to or in excess of an average of 100,000 gallons per day in any thirty—day consecutive period (3,000,000 gallons during a 30—day period); and prior to February 15, 2012, water usage was registered or reported to the New York Department of Conservation. If an agricultural

user is withdrawing a cumulative withdrawal of 100,000 gallons per day in any 30—day consecutive period and was not registered by February 15, 2012, the user must obtain an agricultural withdrawal permit.

The above threshold definition for agricultural facilities is different from that for non-agricultural facilities. Non-agricultural threshold volume is based on capacity per day rather than an agricultural facility's actual withdrawal during a 30—day period. Both types of users are required to submit annual reports to the Department; annual reports are due by March 31st of each year.

Ohio

Ohio's water permitting programs are administered by the Ohio Environmental Protection Agency (EPA). There are two permitting programs, one implemented under the Great Lakes Compact and the other implemented under state statute. Chapter V of this report shows exemptions to Ohio's permitting programs.

Withdrawal and Consumptive Use Permits Under the Great Lakes Compact:

A permit is required for a new or increased withdrawal or consumptive use directly from Lake Erie of at least 2.5 million gallons per day, averaged over any 90—day period. A permit is also required for a new or increased withdrawal or consumptive use of at least 1 million gallons per day, averaged over any 90—day period, from any river or stream or from ground water in the Lake Erie watershed.

A permit is also required for a new or increased withdrawal or consumptive use of at least 100,000 gallons per day from any river, stream, or stream segment (and the entire watershed upstream), if the river, stream, or stream segment is a high quality water. If the drainage area upstream of the intake is greater than 100 square miles, there is a 90-day averaging period that applies to the permit requirement; if the drainage area upstream of the intake is less than 100 but more than 50 square miles, a 45-day averaging period applies, and if the drainage area upstream of the intake is 50 square miles or less, no averaging period applies.

Withdrawal and Consumptive Use Permits Under Ohio Revised Code: Ohio requires a permit from the Director of the Department of Natural Resources (ODNR) prior to withdrawing waters of the state that would result in a new or increased consumptive use of an average of more than 2 million gallons per day in any 30-day period.

Rules are currently being promulgated for both of these permitting programs. Both permits incur a \$1,000 application fee.

The Water Withdrawal Facilities Registration Program requires any owner of a facility, or combination of facilities, with the capacity to withdraw water at a quantity greater than 100,000 gallons per day, to register such facilities with the ODNR, Division of Water. Registration is intended to gather additional information

for resolving conflicts and guiding or advising new users. Annual reports must also be submitted for these facilities.

Virginia

Virginia has withdrawal permitting programs for both surface and ground water, administered by the Virginia Department of Environmental Quality (DEQ). Surface water users who were withdrawing water before permitting went into effect are grandfathered, and do not require a permit, unless they want to increase their withdrawals. According to a Virginia official, 90 percent of surface water users in Virginia are grandfathered. There is no grandfathering for ground waters.

Surface Waters: All withdrawals from surface waters within the Commonwealth of Virginia or from the Potomac River, unless excluded by the Virginia Water Protection (VWP) Permit regulations, require a VWP permit. See Chapter V for a listing of all exemptions.

Permits are issued for a maximum term of 15 years and have a one-time fee; Virginia has fees for both issuance and modification of permits, as shown in Exhibit 116. There are no further annual fees.

Ground Waters: All persons in the Eastern Virginia or Eastern Shore Management Areas who need to establish new withdrawals of groundwater in excess of 300,000 gallons per month from a well, well system, or pond recharged by groundwater with mechanical assistance, or who need to expand an existing withdrawal, must apply for a New or Expanded Groundwater Withdrawal Permit prior to exceeding the 300,000 gallons per month use limit or increasing a permitted withdrawal.

Permits are issued for a maximum term of ten years. See Exhibit 116 for both issuance and modification fees. There are no annual fees.

Virginia requires annual reports of surface water and ground water withdrawals. Withdrawal reports for the previous calendar year are due on January 31. The purpose of withdrawal reporting is to enable appropriate planning for Virginia's future water needs through the collection of accurate information.

West Virginia

West Virginia does not have a water withdrawal permitting program. However, its Department of Environmental Protection conducts an annual Large Quantity User Survey. Any user withdrawing 300,000 gallons or more from either surface or groundwater must collect data to include in the survey. Agricultural users are exempt from reporting.

Exhibit 116 shows various fees for all states that we reviewed, both those states with annual fees and those with permitting fees only.

Exhibit 116

Water Permit Fees in Other States

State and Program	Fees
Connecticut – Permits ^a	• Greater than 50,000 gallons per day (gpd) but less than 500,000 gpd: \$2,050 • 500,000 gpd or more but less than 2,000,000 gpd: \$4,000 • 2,000,000 gpd or more: \$6,250 • Connecticut also charges users an annual fee of \$940.
Delaware	
Permits	• \$375
Florida	
Permits	• Fees for permits range from \$350 to \$11,500, depending on the use type and volume of water
Maryland	
Permits only	• No Fees
New York	
Permits	• No fees
Agricultural Permits	• No fees
Ohio	
Permit	• \$1,000 application fee
Virginia	
Surface Water Permit ^b	• Withdrawals less than 1,000,000 gallons on any day: \$10,000. • Withdrawals between 1,000,000 and 1,999,999 gallons on any day: \$15,000; • Withdrawals between 2,000,000 and 2,999,999 gallons on any day: \$20,000; • Withdrawals equal to or greater than 3,000,000 gallons on any day: \$25,000 ;
Groundwater Permit	• Historic Permits (Initial permit for an existing withdrawal based solely on historic withdrawals): \$1,200; • New or Expanded Groundwater Withdrawal Permits: \$6,000; • Historic Permit Modification: \$600; • New or Expanded Groundwater Withdrawal Modification: \$3,000.
West Virginia	
	• No program

^a A 50 percent discount applies to municipalities.

^b Virginia also charges a permit modification fee of \$5000, regardless of the amount of the withdrawal.

Source: Developed by LBFC staff with information from other states.

C. Methods of Collecting a Fee

We reviewed New Jersey, Minnesota, and Wisconsin to determine how annual water fees are collected in those states. All three states send an invoice to the water user.

New Jersey

Water users are billed on an annual basis, based on their capacity to use water. Therefore, bills are not based on water usage, but on the amount of water users can possibly use, based on their permits. If a user fails to pay the annual fee, the New Jersey DEP sends up to three notices to forward payment. If there are no communications or actions from the user, the account is sent to collections.

If the delinquent user continues to withdraw water, the department may take action. For example, a permit may be cancelled, however, that rarely happens. Generally, water users work with the department for resolution.

Minnesota

Minnesota's online permitting system allows it to generate annual use fee invoices for water users who have filed their final reports. Fees are based on *actual water usage* and are due on February 15 of each year. For delinquent reports, the system automatically generates reminder notices, starting on February 17 and once a week until March, when staff will usually start making phone calls, based on a department-generated report of unpaid fees.

If a user either does not submit a report or fails to pay the annual fee, the Department of Natural Resources has the authority to terminate a permit, however, this is reviewed on a case-by-case basis. According to a Minnesota official, they have a 99 percent compliance rate.

Wisconsin

In Wisconsin, the DNR sends invoices for the annual base fee of \$125 to all water users in May of every year. For those in the Great Lakes Basin who are required to pay the annual use fee, that fee is also included on the invoice, based on their annual withdrawal reports due on March 30. Payment is due by June 30.

If invoices are not paid, the department sends overdue notices at both 30 and 60 days, after which the account is sent to collections. Collections for state agencies in Wisconsin are handled by its Treasury department, which has the authority to implement liens or tax intercepts on delinquent payers. The Treasury can also add

\$35 or 15 percent (whichever is greater) to a delinquent bill. Wisconsin does not rescind water permits, however, because enforcement costs would usually be greater than the \$125 annual base fee.

D. Fixed vs. Sliding Scale Fee System

We found that both a fixed fee and sliding-scale fee system for collection of a consumptive use water fee can be employed in an effective manner. In both scenarios, the user must be invoiced, so administration of either type of program would be similar.

Within Pennsylvania, both the Delaware and Susquehanna River Basin Commissions charge a set amount and bill users according to usage. There is no difference in cost based on how much water is used. The SRBC invoices users on a quarterly basis. The DRBC invoices some users quarterly, including industrial, power, and public water supply facilities, while all others are billed on an annual basis.

We inquired whether there were any other such programs within DEP that are charged on either a fixed fee or sliding scale basis. The Waste Management Program collects fees from landfills and resource recovery facilities. The fee is \$6.25 per ton; facilities report and pay the fees on a quarterly basis.

In the three other states we reviewed—Minnesota, New Jersey, and Wisconsin—that have water use fees, all three base their fees on a sliding scale (See Exhibit 115 for more information regarding fees in those states). In all three of those states, water fees rise as usage rises.

V. Exemptions to Water Use Permit and Use Fees

Most states have some exemptions for their programs, both permitting programs, and those with annual fees. Some types of exemptions are those that grandfather users prior to permitting laws being enacted, individual domestic properties, firefighting purposes, and users using less than a defined threshold amount of water. Several states have either exemptions for agricultural users, or differing requirements than other water users. Exhibit 117, shows exemptions in each of the states we reviewed for this study.

The two organizations that charge use fees to Pennsylvania users also have exemptions to their fees. The Susquehanna River Basin Commission (SRBC) exempts two categories of user:

- public water systems; and
- agricultural uses, including both livestock and irrigation purposes, i.e., anything that can be considered a farm.

The Delaware River Basin Commission (DRBC) has exemptions from its fees as well. They include:

- City of Philadelphia;
- any user that was a user before the compact;
- geographical exemptions—from Mile 1 of the river, where it meets the ocean, to Mile 38 of the river, is considered brackish, or salt water, and the DRBC does not charge for the use of this water (Also, there are no charges for withdrawals above Montague, NJ, at which point the river is managed by the US Supreme Court Decree of 1954.);¹ and
- all agricultural uses.

¹ The terms of the Decree are as follows: (1) Allocated to New York City the equivalent of 800 million gallons per day from the city's three Delaware Basin reservoirs, effective when all three of those reservoirs were fully constructed, which occurred in 1964; (2) Required compensating releases to maintain a flow of 1,750 cubic feet per second at Montague, N.J.; (3) Established an excess quantity to be released from the reservoirs each year (the "Excess Release Quantity" or "ERQ"); and (4) Granted certain diversion rights to New Jersey.

Exemptions in Other States

State & Type of Program	Exemptions
Connecticut	
Water Use Permits ^a	• All users registered with the department on or before July 1, 1983. • Those withdrawing less than 50,000 gallons per day in any 24-hour period.
Delaware	
	• Those withdrawing less than 50,000 gallons per day in any 24-hour period. • Occasional or temporary withdrawals, e.g. homeowners with access to ponds for lawn and garden irrigation or filling water trucks from ponds for dust control.
Florida	
	• Domestic water use at a single family dwelling or duplex using a single withdrawal facility. • Firefighting water wells. • Single family/duplex irrigation. • Short—term dewatering.^b • Closed loop systems.^c
Maryland	
Water Use Permits	• Extinguishing a fire. • Agricultural use under 10,000 gallons/day – users in this category may get voluntary permits. • Individual domestic use except withdrawals for heating and cooling. • Temporary dewatering during construction if: a) The duration of the dewatering including intermittent non-pumping periods is expected to be less than 30 days, and b) The average water use does not exceed 10,000 gallons/day. • Other users of ground water less than 5,000 gpd as an annual average: a. that is not for a community water system, or b. that is not within a water management strategy area, and c. the user files a notice of exemption with MDE at least 30 days prior to the beginning of the use or prior to the expiration date for an existing permitted use.
Minnesota	
Water Use Permits	• Domestic uses serving less than 25 people for general residential purposes. • Test pumping of a ground water source. • Reuse of water already authorized by a permit (e.g., water purchased from a municipal water system). • Certain agricultural drainage systems.
Water Use Fees	• Agricultural irrigation permittees that did not appropriate any water during the year, or had their permits suspended for more than seven days, pay a minimum fee of \$20 per permit. • State and federal agencies.

Exhibit 117 (Continued)

State & Type of Program	Exemptions
New Jersey	
Water Allocation Permits	• Agriculture. • Aquaculture. • Horticulture.
New York	
Water Withdrawal Permits	• Withdrawals for agricultural purposes that, prior to February 15, 2012, were registered, or their annual water usage reported to DEC. However, these withdrawals must be reported annually. • Withdrawals that have received approval from the Delaware River Basin Commission or Susquehanna River Basin Commission. However these withdrawals must be reported annually to DEC. • Withdrawals of hydropower facilities operating under a valid Federal Energy Regulating Commission license; • Withdrawals from the New York State Canal System that are used by the New York State Canal Corporation for purposes authorized by law. • Closed loop, standing column or similar non-extractive geothermal systems. • Long Island wells permitted pursuant to ECL section 15-1527 and Part 602 of 6 NYCRR. • On-site water withdrawal systems for approved inactive hazardous waste remedial site programs conducted pursuant to state or federal court order or state or federal government agency agreement or order. • Withdrawals used for fire suppression or other public emergency purposes. • Direct withdrawals from the Atlantic Ocean or Long Island Sound. • The extension of supply or distributing mains or pipes within a previously-approved water service area that remains within the amount authorized in a water supply permit or water withdrawal permit for the purpose of supplying potable water. • The reconstruction of facilities in an existing water withdrawal system when the capacity of such system is in no way altered (reconstruction does not include constructing an adjacent withdrawal structure). • Older existing permitted systems that do not already meet redundancy requirements may be exempt if required by the NYS Department of Health to add redundant wells. • The construction of filtration or other treatment facilities that will not in any way alter the amount of water which can be made available from the present source of supply. • Water withdrawals to supply ballast water necessary for lawful and normal vessel activity. • Water withdrawal directly related to routine maintenance and emergency repairs of dams. • Temporary water withdrawals for the purposes of construction, dewatering, hydrostatic testing, or aquifer testing, where the volume withdrawn is less than an average of 100,000 gallons per day in any consecutive thirty-day consecutive period (3 million gallons during a 30 day period).

Exhibit 117 (Continued)

State & Type of Program	Exemptions
Ohio Withdrawal and Consumptive Use Permits under the Great Lakes Compact	• A new facility whose proposed withdrawal and consumptive use capacity is below the applicable threshold quantity. • An existing facility whose proposed increase in withdrawal and consumptive use capacity is below the applicable threshold quantity. • A new facility whose actual maximum daily withdrawal will be less than the applicable threshold quantity when averaged over any 90-day period (45-day period if the withdrawal is from a high quality river or stream and the drainage area at the withdrawal point is between 50 and 100 square miles). • An existing facility whose increase in actual maximum daily withdrawal will be less than the applicable threshold quantity when averaged over any 90-day period (45-day period if the withdrawal is from a high quality river or stream and the drainage area at the withdrawal point is between 50 and 100 square miles). • An existing electric generating facility that increases its consumptive use due to a requirement imposed by federal regulation that is unrelated to an increase in electricity production. • A facility that is making a withdrawal for purposes other than industrial use or public water supply from an impoundment collected primarily from diffused surface water sources, including a farm pond, golf course pond, nursery pond, storm water retention pond, or other private pond. • A facility that is making a withdrawal for purposes other than industrial use or public water supply from a river or stream to augment the water supply of an impoundment used for firefighting purposes. • A facility that must temporarily establish a new or increased withdrawal and consumptive use capacity as a result of an emergency (for the duration of the emergency) that, without the new or increased capacity, would result in imminent harm to human health and property. • A facility that is establishing a new or increased withdrawal and consumptive use capacity in compliance with an experimental use permit. • A facility that must temporarily establish a new or increased withdrawal and consumptive use capacity in order to respond to a humanitarian crisis (for the duration of that crisis) if the new or increased capacity is necessary to assist in the management of that crisis. • A major utility facility that is subject to regulation under Chapter 4906 of the Ohio Revised Code or a facility that is increasing its withdrawal and consumptive use capacity directly related to supplying such a major utility facility. • A public water system whose increase in withdrawal and consumptive use capacity is proposed and reviewed in accordance with the requirements of §1501.33(C) of the Ohio Revised Code. • A facility that is subject to regulation under Chapter 1514 of the Ohio Revised Code. • A facility that purchases all of its water from a public water system. • A facility that is withdrawing or consumptively using water from an off-stream impoundment that has been substantially filled with an existing stream withdrawal or a new or increased stream withdrawal that is subject to a withdrawal and consumptive use permit.

Exhibit 117 (Continued)

State & Type of Program	Exemptions
Ohio (Continued)	
Withdrawal and Consumptive Use Permits under Ohio Law	• A major utility facility that is subject to regulation under Ohio Revised Code Chapter 4906. • A public water supply that was in operation on June 29, 1988 and for which no substantial changes are proposed. • A public water supply that encompasses only water distribution facilities. • A public water supply whose plans for new or increased capacity, containing the information required in ORC §1501.33(A), are submitted and reviewed by the Director of the Environmental Protection Agency applying the criteria specified in ORC §1501.34(A), as determined by the Director of the Department of Natural Resources. • A facility that is required to obtain a withdrawal and consumptive use permit under Ohio Revised Code §§1522.10-21.
Pennsylvania	
Withdrawal Permits	• Any user that is not a public water system.
Virginia^d	
Permits – Surface Water	• Surface water users who were withdrawing water before permitting went into place on July 1, 1989, are grandfathered and do not require a permit, unless they want to increase withdrawals. • Withdrawals from non-tidal waters that total less than 10,000 gallons per day. • Withdrawals from tidal waters for non-consumptive uses. • Agricultural surface water withdrawals that total less than 1,000,000 gallons in a single month from non-tidal waters or 60 million gallons in a single month from tidal waters. • Surface water withdrawals from non-tidal or tidal waters, regardless of the volume withdrawn, for the following uses: firefighting or for the training activities related to firefighting, such as dry hydrants and emergency surface water withdrawals; hydrostatic pressure testing of water tight containers, pipelines, and vessels; or normal single-family home residential gardening and lawn and landscape maintenance. • Surface water withdrawals placed into portable containers by persons owning property on or holding easements to riparian lands. • Surface water withdrawals that return withdrawn water to the stream of origin; do not divert more than half of the instantaneous flow of the stream; have the withdrawal point and the return point not separated by more than 1,000 feet of stream channel; and have both banks of the affected stream segment located within one property boundary. • Surface water withdrawals from quarry pits that do not alter the physical, biological, or chemical properties of surface waters connected to the quarry pit. • Surface water withdrawals from a privately owned agriculture pond, emergency water storage facility, or other water retention facility, provided that such pond or facility is not placed in the bed of a perennial or intermittent stream or wetland. Surface water withdrawals from such facilities constructed in beds of ephemeral streams are excluded from permit requirements. • Surface water withdrawals for all other purposes not otherwise excluded above that total less than: 10,000 gallons per day from non-tidal waters or 2,000,000 gallons per day from tidal waters.
Permits – Ground Water	• Users withdrawing fewer than 300,000 gallons per month.

Exhibit 117 (Continued)

State & Type of Program	Exemptions
West Virginia	
	• No program.
Wisconsin	
Annual Water Use Base Fee	• Emergency withdrawals for flood protection. • Withdrawals from high capacity wells for fire protection. • Tribal lands.
Use Fees in Great Lakes Basin	• Those outside of the Great Lakes Basin. • Users who withdraw less than 50 million gallons per year.

^a There are additional exemptions for minor diversions, described in Connecticut's regulations for this program.

^b Dewatering is the process of draining an excavated area that is flooded with rain water or ground water before construction can start. It is carried out where there is an accumulation of ground water at the site where water or sewer lines have to be laid, or excavation for foundations and basements has to be carried out.

^c For example cooling/heating systems for swimming pools or air conditioning units.

^d Agricultural water users are exempt from permit fees, but not from obtaining permits.

Source: Developed by LBFC staff with information from selected other states.

VI. Background

Pennsylvania's Environmental Bill of Rights

Pennsylvania's Constitution, at Article I, Section 27, sets forth what is known as an environmental bill of rights:

The people have a right to clean air, pure water, and to the preservation of the natural, scenic, historic and esthetic values of the environment. Pennsylvania's public natural resources are the common property of all the people, including generations yet to come. As trustee of these resources, the Commonwealth shall conserve and maintain them for the benefit of all the people.

The provision was born from the environmental movement of the 1960s when more than a dozen states added environmental rights provisions to their constitutions. Pennsylvania had an extensive history in dealing with extractive industries and activities, such as coal mining, oil and gas development, deforestation, industrialization, and associated species and habitat loss that was a driving force that led to the development of Article 1, Sec. 27. In the 1969-70 and 1971-72 legislative sessions, both chambers of the General Assembly unanimously agreed to the proposed constitutional change to amend the language. Pennsylvania voters ratified the proposed amendment by a margin of nearly four to one.

The courts initially construed the language of Article 1, Sec. 27 to be what is referred to as not "self-executing," meaning the provision required legislative action to take effect and that the constitutional provision existed only to guide the General Assembly.¹ The 2013 Pennsylvania Supreme Court case of *Robinson Township v.*

¹ Moreover, courts considering any challenge to a state action based on Article 1 Sec. 27 generally were required to apply a three-factor test first articulated in *Payne v. Kassab*, 312 A.2d 86 (Pa. Commw. Ct. 1973). The *Payne* test looked at the agency's action by trying to answer three questions: (1) Was there compliance with all applicable statutes and regulations relevant to the protection of the Commonwealth's public natural resources? (2) Does the record demonstrate a reasonable effort to reduce the environmental incursion to a minimum? (3) Does the environmental harm, which will result from the challenged decision or action, so clearly outweigh the benefits to be derived therefrom that to proceed further would be an abuse of discretion? For many years, there was no major court case upholding a citizen's challenge to a state agency's decision as being unconstitutional under Article 1, Sec. 27, likely, because of the way the courts applied the *Payne* test. To explain how the courts dealt with application of the *Payne* test in the context of Article 1, Sec. 27, the first part of the *Payne* test got interpreted narrowly, requiring only that the court first see if the state agency has authority over the activity, and if it does, ensuring the agency has followed all applicable laws. The second part of the *Payne* test required that all reasonable efforts have been made to ensure environmental incursions are at a minimum. Interpretation of this prong did little to sway a decision in favor of upholding a challenge because courts deferred to the expertise of the state agency in charge to determine if all reasonable efforts have been made. The third part of the *Payne* test would appear to prevent an activity if the environmental harm so clearly outweighed the benefit. Courts held that this balancing test includes social and economic benefits as well environmental. Therefore, sufficient economic benefit could outweigh environmental detriment.

*Commonwealth*² changed forty years of history, and in return how Article 1, Sec. 27 was treated by the courts. In *Robinson*, for the first time, the court used Article 1, Sec. 27 to strike down a law. The Pennsylvania Supreme Court found major parts of Pennsylvania’s 2012 oil and gas law, which was designed to facilitate the development of natural gas from Marcellus Shale, unconstitutional. In a plurality opinion (ratified by a majority opinion four years later in the *Pennsylvania Environmental Defense Foundation*³ case) the court changed its approach to Article I, Sec. 27 concluding the constitutional provision is self-executing—meaning it does *not* require any legislative action to be enforceable, but can be enforced by a court without there being any form of implementing legislation. In analyzing the language of Article 1, Sec 27, the court wrote that its first sentence established two rights in the people: first, a right to clean air, pure water, and to the preservation of the natural, scenic, historic, and esthetic values of the environment; and second, a limitation on the state’s power to act contrary to this right. These rights “bind” the state as well as local governments.⁴

The court concluded that the second and third sentences of Article I, Sec. 27 involve a public trust; public natural resources are owned in common by the people, including future generations. The state—as trustee—has a fiduciary duty to conserve and maintain public natural resources. “Conserve and maintain” alludes to a duty to prevent and remedy degradation, diminution, or depletion of public natural resources. This involves two specific separate obligations of the state: to refrain from permitting or encouraging degradation, diminution, or depletion of public natural resources, and to act affirmatively to protect the environment via legislative action.⁵

Sources of Water in Pennsylvania

There are several major sources of water in Pennsylvania, including Lake Erie, and the Susquehanna, Delaware, Ohio, and Potomac Rivers. Much of the Chesapeake Bay watershed is within Pennsylvania as well. Most of these bodies of water have either regulatory bodies or advisory commissions, discussed below, to regulate or oversee the withdrawal, consumptive use, or diversion of water. The Ohio River does not have a commission or advisory body, however, its basin is pictured in Exhibit 118.

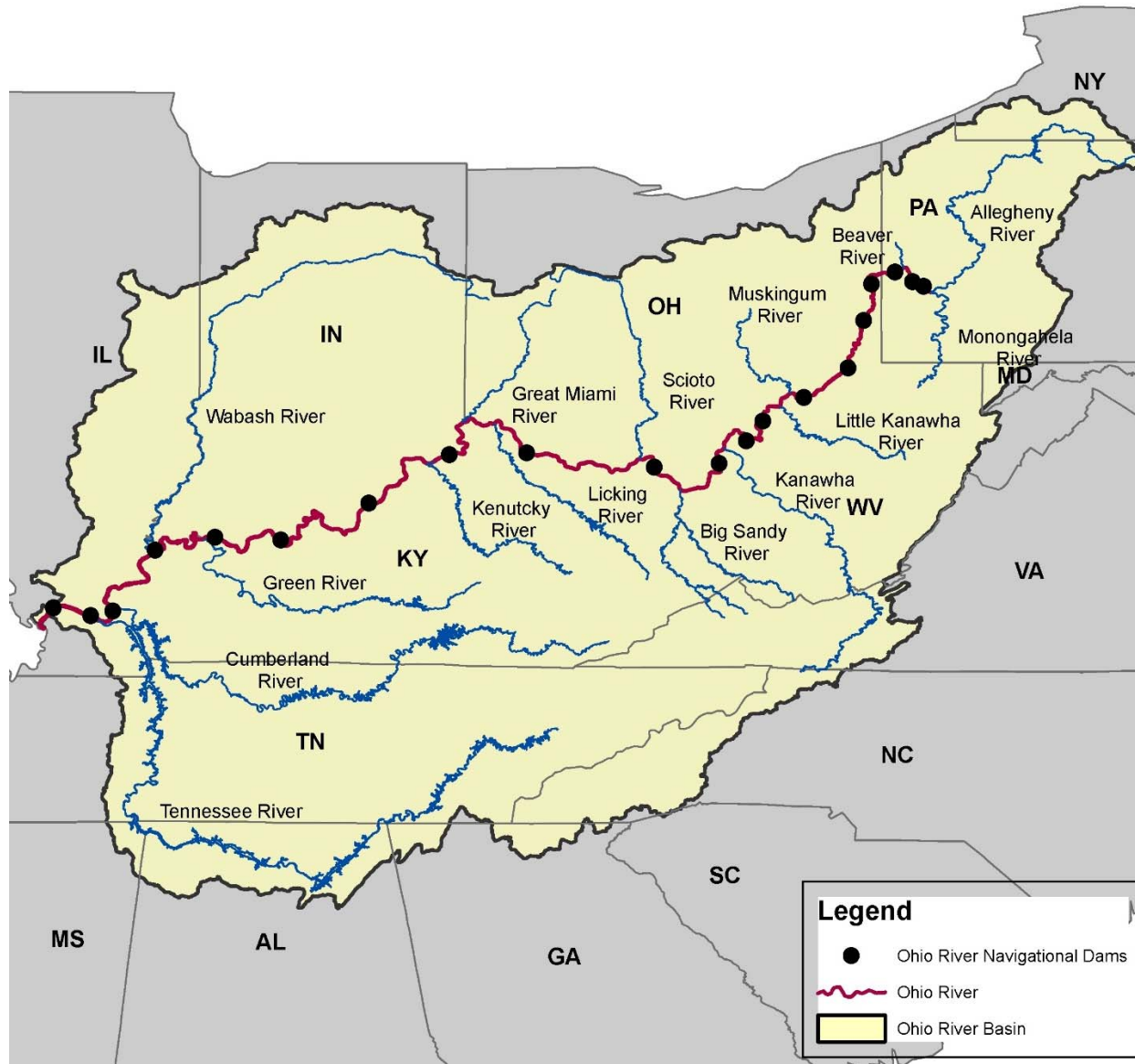
² 83 A. 3d 901 (Pa. 2013).

³ 161 A.3d 911 (2017). In the PEDF case of 2017, a majority of Pennsylvania’s Supreme Court established a broad interpretation of the Environmental Rights Amendment to the state constitution, cementing in place the Commonwealth’s role as trustee for public natural resources. The decision relies on the 2013 *Robinson* ruling that struck down parts of a major gas drilling law known as Act 13 but with only a plurality of justices agreeing with the broad interpretation of the Environmental Rights Amendment.

⁴ See 83 A. 3d 901 at 968-975.

⁵ In light of this new analysis of Article 1, Sec. 27, the court also found the balancing test of *Payne* to be inappropriate.

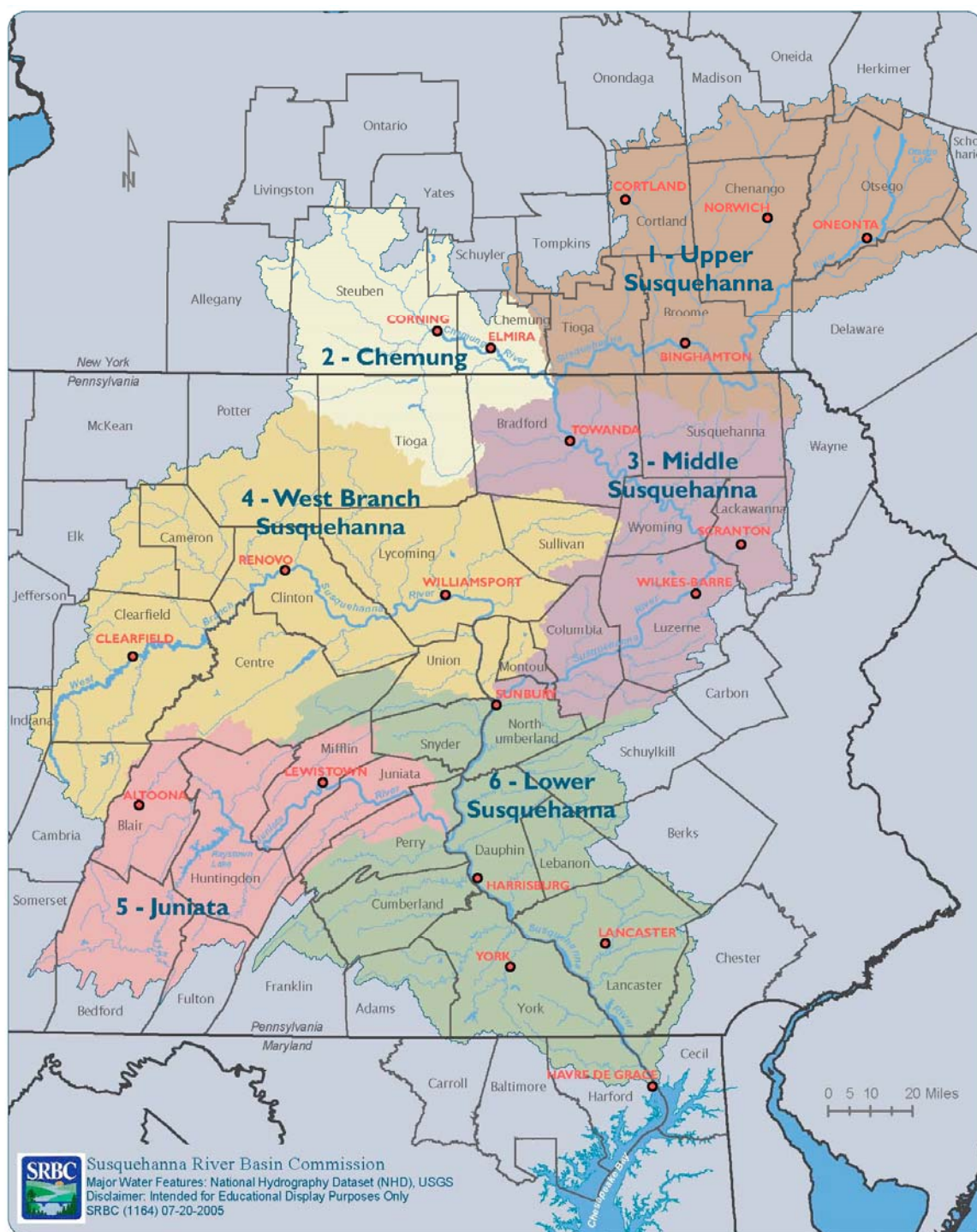
Ohio River Basin



Source: Ohio River Valley Water Sanitation Commission website.

Susquehanna River Basin Commission (SRBC): The Susquehanna River Basin Compact was signed into law on December 24, 1970. The Compact, as adopted by Congress, and the legislatures of New York, Pennsylvania, and Maryland, provides the mechanism to guide the conservation, development, and administration of the water resources of the Susquehanna River Basin. The Compact established the SRBC as the agency to coordinate the water resources efforts for the three states and the federal government. See Exhibit 119 for a map of the Susquehanna River Basin.

Susquehanna River Basin and Sub-basins



Source: Susquehanna River Basin Commission website.

The mission of the SRBC, defined in the Compact, is to enhance public welfare through comprehensive planning, water supply allocation, and management of the water resources of the Susquehanna River Basin.

The SRBC regulates three water uses, including:

- Withdrawals: Removal or withdrawal of 100,000 gallons per day (gal/d) from any source or combination of sources within the basin;
- Consumptive Water Uses: Any consumptive water use of 20,000 gal/d or more from any water source;
- Diversions: Any quantity of water diverted into the basin is subject to review and approval. Water withdrawn from any source within the basin and diverted out of the basin is regulated if the quantity is 20,000 gal/d or more.

The SRBC requires payment of nonrefundable fees for the review of applications for the following categories of projects:

- consumptive use;
- surface water and groundwater withdrawals;
- diversions;
- hydroelectric projects;
- any other projects requiring the review/approval of the Commission under the Compact that do not involve a request for a quantity of water; and
- other applications required under 18 CFR § 806.5;⁶ and
- modifications to approvals under 18 CFR § 806.18.⁷

There are two categories of fees for applications. The standard fee ranges from \$530 for a water source registration for a project required under 18 CFR §806.5, to \$236,325 for hydroelectric projects. The municipal fee ranges from \$420 for a reissuance of approval to \$48,500 for a consumptive water use application for withdrawals of over 5,000,000 gal/d.

⁶ These projects may include: those that may affect interstate water quality; those within a member state that have the potential to affect waters within another member state; includes, but not limited to projects with the potential to alter the physical, biological, chemical, or hydrological characteristics of water resources streams designated by the Commission. It also includes those projects that may have a significant effect upon the SRBC's comprehensive plan or those projects which could have an adverse, adverse cumulative, or interstate effect on the water resources of the basin.

⁷ Modifications may be minor, for example: correction of typographical errors, addition of sources for consumptive use, or increases to total system limits that were established based on the projected demand of the project. Modifications may also be major, for example: increases in the quantity of withdrawals, consumptive uses or diversions, increases to peak day consumptive use, or changes that have the potential for adverse impacts to water resources or competing water users.

The SRBC also charges a Consumptive Use Mitigation Fee. This fee is currently set at \$0.33 per 1,000 gallons and is assessed only on the consumptive use portion of surface and ground water withdrawals—the SRBC does not charge for the initial withdrawal of water. The fee is voluntary, but most users of the Susquehanna’s waters opt to pay the fee to satisfy SRBC’s consumptive use mitigation requirement.

Exemptions from the consumptive use fee imposed by the SRBC are:⁸

- public water systems, and
- agricultural uses, including both livestock and irrigation purposes.

The consumptive use mitigation fee was originally based on the costs incurred by the SRBC and two power companies to enter into an agreement with the US Army Corps of Engineers to retrofit and secure storage at one of its existing flood control reservoirs. The fee is collected to allow the SRBC to pursue similar storage projects and to engage in mitigation activities. Mitigation efforts can be taken in several different ways, for example, ceasing use of water on a temporary basis, relying on stored water, or releasing water from a lake. SRBC income from mitigation fees was \$3.7 million and \$2.9 million in 2015 and 2016, respectively.

The SRBC estimates that a billion gallons per day of water usage/withdrawals from the Susquehanna are under their jurisdiction and another billion gallons per day are unregulated. This is because many older facilities that existed before SRBC’s establishment were grandfathered and not subject to SRBC regulation. SRBC officials estimate that there are 450-500 such facilities in this category in Pennsylvania, mostly small public water supplies and older manufacturing facilities.

Delaware River Basin Commission (DRBC): The Delaware River Basin includes all or portions of 42 counties and all or portions of 838 municipalities. Concurrent legislation was signed in 1961 by President Kennedy and the Governors of Pennsylvania, New Jersey, and New York, creating the Delaware River Basin Commission. See Exhibit 120 for a map of the Delaware River Basin.

The mission of the DRBC is to: provide comprehensive watershed management; act as stewards of the Basin’s water resources, particularly with respect to surface water quality, including both point and nonpoint sources of pollution; monitor ground and surface water quantity, including water demands, water withdrawals, water allocations, water conservation, and protected areas; and manage water in drought situations. Additionally, the DRBC works to promote effective

⁸ There is an exception to the public water supplier exemption, which is those that export water from the Susquehanna Basin to another basin. This type of diversion is considered a regulated consumptive use and is subject to SRBC mitigation requirements, including the optional payment of the mitigation fee.

inter-agency coordination to prevent duplication of efforts, and to seek increased public involvement.

To carry out its mission, the DRBC:

- is the regulatory arm of withdrawals and discharges;
- oversees planning;
- watches impacts on water resources;
- works with other groups to set standards;
- works on Special Protection Waters, a regulatory program for the river from Trenton to its headwaters; and
- has the power to create special protected areas.

Exhibit 120

Delaware River Basin



Source: Delaware River Basin Commission website.

The DRBC manages two reservoirs built by the Army Corps of Engineers, the waters of which are set aside for flood mitigation and low flow conditions.

The DRBC charges fees only for surface water for both consumptive and non-consumptive uses; there are no fees for groundwater withdrawals. Its fees are \$81.01 per million gallons for consumptive use and \$0.81 per million gallons for non-consumptive use. Exemptions⁹ to the charge include:

- City of Philadelphia;
- Any user that was a user before the compact;
- Geographical exemptions—from Mile 1 of the river, where it meets the ocean, to Mile 38 of the river, is considered brackish, or salt water, and the DRBC does not charge for the use of this water (Also, there are no charges for withdrawals above Montague, NJ, at which point the river is managed by the US Supreme Court Decree of 1954.);¹⁰ and
- All agricultural uses.

These fees, set in the 1970s, are based on debt service and maintenance costs, and have only been increased twice. Surface water charges provide the revenues needed for debt service, operations, and maintenance costs for water supply storage in two federal multi-purpose reservoirs, at Beltzville and Blue Marsh, as well as administrative and staff costs related to the protection and preservation of the basin's water quantity and quality. DRBC collects about \$3.4 million per year, based on about 1.8 billion gallons of water, which are used by 300 entities, mostly for power generation.

The DRBC also has a water conservation program and has adopted policies to reduce the demand for water. One of these conservation policies is a water audit program requirement for owners of water supply systems serving the public to ensure accountability in the management of water resources. The water audit is a means of assessing accountability as it evaluates how effectively water moves from the source to the customer and is used to identify areas of water loss.

Interstate Commission on the Potomac River Basin (ICPRB): Authorized by an Act of Congress in 1940, the Interstate Commission on the Potomac River Basin is an advisory, non-regulatory interstate compact agency made up of Maryland,

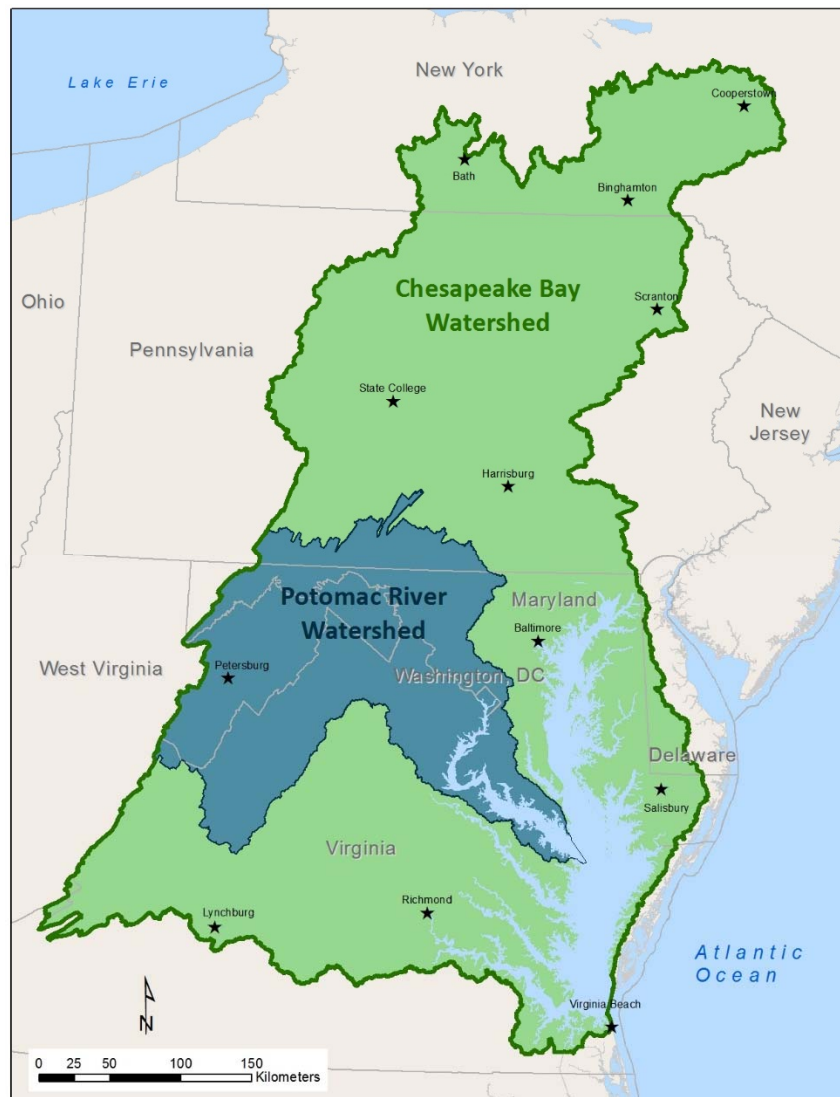
⁹ Exemptions can be lost. An entity or business can lose its certificate of entitlement if there is an ownership change.

¹⁰ See, *New Jersey v. New York*, 347 U.S. 995 (1954). The terms of the Decree are as follows: (1) Allocated to New York City the equivalent of 800 million gallons per day from the city's three Delaware Basin reservoirs, effective when all three of those reservoirs were fully constructed, which occurred in 1964; (2) Required compensating releases to maintain a flow of 1,750 cubic feet per second at Montague, N.J.; (3) Established an excess quantity to be released from the reservoirs each year (the "Excess Release Quantity" or "ERQ"); and (4) Granted certain diversion rights to New Jersey.

Pennsylvania, Virginia, West Virginia, the District of Columbia, and the federal government. The mission of ICPRB is to protect and enhance the waters and related resources of the Potomac River basin through science, regional cooperation, and education. See Exhibit 121 for a map of the Potomac River Basin.

Exhibit 121

Potomac River Basin



Source: Interstate Commission on the Potomac River Basin website.

The ICPB is different from the Susquehanna and Delaware River Commissions in that it does not charge fees, either for permitting or water withdrawals. It is an investigative and advisory body that issues reports and recommendations regarding water issues on the Potomac River, especially relating to water quality. The Commission does not issue standards and has no regulatory authority.

Great Lakes Commission: The Great Lakes Commission was established in 1955 by the Great Lakes Basin Compact, signed by five states: Illinois, Indiana, Michigan, Minnesota, and Wisconsin. New York, Ohio, and Pennsylvania later signed the Compact. The Compact was ratified by the states' legislatures and granted consent by the US Congress on July 24, 1968. The Great Lakes Commission is an interstate compact agency that represents, advises, and assists its member states and provinces by: fostering dialogue; developing consensus; facilitating collaboration, and speaking with a unified voice to advance collective interests and responsibilities; promoting economic prosperity and environmental protection; and achieving the balanced and sustainable use of Great Lakes-St. Lawrence River basin water resources. See Exhibit 122 for a map of the Great Lakes Basin.

Exhibit 122

Great Lakes Basin



Source: Ohio Department of Natural Resources website.

The Commission does not charge for water withdrawals. Its work is focused on several areas, including:

- commercial navigation,
- costal conservation and habitat restoration,
- invasive species,
- economic development and community revitalization,
- water quality,
- information and management delivery,
- advocacy, and
- water management and infrastructure.

Chesapeake Bay Commission (CBC): The CBC was created in 1980 by Pennsylvania, Maryland, and Virginia to assist the states in cooperatively managing the Chesapeake Bay and to advise the members of each state's General Assembly. See Exhibit 123 for a map of the Chesapeake Bay Watershed. The Commission is active in many issues impacting the bay, from managing living resources and conserving land, to protecting water quality. Part of the CBC's mission reads:

By laws enacted in the three member states more than three decades ago, the CBC is charged with addressing the broad range of issues and policies that reflect the pollution sources, land uses and human impacts in the Bay region, an area spanning six states, a 64,000 square mile watershed and 180,000 miles of tributaries and coastline. Commission members craft and secure passage of laws and policies that must balance many ecological, societal and economic concerns. The restoration's primary focus is on clean water, believing that restored water quality will lead to improved conditions for the resources that depend upon it.

The CBC is involved in many aspects of bay management, including:

- **Total Maximum Daily Load (TMDL):** Under the Federal Clean Water Act, the Chesapeake Bay must adhere to a "pollution diet" that defines the maximum amounts of nitrogen, phosphorus, and sediment that the Bay can manage on an annual basis. Practices to achieve these pollution limits must be fully in place by 2025. Protection and enhancement of funding sources are a critical issue in all three member states.
- **Land Conservation:** The advent of the TMDL in 2010 focused energies on pollution reductions but overlooked the value of land conservation in achieving these reductions and improved water quality. A pro bono legal analysis determined that the Clean Water Act, a Presidential executive

order, and the TMDL itself supported the use of land conservation as a tool for protecting water quality.

- *Nutrient Trading:* The Commission's Report "Nutrient Credit Trading for the Chesapeake Bay, an Economic Study" published in 2012 showed that trading had the possibility of delivering significant cost savings as jurisdictions implement practices to achieve TMDL pollution reductions. The CBC concluded that verification of pollution reduction tools and practices performed on a regular basis are necessary to ensure that trading is delivering genuine nutrient reductions.
- *Fisheries Management:* The Commission's recognition that the overarching goal of bay clean-up is the restoration of living resources led it to monitoring the rebound in numbers of blue crab, engaging fisheries managers and the seafood industry to clarify policy actions to improve fisheries management in the Potomac River and state waters bay-wide, and working to expand oyster restoration activities in the Potomac and other rivers.
- *Manure to Energy:* The CBC moved to promote manure to energy as a tool to help restore the Bay. Commission members focused their efforts on ways to promote wider adoption of the practice, and on attracting private investment. Of equal importance to its members was ensuring that the practice both accomplishes nutrient reductions while protecting air quality.

Chesapeake Bay Watershed



174

Water Use Planning and Reporting Requirements in Pennsylvania

Planning: Act 2002-220 added provisions to Title 27, Environmental Resources, addressing the Agricultural Advisory Board as well as water resources planning. It required an update of the State Water Plan within five years and created both regional water resource committees and a statewide water resource committee that are to be involved in guiding the development of the plan for presentation to DEP for approval. The regional committees are to develop regional plans (with ongoing consultation with the Statewide Water Resources Committee and DEP) that is incorporated (following review and approval) into the state plan. Act 2002-220 requires the state plan to be updated through this general process every five years and sets forth a general process for the plan update. It also gives authority to DEP, in consultation with the State Committee, to develop policies and guidelines for developing the regional plan, ensuring public participation, identifying critical water planning areas, and resource plans for the critical areas. DEP is to establish and maintain—in consultation with the Compact Basin Commissions, relevant federal, state, and regional agencies with water resource management responsibilities—a statewide data system regarding the distribution, quality, and use of water resources in Pennsylvania.

Six regional committees¹¹ created under Act 2002-220 relate to the following watershed drainage area in Pennsylvania:

- Delaware River (and tributaries);
- West Branch Susquehanna River sub basin and upper Susquehanna, middle Susquehanna, and Chemung sub basins (and tributaries);
- Juniata River and lower Susquehanna River and tributaries below Sunbury, and Gunpowder, Northeast, and Elk Creek watersheds draining to the Chesapeake Bay;
- Ohio River (and tributaries);
- Lake Erie and Genesee River; and
- Potomac River (and tributaries).

Membership on regional committees includes a broad representation of business and industry, agriculture, local government, and environmental interests. It embraces those with a knowledge, background, or understanding of water resources planning and management, conservation district directors, representatives of local government (other than counties), as well as representatives of various stakeholder

¹¹ Each regional committee has authority to guide development of the regional plan recommended to the state committee; consult, advise, and recommend to the state committee and DEP; recommend identification of critical water planning areas; and solicit public comments regarding the regional plan.

groups. The Statewide Water Resources Committee¹² has a broad membership¹³ including representatives of the regional committees, a cross section of water user interests, local government, environmental and conservation interests, and professions relating to water resources management.

Act 2002-220 requires, as part of developing regional and state plans, identification of critical water planning areas, and that Critical Area Resource Plans will be developed under the guidance of the regional committees in conjunction with a critical area advisory committee. Act 2002-220 also requires DEP to establish a water resource technical assistance center to promote voluntary water conservation and provide technical assistance on water resource use issues. Additionally, DEP may issue compliance orders with which a person has a duty to comply. Failure to comply with a DEP compliance order is enforceable by DEP in Commonwealth Court as contempt of court.

Water Registration and Reporting: Act 2002-220 requires registration and periodic reporting to DEP of water use by the following:

- each public water supply agency;
- each hydropower facility; and
- users of 10,000 gallons per day or more of water (withdrawal or withdrawal use from one or more points of withdrawal within a watershed operated as a system either concurrently or sequentially).

The Act requires registration of the source, location, and amount of withdrawal or use or both. Records are to be kept for five years and available for DEP inspection. The act does not describe any fees associated with registering and reporting. The Environmental Quality Board is to adopt regulations in consultation with the Statewide Water Resources Committee. Water use regulations under the act are to avoid duplication of effort if required information is otherwise being provided.

¹² The state committee has authority to recommend to DEP approval and adoption of the state plan, assist DEP with the public participation component, recommend approval by DEP of guidelines for both the regional and the state plans, review and comment on relevant DEP regulations and policies, and do all else that is assigned to it by this law and other laws.

¹³ Ex officio voting members include the Secretaries of DEP, PDA, DCNR, the Executive Director of PFBC, the Chairman of the Public Utility Commission, and the Executive Director of Pennsylvania Emergency Management Agency. Ex officio nonvoting memberships are to be offered to the Secretary of DCED, the Executive Director of the Governor's Center for Local Government Services, and representatives of each compact basin commission.

The act and its associated regulations require reporting by March 31 for the prior calendar year for public water suppliers, and by June 30 for the following users:

- power generation facilities;
- manufacturing industries;
- mineral industries;
- bulk, vended, retail, and bottled water systems;
- agriculture;
- golf courses; and
- ski resorts.

General contents of each report must include:

- registration information,
- amounts of both consumptive and non-consumptive uses,
- locations and amounts of any waters returned or discharged, and
- amounts of water transferred between public water supply agencies by means of interconnections.

The regulations have additional reporting requirements for specific types of users. For example, power generating facilities must report generating capacities, generating units, and water storage information; and agricultural users must report irrigation water use, animal water use, and water storage information.

State Agencies With Water Quality Responsibilities

Several state agencies have responsibility for and oversight of Pennsylvania's waters. These include DEP, DCNR, PFBC, and PDA. The primary purpose of a water use fee, proposed in House Bill 20 of 2017-18 is to establish the Water Use Fund to be distributed to various departments for water related programs and activities. Under House Bill 20, each of these agencies would receive funding to further their water-related responsibilities.¹⁴

Department of Environmental Protection (DEP): DEP has two offices that have water-related responsibilities: the Office of Water Programs and the Office of Water Resources Planning.

Deputy Secretary for Water Programs: The Deputy Secretary for Water Programs plans, directs, and coordinates departmental programs associated with the

¹⁴ See Appendix B for information related to dedicated nonpoint source water pollution funding.

management, quality, and protection of the Commonwealth's water resources. There are five bureaus/offices under this deputy secretary, including:

1. *Bureau of Waterways Engineering and Wetlands* has four core programs, including Dam Safety; Wetlands, Encroachment and Training; Project Development; and Project Inspection.
2. *Bureau of Clean Water* is responsible for protecting and preserving the waters of the Commonwealth through the establishment of water quality standards and the implementation of monitoring and assessment programs.
3. *Bureau of Safe Drinking Water* ensures a safe and reliable supply of drinking water for Pennsylvania through regulation of more than 8,500 public water systems.
4. *Chesapeake Bay Program Office* assures the proper development, implementation, and coordination of the Commonwealth's efforts for restoration of the Chesapeake Bay.
5. *Regional Permit Coordination Office* is responsible for the comprehensive review and issuance of decisions related to construction storm water discharges and stream and wetland encroachment permits for complex linear infrastructure projects. The office coordinates with appropriate regional offices that may be processing other permit applications associated with complex linear projects, and may also assist the regional offices to ensure timely review and decision making for permits.

Special Deputy Secretary for Water Resources Planning: The Special Deputy Secretary for Water Resources Planning oversees Pennsylvania's membership within interstate river basin organizations, administers the Department's Coastal Resources Management Program (CRM) for the Delaware Estuary and Lake Erie, and manages the Great Lakes Program. Other responsibilities include serving as project advisor for Growing Greener grants, overseeing the Department's non-point source program, providing support for conservation districts, and maintaining cooperative working relationships with the Department of Agriculture and the State Conservation Commission. The Deputy Secretary is also responsible for the Department's State Water Planning Program and responsible for maintaining water use data.

The Water Resources Planning office includes:

1. *Planning and Conservation Division* provides services to help protect and restore the quality of watersheds, streams, and lakes by overseeing the Federal Nonpoint Source implementation grant and the watershed specialist grant program with county conservation districts.

2. *Compacts and Commissions Office* coordinates Pennsylvania's responsibilities as a member of intrastate and interstate organizations and develops strategies to work with established river basin commissions and interstate associations.

Pennsylvania Fish and Boat Commission (PFBC): The PFBC's mission is to protect, conserve, and enhance the Commonwealth's aquatic resources and provide fishing and boating opportunities. The mission reflects the statutory responsibilities in the Fish and Boat Code, 30 Pa.C.S. §321, relating to:

- the encouragement, promotion, and development of fishery interests;
- the protection, propagation, and distribution of fish;
- the management of boating and operation of boats; and
- the encouragement, promotion, and development of recreational boating.

Relevant to this study, however, are the Commission's water conservation efforts. Clean water is essential to species preservation in Pennsylvania's waters.

The PFBC's Annual Report details the conservation efforts of the organization. In 2016, the PFBC undertook many water-related conservation projects, including:

- A continuing effort to have the federal Department of Environmental Protection declare the Susquehanna River a high priority impaired water, which would trigger a two-year timeline requiring Pennsylvania's DEP to develop a comprehensive plan to identify the causes and sources of pollution and develop a plan to clean up the river consistent with the federal Clean Water Act;
- Implementing its inaugural SOS—Save Our Susquehanna project—a series of habitat improvements on Limestone Run in Montour and Northumberland Counties to reduce erosion and sediment loading;
- Entering into habitat partnerships to provide technical assistance to landowners and watershed groups by planning, designing, and managing construction of projects to stabilize stream channels, minimize sedimentation, and enhance local water quality;
- Awarding grants to develop and implement projects that benefit fishing, boating, and aquatic resources in Cameron, Elk, Potter, and McKean Counties;
- Participating in DEP's Drought Task Force, in monitoring low flows in Pennsylvania's waterways;

- Working with the Unassessed Waters Initiative to survey waters across the state to evaluate them for wild trout populations; and
- Reaching a \$2.5 million settlement with Murray Energy for civil damages resulting from a 2009 pollution incident in which discharges from a coal mine contributed to a massive fish kill.

Department of Agriculture (PDA): The PDA is involved with water mainly through County Conservation Districts (CCD). Roughly half of all CCD employees work on watershed restoration and planning, nutrient management, stream encroachment, and farm conservation. The water-related responsibilities of the CCDs are geared toward lessening negative impacts to the Chesapeake Bay watershed from agricultural activity. In addition to the Chesapeake Bay Program, the CCDs work on programs such as the:

- Erosion and Sediment Control Program,
- National Pollutant and Sediment Control Program,
- Water Obstruction and Encroachment Permitting Program,
- Nutrient Management Plans,
- Strategic Watershed Action Team Program,
- Non-Point Source Implementation Program, and
- Pennsylvania Coastal Non-point Pollution Control Program.

Other water-related programs within the PDA are the Resource Enhancement and Protection Program (REAP) and the Pennsylvania Dirt, Gravel, and Low Volume Road Program. REAP allows farmers and landowners to earn tax credits in exchange for implementing conservation Best Management Practices on farms, including riparian buffers. The Dirt and Gravel program provides education, technical assistance, and grant funding to local public road-owning entities to implement environmentally sensitive maintenance practices aimed toward reducing non-point pollution impacts of local public roads.

Department of Conservation and Natural Resources (DCNR): Established on July 1, 1995, the mission of DCNR is to conserve and sustain Pennsylvania's natural resources for present and future generations' use and enjoyment.

The Pennsylvania Rivers Conservation Program is in place to protect and enhance Pennsylvania's waterways. The program, administered by DCNR's Bureau of Recreation and Conservation, provides technical and financial assistance to partners to carry out activities that improve watershed health and/or provide water-based outdoor recreation opportunities and includes initiatives that benefit all types of waterways and water resources. Initiatives included in the DCNR Rivers Conser-

vation Program are: grants for projects to restore and protect rivers and watersheds; scenic rivers designations; and the Rivers Registry, a clearinghouse of river conservation plans.

Another of DCNR's water conservation efforts is forest buffers along waterways, known as riparian buffers. Buffers are the trees, shrubs, and grasses planted along streams that play an important role in maintaining the health of Pennsylvania's waterways, serving as a transition from land to water. Riparian forests act as filters for the sediments and pollutants from farm fields, residential lawns, and roadways to help keep them from reaching the water. DCNR has a goal of planting 95,000 acres of riparian forest buffers statewide by 2025 to improve waterways in Pennsylvania and the Chesapeake Bay. To facilitate this goal, DCNR awards grants through its Riparian Forest Buffer Grant Program.

Examples of Coordination Between State Agencies Regarding Water Programs and Activities

Due to the many entities involved in water activities in Pennsylvania, coordination between responsible entities is necessary. Act 2002-220 states:

The Statewide [Water Resources] committee, the regional committees and the department [of Environmental Protection] shall cooperate and coordinate with appropriate Compact Basin Commissions and Federal, interstate, State and political subdivisions, municipalities, public water supply agencies and other agencies for efficient planning for the maintenance and enhancement of the water resources of this Commonwealth.

The Environmental Quality Board (EQB) is an independent board that adopts all of DEP's regulations. It is chaired by the Secretary of DEP. The EQB, consists of 20 members, 11 of whom represent state agencies:

- Department of Environmental Protection;
- Department of Agriculture;
- Department of Health;
- Department of Community and Economic Development;
- Pennsylvania Utility Commission;
- Pennsylvania Fish & Boat Commission;
- Pennsylvania Game Commission;
- Department of Labor and Industry, Governor's Office of Policy;
- Historical and Museum Commission;
- Governor's Office of Policy; and
- PennDOT.

Of the remaining members of the EQB, four are members of the legislature, and five are members of the Citizens Advisory Council.¹⁵ The EQB's powers and duties include formulating, adopting, and promulgating the rules and regulations of DEP.

On a more informal basis, according to a DEP official, DEP consults with other agencies through the Governor's Policy Office and the network of policy staff in other state agencies. In order to be informed, staff from other agencies frequently attend meetings of DEP's various advisory committee meetings, including:

- Chesapeake Bay Steering Committee,
- Coastal Zone Advisory Committee,
- Sewage Advisory Committee, and
- Small Water Systems Technical Assistance Center Board.

Additionally, many other interactions occur between agency staffs on a regular basis with smaller, less formal meetings.¹⁶ Some examples include PennDOT and the PA Turnpike Commission, which regularly meet with DEP to review permitting matters. Staff from the PFBC meet with DEP's Water Quality Standards division. Staff in the Bureau of Safe Drinking Water meet with the PUC, DOH, and PDA. DEP's Vector Management staff also work closely with the DOH.

For example, to achieve the goals set forth under Pennsylvania's Buffer Initiative, the Riparian Forest Buffer Advisory Committee has been established. The committee is composed of members from DCNR, DEP, PDA, PFBC, PGC, and many other entities and organizations. This committee's objectives include:

- sharing ideas on successes and lessons learned;
- developing recommendations and provide feedback to DCNR, PDA, and DEP on riparian forest buffer programs;
- developing communications and outreach advice; and
- assisting with implementation of the Commonwealth's two-year Riparian Forest Buffer work plan

¹⁵ The Citizen's Advisory Council is an advisory body to the DEP.

¹⁶ Some examples include PennDOT and the Turnpike Commission, which regularly meet with DEP to review permitting matters. Staff from the Fish and Boat Commission meet with DEP's Water Quality Standards division. Staff in the Bureau of Safe Drinking Water meet with the PUC, Department of Health, and Department of Agriculture. DEP's Vector Management staff work closely with the Department of Health.

VII. Appendices

APPENDIX A

Legislative History

House Bill 20 of 2017, known as the Water Resource Act, is currently under legislative consideration. HB 20 includes the following provisions:

- Requires registration of extraordinary non-agriculture and non-municipal water users. Extraordinary water users are defined as those that withdraw more than 10,000 gallons of water per day from Pennsylvania waters for the purpose of for-profit business;^a
- Establishes a water resource fee for withdrawals of water greater than 10,000 gallons and used for non-agricultural or non-municipal purposes that are (a) withdrawn and subsequently returned to the water source (\$.0001 per gallon) and (b) withdrawn and consumed (\$.001 per gallon).
- Any fees paid under this bill will be subtracted from any fees imposed by the Susquehanna River and Delaware River Basin Commissions.
- The fees collected are to be paid into the new Water Use Fund and will be distributed as follows:
 - o \$30 million to the Department of Environmental Protection for water-related programs and activities, with the remainder for general government operations;
 - o \$25 million to the Department of Conservation and Natural Resources for the same;
 - o \$5 million to the PA Fish and Boat Commission for the same;
 - o \$5 million to the Department of Agriculture for the same;
 - o Remainder to PENNVEST for distribution for the maintenance and protection of watersheds, water resources, water environments, furtherance of water conservation, and other water-related environmental initiatives, as well as debt service to Watershed Protection Bonds.
- Allows PENNVEST to submit a ballot question regarding bond issuance of up to \$3 billion for the protection of watersheds, water resources, water environments, fresh water sources, furtherance of water conservation and other water-related environmental initiatives.
- The Department of Environmental Protection is to promulgate regulations to enforce and administer this act.

Prior Proposed Legislation

House Bill 2114 of 2015, is the prior version of the proposed Water Resource Act. HB 2114 was substantially similar in its provisions to the current version in HB 20

Appendix A (Continued)

except it did not provide for a portion of the Water Use Fund to be paid to the Department of Agriculture, did not have a provision for payment of the remainder in the fund, and put the submission of the ballot question under the authority of DEP, not PENNVEST, as it is under HB 20.

Senate Bill 1401 of 2015 was to create the Water Quality Improvement Act and included the following provisions:

- As in both House bills above, SB 1401 required extraordinary water users to register with the Department of Environmental Protection, establishes the same water resources fee as both House bills, and subtracts any fees imposed by the SRBC and DRBC.
- Established the Watershed Quality Improvement Fund, into which fees would be deposited. This fund was to be used by the State Conservation Commission to finance the costs of design and installation of enhanced nutrient removal technology at publicly owned treatment works designated as significant dischargers or eligible nonsignificant dischargers for the purpose of compliance with effluent limitations for total nitrogen and total phosphorus of the Chesapeake Bay Total Maximum Daily Load Watershed Implementation Plan, a local total maximum daily load or applicable regulatory or permit requirements and the purchase of verified total maximum daily load parameter credits under section 6, which establishes the Water Quality Improvement Program.
- Established the Water Quality Improvement Program, which was to be used to finance the purpose of the Watershed Quality Improvement Fund, to be administered by the State Conservation Commission. The Commission was to make no less than 50 percent of the fund available for matching grants to local governments, conservation districts, and institutions of higher education and individuals who propose scientific initiatives. Projects may include:
 - o The acquisition of conservation easements related to the protection and restoration of water quality and stream buffers;
 - o Conservation planning and design assistance to develop and implement conservation plans and nutrient management plans for agricultural operations;
 - o Instructional education directly associated with the implementation or maintenance of specific nonpoint source pollution reduction plans and initiatives;
 - o The replacement or modification of residential onsite sewage systems to include nitrogen removal capabilities;
 - o Implementation of cost-effective nutrient and sediment reduction practices.

Appendix A (Continued)

- Set conditions for contracts with total maximum daily limit parameter credit sellers.^b
- Required the State Conservation Commission to establish a voluntary compliance opt-in to allow permittees and other buyers to comply with total maximum daily limit parameter permit requirements.
- The State Conservation Commission was authorized to promulgate regulations to carry out the provisions of this act.

^a The term does not include withdrawals made by a community water system or a non-community water system that is regulated by the Department of Environmental Protection under the PA Safe Drinking Water Act.

^b A total maximum daily limit parameter is defined as a pollutant that has been identified as the cause of nonattainment of water quality standards and for which a total maximum daily load has been developed to set allowable loading targets.

Source: Developed by LBFC staff.

APPENDIX B

Dedicated Nonpoint Source Water Pollution Funding in Other States

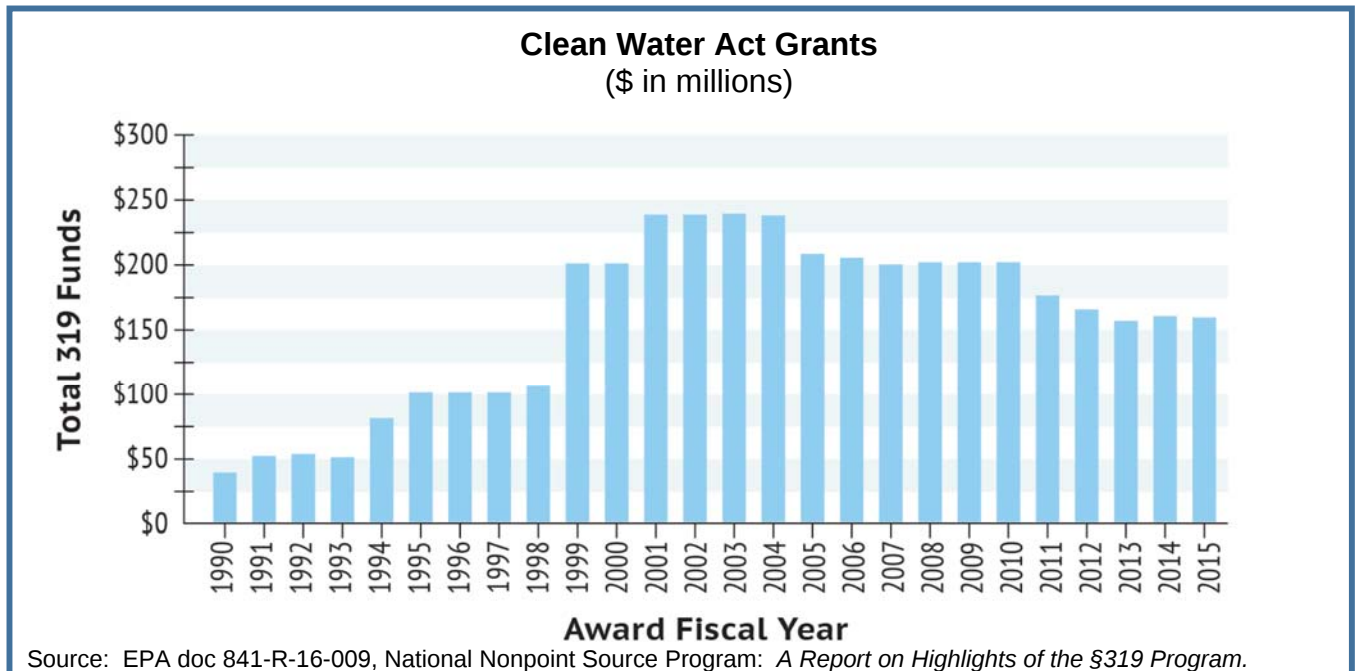
Introduction

States report that nonpoint source (NPS) pollution is the leading remaining cause of water quality problems. NPS pollution impacts waters in differing manners and may not always be fully assessed. The types of nonpoint source water quality concerns that affect a given waterbody are influenced by the land use that surrounds the body of water.

Land runoff, precipitation, atmospheric deposition, drainage, seepage or hydrologic modification all may cause NPS pollution. The EPA explains that NPS pollution, unlike pollution from industrial and sewage treatment plants, comes from many diffuse sources. NPS pollution is caused by rainfall or snowmelt moving over and through the ground. As the runoff moves, it picks up and carries away natural and human-made pollutants, finally depositing them into lakes, rivers, wetlands, coastal waters and ground waters.”

319 Grant Programs for States and Territories

In 1987, Section 319(h) was added to the federal Clean Water Act. Section 319 established a national program to control nonpoint sources of water pollution. The EPA affords guidance and grant funding to states, territories and tribes to administer state NPS programs. Recipients of Section 319 grant funds must provide a 40 percent match, either in dollars or in-kind services. The graph below shows Section 319 total funding, as reported by the EPA.



Appendix B (Continued)

Additional State Funding

Many states apply significant additional resources to address NPS issues. The EPA's Office of Wetland, Oceans, and Watersheds conducted a National Evaluation of the Clean Water Act Section 319 Program in 2011 that specifically looked at how states leverage additional state funding for NPS issues. The report explained as follows:

Examples of how states obtain and utilize additional resources for implementation of their NPS program include:

- Directly providing legislated state funds (beyond the state's 319 match) for implementation of NPS programs and projects;
- Coordinating NPS program implementation with other state and federal programs such that non-319 funds are directed to NPS projects, including state environmental trust funds, Clean Water State Revolving Fund, and federal land management agencies' programs;
- Providing seed money to support a larger project, such as a public event or the roll-out of a new initiative, where additional (non-319) funds are then used in accordance with NPS program goals and objectives; and
- Working with current or potential 319 project sponsors to identify additional sources of funding for a significant watershed project.

The report goes on to explain:

The primary findings with regard to NPS program leveraging of state funding are: The most common sources of additional state funding are state appropriations for BMP loan or grant programs (often focused on agriculture), state-based environment or natural resources trusts (commonly funded by lottery or license plate fees), state bond initiatives, and state-earned interest, fees or repayment on Clean Water State Revolving Fund (CWSRF) loans.

The EPA evaluation highlighted fifteen states that at least doubled their Section 319 funding by use of other state funding. Those fifteen states along with the source of their additional funding are set forth in the exhibit below:

Appendix B (Continued)

Additional State Funding for State NPS Programs

Maryland

- Soil Conservation and Water Quality Planning Program
- Agricultural Cost-Share program
- Chesapeake and Atlantic Coastal Bays Trust Fund (supported through a gas tax and rental car tax.)

Minnesota

- Voters approved the Clean Water, Land and Legacy Amendment (CWLA) to the State Constitution that increased the sales tax rate by three-eighths of one percent on taxable sales, starting July 1, 2009. Approximately a third of this revenue is being dedicated to a Clean Water Fund (CWF) to protect, enhance, and restore water quality in lakes, rivers, streams, and groundwater, with at least five percent of the fund targeted to protect drinking water sources.
- Clean Water Partnership Fund
- Environment & Natural Resources Trust Fund

North Carolina

- Agriculture Cost Share Program
- Clean Water Management Trust Fund
- Environmental Enhancement Program, and
- Community Conservation Assistance Program

Virginia

- Water Quality Improvement Fund

Pennsylvania

- "Growing Greener" fund

Oregon

- Water Enhancement Board (OWEB) state watershed restoration grant program.

Utah

- Wastewater Loan Program Subaccount – funded through interest from CWSRF
- Agriculture Resource Development Loan program

Florida

- TMDL Water Quality Restoration Grant Program

Wisconsin

- Targeted Runoff Management (TRM) Grant Program
- Agricultural BMP Cost Share program
- Urban NPS and Stormwater Management Grant Program

Kentucky

- Agriculture Water Quality State Cost Share Program

Iowa

- Lakes Restoration Fund
- Watershed Improvement Review Board
- Water Protection Fund
- Watershed Protection Fund
- Publicly Owned Lakes Program, and
- Integrated Farm and Livestock Management Fund

New York

- Agricultural Environmental Management (AEM) Program
- Water Quality Improvement Projects (WQIP) Program

Vermont

- BMP Cost Share Grant Program
- Ecosystem Restoration Program
- Better Backroads Program

Kansas

- Water Plan Fund

Tennessee

- Agricultural Resources Conservation Fund

Source: A National Evaluation of the clean Water Act Section 319 Program, November 2011, US EPA, Office of Wetlands, Oceans, & Watersheds.

Appendix B (Continued)

EPA officials indicated to us that the 2011 national evaluation of the Section 319 program remains the most current information they have regarding the extent to which states are leveraging Section 319 funds with other state funding. They noted that the most significant development in states' NPS funding is their use of state revolving fund monies for nonpoint purposes. This is being done by several states. The Clean Water State Revolving Fund (CWSRF) program is a federal-state partnership that provides communities a permanent, independent source of low-cost financing for a wide range of water quality infrastructure projects. State CWSRF programs provide loans to eligible recipients to:

- construct municipal wastewater facilities,
- *control nonpoint sources of pollution,*
- build decentralized wastewater treatment systems,
- create green infrastructure projects,
- protect estuaries, and
- fund other water quality projects.

[Emphasis added]

While NPS projects were always eligible under CWSRF programs, in 2009, federal funds distributed to states under the American Recovery and Reinvestment Act (ARRA) provided approximately \$4 billion in extra funds that went above and beyond the annual allocation for CWSRF. ARRA established a new CWSRF Green Project Reserve (GPR) requirement, directing states to set aside at least 20 percent of their annual CWSRF allotment for projects with energy efficiency, water efficiency, green infrastructure or other environmentally innovative project components—many of which would fall under the NPS pollution control area. As a result of the ARRA requirements, several of states have made progress expanding CWSRF-eligible projects to include NPS categories.

Example states utilizing CWSRF funds for NPS projects are as follows:

- Minnesota's CWSRF program is highly integrated with its NPS program, providing almost \$15 million in NPS loans in fiscal year (FY) 2010.
- Delaware has developed an Agricultural Non-Point Source Loan Program as part of its CWSRF. Local conservation district planners and NRCS assist agricultural producers with needs assessments and with project planning and design.
- The Maine Forest Service's Division of Forest Policy and Management, the Maine Department of Environmental Protection, and the Maine Municipal Bond Bank have teamed up on the Forestry Direct Link Loan Program, which provides incentive financing to loggers that reduce NPS pollution risk on timber harvests in Maine.

Appendix B (Continued)

- California uses recycled CWSRF investments in NPS projects toward its required match contribution to its CWA section 319 grant from EPA. Because California uses this mechanism to provide the required 40 percent match upfront, the state can be flexible in its match requirements for target groups such as disadvantaged communities.
- Indiana relies on recycled CWSRF funds to meet its federal CWA section 319 grant match obligations.
- South Dakota's Department of Environment and Natural Resources' NPS program has worked with the state's Board of Water and Natural Resources to develop an incentive rate to promote the use of CWSRF funds for NPS projects.
- Some states seek "sponsorships," whereby a publicly owned treatment works agrees to add the cost of a NPS project to its loan in return for a reduced CWSRF interest rate.
 - Ohio's Water Resource Restoration Sponsor Program (WRRSP) provides communities with the opportunity to sponsor NPS projects using the interest savings generated through a below-market-rate POTW project loan.
 - Idaho Department of Environmental Quality's (DEQ) CWSRF "sponsorship agreements," patterned after Ohio's WRRSP, provide funding to NPS projects that have a nexus with the point source community by adjusting either the interest rate charged on wastewater treatment/col-lection facility loans or extended term financing that lowers the annual debt service.
 - Oregon DEQ's "sponsorship option" financing, available for public agencies, allows a watershed restoration project to be funded in con-junction with a community's traditional wastewater project.
- Maryland relies on a linked-deposit mechanism (in addition to direct CWSRF loans) to provide a source of low interest financing to implement NPS capital improvements that will provide safe drinking water and reduce the delivery of nutrients to the Chesapeake Bay and its tributaries.
- The Arkansas Natural Resources Commission (ANRC) provides CWSRF funds to support NPS projects such as building stacking and compost sheds, installing livestock exclusion fences, practices to recover irrigation tail water, and purchasing no-till farming drills.
- Iowa's NPS program staff members in the Department of Natural Resources coordinate with the Iowa CWSRF program and Iowa Department of Agricul-ture, Land and Stewardship (IDALS) to administer the CWSRF program.

Source: Developed by LBFC staff from EPA documents.

Appendix B (Continued)

- California uses recycled CWSRF investments in NPS projects toward its required match contribution to its CWA section 319 grant from EPA. Because California uses this mechanism to provide the required 40 percent match upfront, the state can be flexible in its match requirements for target groups such as disadvantaged communities.
- Indiana relies on recycled CWSRF funds to meet its federal CWA section 319 grant match obligations.
- South Dakota's Department of Environment and Natural Resources' NPS program has worked with the state's Board of Water and Natural Resources to develop an incentive rate to promote the use of CWSRF funds for NPS projects.
- Some states seek "sponsorships," whereby a publicly owned treatment works agrees to add the cost of a NPS project to its loan in return for a reduced CWSRF interest rate.
 - Ohio's Water Resource Restoration Sponsor Program (WRRSP) provides communities with the opportunity to sponsor NPS projects using the interest savings generated through a below-market-rate POTW project loan.
 - Idaho Department of Environmental Quality's (DEQ) CWSRF "sponsorship agreements," patterned after Ohio's WRRSP, provide funding to NPS projects that have a nexus with the point source community by adjusting either the interest rate charged on wastewater treatment/col-lection facility loans or extended term financing that lowers the annual debt service.
 - Oregon DEQ's "sponsorship option" financing, available for public agencies, allows a watershed restoration project to be funded in con-junction with a community's traditional wastewater project.
- Maryland relies on a linked-deposit mechanism (in addition to direct CWSRF loans) to provide a source of low interest financing to implement NPS capital improvements that will provide safe drinking water and reduce the delivery of nutrients to the Chesapeake Bay and its tributaries.
- The Arkansas Natural Resources Commission (ANRC) provides CWSRF funds to support NPS projects such as building stacking and compost sheds, installing livestock exclusion fences, practices to recover irrigation tail water, and purchasing no-till farming drills.
- Iowa's NPS program staff members in the Department of Natural Resources coordinate with the Iowa CWSRF program and Iowa Department of Agricul-ture, Land and Stewardship (IDALS) to administer the CWSRF program.

Source: Developed by LBFC staff from EPA documents.

APPENDIX C

Responses to This Report



Pennsylvania Fish & Boat Commission

EXECUTIVE DIRECTOR
P.O. Box 67000
HARRISBURG, PA 17106-7000
717-705-7801 – 717-705-7802 (FAX)
E-MAIL: JARWAY@STATE.PA.US

June 1, 2018

Patricia A. Berger
Executive Director
Legislative Budget and Finance Committee
PO Box 8737
Harrisburg PA 17105-8737

Dear Ms. Berger:

Thank you for your May 17, 2018 letter and link to a confidential electronic copy of the report titled: *Feasibility of Establishing a Water Use Fee in Pennsylvania* (LBFC Feasibility Study). The Pennsylvania Fish and Boat Commission (PFBC) appreciates the opportunity to review and comment on this draft document, and I accept your invitation to attend the hearing scheduled for June 6, 2018.

The establishment of a water use fee in Pennsylvania has been a professional and personal goal of mine for most of my 38-year career with the Commonwealth. Since becoming executive director of the PFBC in 2010, I have tried to bring attention to this issue and in 2011, I authored an article in the Pennsylvania Angler and Boater Magazine titled: *Highway Robbery* http://www.fishandboat.com/Zone1/Documents/straightTalkDocs/2011_01_02_robbery.pdf. In the article, I called attention to the uses and amounts of water that are withdrawn from Pennsylvania waters. Therefore, on behalf of the Commonwealth's anglers, boaters, fish, aquatic species and citizens, I thank you for a comprehensive LBFC Feasibility Study which examines, in great detail, the sources, uses, withdrawals and possible compensation rates. Your study assembled a significant amount of data and provides excellent material to further inform and engage the public and lawmakers on this important topic.

When water is withdrawn from a Commonwealth stream, lake, river or from beneath the ground's surface and used by man for other purposes, it takes away a certain amount of water from other users. Our Commonwealth's water resources are "the common property of all the people, including generations yet to come. As trustee of these resources, the Commonwealth shall conserve and maintain them for the benefit of all the people." (Section 27, Article 1 of the Pennsylvania Constitution). As perhaps one of the oldest Commonwealth agencies whose original charter was to restore American shad runs to the Susquehanna River and protect native

Our Mission:

www.fishandboat.com

To protect, conserve and enhance the Commonwealth's aquatic resources and provide fishing and boating opportunities.

brook trout from the sediment pollution occurring because of the large-scale logging of our landscape, the PFBC traditionally represents the Commonwealth as the trustee for our fish and aquatic life resources. These are the very resources which provide fishing and boating opportunities for over 1.1 million anglers and over half a million boaters.

Our Commonwealth anglers spend over \$1.2 billion annually in Pennsylvania's economy and have a vested interest in how water is used and regulated since the growing demand for water has the potential to seriously affect the sports of fishing and boating. Water is truly a Commonwealth asset, should be regarded as a commodity of economic value, and not a Commonwealth good which is freely given away. It is important that all people understand the scope and scale of how various water uses and withdrawals impact the environment, as well as the species and humans which rely on water to live. Therefore, I will not be restating the facts you have reported but will provide additional insight as to why compensation for unmitigated impacts should be provided to the Commonwealth and its regulatory and natural resource agencies, so they may act together as trustees of Pennsylvania's most valuable natural resource for present and future generations.

PFBC Authority for Water Quality Protection

Pages 180-181 contain a summary of the PFBC's water resource responsibilities which includes several important activities, but I would like to point out several others. The PFBC's mission is conservation and recreation. We also have law enforcement powers provided by specific legislated authority to protect against disturbance of waterways (30 Pa.C.S. §2502), pollution of waters (30 Pa.C.S. §2504) and regulation of dams for fish passage and safety (30 Pa.C.S. § 3501-3510). During a water pollution event or waterways disturbance, PFBC Waterways Conservation Officers (WCOs) engage in criminal investigations and may seek statutory penalties and restitution of damages to include loss of fish and aquatic life and associated recreational uses.

Prevention and care are more effective tools in protecting the environment than reactively enforcing the law and merely collecting fines and penalties. The fines we collect as an agency are proportionately very small in comparison to the cost of employing a staff of professional law enforcement officers and scientists. The PFBC is responsible for managing over 160 species of fish, 77 species of reptiles and amphibians, 65 species of freshwater mussels, and thousands of taxa of aquatic invertebrates such as mayflies, stoneflies, caddisflies, dragonflies, and crayfish. In addition, the PFBC has statutory and regulatory responsibility for Pennsylvania's endangered, threatened and rare species of fish, reptiles, amphibians and freshwater mussels. Most of these species have a critical need for clean water at some point during their life history.

The PFBC's water quality and aquatic species protection efforts are paid for by revenue received through the sale of fishing licenses, boat registrations and the federal excise tax collected from the sale of fishing and boating equipment. These services, which benefit all Pennsylvanians, are exclusively paid for by the Commonwealth's anglers and boaters. There were approximately 860,000 annual fishing license buyers (an estimated 1.1 million PA anglers) and approximately 300,000 boat registration holders in 2017. Therefore approximately 10% of our 12.8 million residents pay for critical services which benefit all Pennsylvanians.

PFBC staff review and provide comments on a wide range of water quality or quantity permits issued by DEP, the Delaware River Basin Commission (DRBC), the Susquehanna River Basin Commission (SRBC), the US Army Corps of Engineers (USACOE), the Federal Energy Regulatory Committee (FERC) and many local entities in need of a state or federal permit. Our staff comment on potential impacts to all fish and aquatic life resources including wild trout and the recreational benefits that they provide. Specific impacts include but are not limited to fish passage, dissolved oxygen upstream and downstream of dams, thermal impacts of reservoirs, National Pollution Discharge Elimination System (NPDES) permits for coal mining activities, sand and gravel dredging, oil and gas development and a variety of other industrial facilities.

Hydroelectric Power

The LBFC Feasibility Study report identifies hydroelectric power generation as the most significant user of Pennsylvania's water resources. The hydroelectric power industry was estimated to account for 92 percent of total water withdrawals in Pennsylvania. While hydroelectric power has been labeled "clean or green power" due to its low or nonexistent air emissions, its impact on aquatic environments and the species which inhabit our streams, rivers and lakes is significant.

Since 2004, three-of-five lower Susquehanna River hydroelectric power generating facilities (York Haven, Holtwood, Muddy Run Pumped Storage) have been relicensed by the Federal Energy Regulatory Commission (FERC). FERC licensing at the Conowingo Dam, which is located just across the border in Maryland, is anticipated to occur in 2018. Only the Safe Harbor Dam, which is on a different FERC licensing schedule, has not received an updated FERC license recently. Impacts to fish, water quality and aquatic species are similar at each of these facilities. In most cases, it is the scale and size that changes the magnitude of impacts. There are also hydroelectric dams of a smaller scale in western Pennsylvania on mainstem portions of the Three Rivers (Allegheny, Monongahela and Ohio Rivers), Allegheny Reservoir at Kinzua, along the Clarion River and others. Despite extensive agency review and regulatory requirements to minimize impacts from these projects, unmitigated residual impacts occur that not only directly impact Pennsylvania's fisheries but also the anglers and boaters who enjoy them for recreation. The following comments focus on these residual impacts and explain why

compensation for such activities is essential to protecting water quality, aquatic species and the environmental rights of Pennsylvania's citizens consistent with Article 1, Section 27 of the Pennsylvania Constitution.

Hydroelectric dams may be either run-of-river or peaking. Run-of-river dams pose less aquatic impacts than peaking projects since peaking dams fluctuate water flows, often very dramatically, to provide on-demand power generation. Dams block upstream and downstream fish migration, in-river movement between spawning and foraging areas, and produce acute and delayed mortality from turbine blade strikes when fish are pulled into dams during generation. The PFBC was originally created by the General Assembly in 1866 to restore the runs of American shad to the Susquehanna River because the Columbia Dam at Wrightsville was blocking upstream migration. Since that time many other dams have been built to generate electricity making this original challenge almost impossible to meet.

A long-standing concern about power dams is the establishment and maintenance of minimum flows. Since water is "fuel" to run a hydroelectric plant, an operator typically tries to use every drop of water and run it through a power generating turbine, if possible, to maximize profits. The PFBC and other natural resource agencies work hard to obtain minimum flows that provide life sustaining flows for aquatic species which live upstream and downstream of these facilities. Water discharged through a dam from an impounded pool upstream often contains low levels of dissolved oxygen. If released improperly and without aeration, the levels may be low enough to kill aquatic life or alter behavior in the impacted zone. Furthermore, changing a free-flowing river to a lake or series of lakes dramatically changes the ecological functions of that water body. In addition, changing a river to a lake increases the amount of evaporative loss of water. A recent study reported that over one million man-made dams around the world have been determined to be major sources of global greenhouse gases emitting nearly a billion tons of annual carbon dioxide equivalents (Liess, et al. 2016). Neither the ecological, evaporative loss of water nor the additional production of greenhouse gases (methane, carbon dioxide and nitrous oxide) are mitigated as part of current permitting process.

Peaking, which is alternating between minimum flow releases and very high flow releases on a daily or sub-daily basis, flushes out aquatic invertebrates and can compact and harden river substrates such that aquatic insect and macroinvertebrate diversity plummets. Interstitial spaces between rocks are filled in, and areas to colonize are eliminated. Unnatural levels of predation by predator fishes, fish-eating birds and mammals often results when flows, turbine-injured fishes, and reduced natural foraging opportunities align downstream of a dam. Upstream of a peaking dam, impoundment water levels fluctuate within a certain range from inches to multiple feet. This is especially harmful to the spawning activities of fish, as they may move into an area to spawn and within a day or less the recently deposited eggs are dewatered. Consequently, the PFBC may need to spend angler license funds on stocking sportfish to

augment fish populations impacted by degraded spawning habitat. In addition, aquatic vegetation is limited, which impacts not only fish but waterfowl, amphibians, reptiles and other aquatic species.

Finally, the nature of hydroelectric power generation is that it can provide large inputs of power to the grid in a short period of time. Power demands are greatest during the hottest days of summer, when river flows are typically at their lowest, and again in the coldest periods of winter when flows are often low, or water temperatures are very cold. Drastic flow changes during stressful periods greatly reduce aquatic life diversity and abundance. While FERC licenses commonly include permit conditions and certain environmental standards, those licenses are typically issued for between 30 and 50 years. A water use fee at the state level would presumably be adjusted over time based on usage, inflation and other factors. A usage-based fee would also cause hydroelectric power companies to more carefully consider flow and frequency needs to meet customer demand. Other than satisfying a minimum flow standard in their FERC license, there are no economic incentives for a company to optimize and minimize water usage. Collecting such a fee and providing a portion to natural resource agencies, including the PFBC, would ensure continued vigilance and oversight of these most significant water users.

Impingement and Entrainment

As water is withdrawn from a river, stream or impoundment, fish are often drawn in as well. Impingement (being trapped on a screen or fence of mesh at an intake) and entrainment (being moved through an intake system or discharge) kills millions of fish in Pennsylvania each year. Some facilities can be fitted with travelling screen devices or have low intake velocities which may eliminate or greatly reduce entrainment and impingement. In other cases, such as pumped storage hydroelectric facilities, nuclear plants with cooling water towers, and hydroelectric dams, operating flow velocities and infrastructure do not allow placement of mitigative devices. In these cases, the losses cannot be mitigated, and therefore cannot be fully compensated. In some cases, DEP, with technical support from the PFBC, has been able to negotiate mitigation payments to partially offset the aquatic species losses. However, the estimates for those calculations are conventionally underestimated since the scale of the problem in many cases is so large that, the compensatory mitigation costs would be unrealistic. In these cases, it would be reasonable to require a water withdrawal or use fee to supplement negotiated mitigation arrangements to attempt to make the Commonwealth whole for the harm being caused.

Despite the licensing and permitting requirements that are applied to hydro projects, impacts continue to occur that are unmitigated and negatively impact the Commonwealth's aquatic resources and Pennsylvania anglers and boaters.

Invasive Species

Water usage, particularly water transfers, can facilitate and accelerate the spread of harmful aquatic species. A well-known case in Pennsylvania a few years ago was a 30 mile-long fishkill on Dunkard Creek, Greene County. Water withdrawals, mining discharges, and interstate movement of contaminated equipment all played a role in this environmental disaster. Mine water discharges containing elevated saline levels created environmental conditions suitable for the survival of a toxic golden algae. It is believed the golden algae was transported on mining equipment from Texas. When the correct salinity aligned with the presence of a non-native toxic algae, conditions were right for a major fishkill. This example demonstrates the potential impacts and costs to state agencies, such as the PFBC, who must investigate the kill, collect evidentiary results, produce a defensible damage assessment claim, and then litigate that claim in court. In this case, the PFBC hired outside counsel to represent the Commonwealth and litigate the case in the Supreme Court of West Virginia. Fortunately, the Commonwealth prevailed and secured a victory for the fish, amphibians, aquatic invertebrates and all Pennsylvanians. There are tangible environmental costs associated with removal and use of the Commonwealth's waters, and a usage fee is an appropriate way to begin to account for some of those impacts.

Consumptive Use and Bottled Water

Of all the potential consumptive uses of water, perhaps the most intriguing is water withdrawals for bottled water. A recent proposal in Centre County brought this issue to light for residents and Pennsylvania citizens at large. Ultimately, the bottled water company decided not to seek a groundwater withdrawal permit and permits to develop a bottling facility. It was reported in the media that a local water authority was prepared to sell water to a bottling company at the same rate as its residential customers. Among the many concerns about a variety of environmental impacts, increased truck traffic and other community impacts, the public seemed most concerned that a private, for-profit industry would be able to buy water at the same price as residential users and then bottle and sell it at a significant profit. This example suggests that the public may be ready for a water use fee that considers how the water will be used and adjusts that fee based on the commercial or public sector.

The PFBC was most interested in the proposed Centre County project because of the potential impacts to Logan Branch, a Class A wild trout stream and its receiving water, Spring Creek, which is also Class A and supports the highest density of wild brown trout in Pennsylvania. In this case, water withdrawals could have impacted both the public and fish in a nearby destination fishery that adds economic benefits to the Centre Region. Although only two levels of fee structure were analyzed, as the legislative process moves forward, perhaps there should be consideration of one or more additional fee levels. Although there are for-profit

entities in both the bottled water industry and the electric power generation industry, power generation is considered a public utility, while a bottled water company typically is not. Perhaps there should be a fee structure which recognizes that distinction and assigns a value to the water based on its public benefit, environmental impacts and private profits.

Withdrawal Permit Minimum Thresholds

Watershed size, water source volume, and worst-case flow rates should be considered when determining the minimum threshold for withdrawal permits. For example, exempting a fee to withdraw 10,000 gpd from the mainstem of the Susquehanna River may be reasonable due to the low percentage of the total river flow (and presumably lower impacts) that amount represents. However, in a small watershed with a high-quality stream, a withdrawal of less than 10,000 gpd could be significant and result in a higher relative impact to that watershed, aquatic species and habitats. Perhaps there could be a sliding scale developed to take into consideration the unique nature of a watershed, stream or aquifer, rather than programmatically allowing those withdrawals to occur without fees. Likewise, consideration should be given to ensuring that an applicant or user cannot combine multiple water withdrawal points by maintaining them each at less than the 10,000 gpd, threshold thereby avoiding the fees but in fact obtaining water at a level by which significant environmental impacts could occur.

Industrial Waste

Degradation of the Commonwealth's surface and ground waters is legally permitted by PA DEP through an NPDES permit which prevents pollution but allows for certain levels of degradation. Although NPDES permits attempt to minimize impacts to water users, including fish, aquatic life and recreational users downstream of permitted discharges, contaminants are typically individually regulated based upon their suspected toxicity to people or fish as prescribed in 25 PA Code Chapter 93. Very little is understood about the cumulative impacts of a variety of chemicals that are discharged from thousands of permitted industrial waste discharges throughout the Commonwealth. This places fish and aquatic life at risk of harm due to cumulative impacts from multiple chemicals that can act together additively or synergistically. As water gets diverted to other uses, there becomes less and less available in streams and rivers for dilution and assimilation which compounds the risks to people and fish.

1. Mining

The PFBC has been involved in the review of permits, enforcement of discharges, spills, erosion and sedimentation violations, etc. in coal, sand and gravel and limestone mining for many decades. Much time and effort has been spent in the coal fields working with

mining companies, DEP and other state and federal agencies to protect our waterways. Mining of minerals located below the groundwater elevations can reduce surface flows and change natural flow characteristics of receiving streams. Exposure of minerals to the atmosphere and water leads to oxidation, which alters water chemistry and impacts aquatic habitats and species. Chronic and acute exposure to compounds produced by mining can limit species abundance and diversity and, in the most extreme cases, completely kill all aquatic life. Limestone and sand and gravel quarries may beneficially raise the alkalinity of receiving waters due to product washing operations; however, in recent years and especially during drought conditions, quarry operations in several Pennsylvania locations have been implicated in the formation of sinkholes, stream sections drying up, and a significant reduction of stream flows due to groundwater intrusions.

Many quarries must pump water out of the mining area to provide safe access to the material. When discharged to a receiving stream, these activities may create an unnatural flow regime. Dissolved and suspended sediments are often discharged to the receiving water and although temperature and flow may be considered beneficial, abnormally high concentrations of particles which are introduced to the stream may cause a decline in invertebrate diversity and abundance. In most cases, water used in mining operations is used and returned but in an altered condition.

2. Oil and Gas Extraction

The Pennsylvania oil and gas industry has been involved in conventional oil and natural gas production for over 100 years. Hydraulic fracturing (fracking) continues to be used to stimulate and enhance the production of oil and gas by introducing water under pressure to create small fractures in the producing formations. More recently, unconventional, deep well natural gas production has emerged on the Pennsylvania landscape. The fracking of deep wells requires larger quantities of water to fracture open shale formations than is typically required in the fracking of shallow wells. Surface water withdrawals for both conventional and unconventional extraction of natural gas may impact aquatic communities of small first and second order streams by reducing the quantity and quality of aquatic habitats which reduces the abundance of animals which can live there. These losses are not mitigated for during the permit process.

Surface water withdrawals also impinge and entrain aquatic organisms resulting in increased mortality of fish, amphibians, freshwater mussels and other aquatic organisms. Due to the intermittent use of these facilities, impingement and entrainment mortality is minor at single withdrawal sites as compared to hydroelectric or thermoelectric generation sectors, which withdraw tremendous volumes of water continuously. However, there are cumulative impacts, as the number of low volume, intermittent,

surface water withdrawal facilities far outnumber those used for electric generation. Impingement and entrainment is often partially mitigated at these larger projects, but mitigation is not required at water withdrawal sites associated with oil or natural gas fracking.

A typical deep natural gas well can use millions of gallons of water in an average frack. Water used in fracking operations is consumptively used as it is injected into shallow and deep shale formations and will remain unavailable to the surface or ground water cycle for an undetermined length of time, perhaps forever. This may contribute to lowering of the water table and reducing baseflows of local streams which ultimately impact on surface water temperature and discharge. Although there are other methods of creating the necessary pressures to frack oil and gas wells including a variety of natural gases, water continues to be used because it is freely provided by the Commonwealth without just compensation. No mitigation is provided for potential inimical impacts to water quality or quantity.

Flow back or produced water which could be considered “water used and returned” contains elevated levels of many chemical constituents considered to be pollutants of surface waters including a suite of metals and chlorides, bromide, strontium and radium. If not treated properly, discharge of produced water could significantly impair surface waters, resulting in impacts to Commonwealth resources placed in trust of the PFBC. Provided the developer meets the discharge requirements required in the PA DEP’s National Pollutant Discharge Elimination permit, no mitigation is required, even if established limits are not protective of the most sensitive aquatic life forms (e.g. freshwater mussels and salinity, Warren Brine Treatment Facility on the Allegheny River). The previous discussion about the permitting of degradation by PA DEP for all NPDES permits also applies to those issued for the discharge of treated oil and gas wastewaters. A water use fee would at least begin to address these unmitigated impacts.

Thermal Impacts

Thermal impacts result when water is warmed to temperatures above the ambient, natural condition. Water temperatures can be raised during circulation through cooling towers or systems, via transport through pipelines, exposure to sunlight in storage tanks or holding ponds, and during wastewater treatment processes. Manufacturing uses may also increase water temperatures so that even if it is a non-consumptive use, the water’s physical characteristics have been altered. Long term changes to stream temperatures result in a change to the aquatic community, including fish. A wild trout stream can be converted to a warm water stream with a different species complex simply by elevating the ambient water temperature over time. Water temperature regimes that vary from the normal can greatly impact fish and aquatic species

presence, reproduction, foraging and susceptibility to predation and disease. In fact, water temperature is the most significant factor affecting fish population structure, abundance and distribution not only in our Commonwealth but also globally.

Large impoundments created for water storage and hydroelectric usage create additional surface area, allowing thermal heating to occur, which increases evaporation resulting in an unmeasured and unaccounted-for consumptive use. Thermal plumes of water entering a colder river during the winter months will attract fish as their body temperature and metabolism are governed by water temperatures. Once in these warm water refuges, a flow reduction or sudden discontinuance of flows can result in significant fish kills. This has happened repeatedly on the Susquehanna River at the Brunner Island Generating Station. While fines have been assessed, the nature of a fish kill assessment and an inability to count every fish and fully determine the impact of delayed mortality leads to settlements that do not truly account for the loss to the fishery and the public. Thus, a use-based fee is an appropriate means to recoup losses and to fund assessment and enforcement work.

Stream Habitat Improvement

The PFBC is the leader in Pennsylvania for the design, partnership, coordination and implementation of instream habitat and streamside habitat improvement projects. A major focus of these projects occurs in farmland, where agricultural practices have resulted in reduced riparian buffers and livestock in the streams, which cause increases in nitrogen, phosphorus and sediment. As noted in the LBFC Feasibility Study, the PFBC's Save Our Susquehanna project aims to improve water quality and reduce nutrient and sediment pollution via donated funds by anglers and concerned citizens. The study clearly exempts agriculture from water use fees, and in fact reports a relatively low impact for consumptive and non-consumptive uses. However, farming practices which result in trampled banks, increased sediment and erosion and elevated nutrient levels confirm that agriculture causes impacts to water. One has to look no further than the problems identified in the Chesapeake Bay being traced back from the Susquehanna River and its tributaries to Pennsylvania farmlands. Commonwealth water that flows through a farm which does not employ best management practices, becomes degraded and oftentimes creates polluted runoff that includes unused fertilizer, pesticides, herbicides and animal waste. DEP estimates of nutrient loading to the Chesapeake Bay indicate that more than 80 percent of Pennsylvania's nutrient inputs originate from nonpoint sources, farmland being the primary one of these sources.

Pennsylvania has been ranked #1 in the U.S. for dam removals for the last 14 years. Unwanted dams and those which no longer serve their intended purpose are removed in coordination with the PFBC's dam removal/fish passage program specialist. Because there are minimal dedicated funds for these projects, staff must find grants and willing partners for each

project. If a dam is abandoned and no owner can be located, these structures become the responsibility of the Commonwealth, which by default becomes the owner. There are thousands of dams in Pennsylvania which could be removed to benefit fish, aquatic life and public safety. The PFBC is required to identify and ensure that dangerous dams have proper signage and are posted with upstream and downstream “no entry” and “warning” signs. This important public service is currently funded by angler and boater dollars but benefits all citizens of Pennsylvania.

Recently, a tragedy occurred at the Dock Street Dam in Harrisburg where several family members perished due to the dangers of a low head dam. Accurately referred to as “drowning machines” because of their deadly hydraulics, Pennsylvania has thousands of low head dams. Water use fees applied to those dam owners would be a proper way to recognize the risk they pose and to provide an incentive for removal. With funding provided by a water use fee, the PFBC would be able to increase its efforts to either make these dams safer or remove them.

Additional Considerations

In Centre County, the University Area Joint Authority (UAJA) operates a unique, beneficial use waste water treatment facility. The UAJA serves State College and several surrounding communities. Wastewater is treated at the plant to higher than drinking water standards and is sent through a pipeline to several industrial water users. A minimum flow, in addition to any excess water, is discharged into a wetland which enters the headwaters of Slab Cabin Run, a wild trout stream. In this case, UAJA has developed a unique system aimed at conserving water and recycling it to provide for residential, industrial and environmental uses. By recognizing the value of water, our hope would be that a fee structure can be developed to incentivize other municipalities to take a similar approach.

Exhibits #3, 5, and 7 of the LBFC Feasibility Study were very informative. They are Pennsylvania maps showing county lines with surface, groundwater and total water withdrawals by county. Exhibit #3 depicts total water withdrawals. Exhibit #5 shows total surface water withdrawals, and Exhibit #7 shows total groundwater withdrawals. As noted in the study, York and Lancaster counties lead the state in total water withdrawals which is highly influenced by the presence of multiple nuclear, hydroelectric, coal-fired and pumped storage facilities. In a similar vein, Clarion and Armstrong Counties with multiple power plants and some hydroelectric facilities were also ranked high for total water withdrawals. A concentration of large withdrawals in a limited geographic area may compound the impacts of water use and withdrawal. Most interesting was the identification of Centre County as the location with the highest (nearly 35 million gpd) groundwater withdrawal total in Pennsylvania. Counties with the most groundwater usage are closely linked to those counties with abundant limestone springs and aquifers. These counties also line up with most of the Commonwealth’s most popular and highest quality wild trout streams. This raises two important points. First, although these areas

have abundant groundwater resources, that also makes them a target for additional withdrawals. Second, abundant groundwater, especially in the form of springs, provides ideal wild trout habitat, which places those streams and habitats at a higher risk.

Wild trout not only provide important recreational opportunities and economic benefits, they are also a primary indicator of good water quality. Identifying wild trout waters and protecting them means that the cold, high quality water they need to survive is also protected. Unpolluted headwaters and tributaries containing trout are often sources of public drinking water. Public drinking water intakes further down the watershed benefit from high quality waters existing upstream. Protecting wild trout and the waters they inhabit helps protect drinking water for many Pennsylvanians.

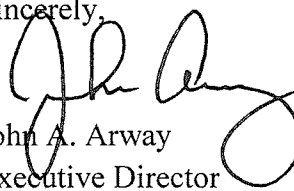
Funding for the PFBC through the proposed water withdrawal and use fee is justified as there is a need for vigilance, project and permit review, and consultation to ensure that these unique groundwater resources are not misused or overused and that wild trout waters are protected. Although there is no mention of it in the study or existing legislation, a portion of the funds received through this proposed program should be set aside to ensure that necessary studies are performed to develop groundwater usage budgets in advance of water withdrawal requests rather than after the requests come in. We have to look no further than southeastern Pennsylvania where the demand for water has exceeded the supply and required DEP to establish groundwater protection zones and ration the amount of water used much like in the western United States.

In summary, the PFBC has many responsibilities as the Commonwealth agency with trusteeship for fish and aquatic life interests. In large part, our agency efforts are funded through fishing license and boat registration fees. The prospect that a water use fee in Pennsylvania is being studied and seriously discussed is a very encouraging sign for the future. I urge those who read the LBFC Feasibility Study to use it in the development of necessary legislation and consider additional refinements which address the complexities of how water is used and how it impacts public uses and the aquatic environment and associated public recreational uses.

The PFBC has always performed many services for the benefit of the entire Commonwealth using the funds provided by anglers and boaters. Over time, some challenges have changed the way priorities are set and funds are used for various programs to fulfill the agency mission of protecting, managing and enhancing the Commonwealth's aquatic resources and providing fishing and boating opportunities. Anglers and boaters cannot continue be expected to pay for the extra services that benefit all Commonwealth citizens. Water is one of our most precious resources and we have reached the point in time where we must recognize its' property value much like society has for other natural resources like timber, sand and gravel,

limestone, coal, oil and natural gas and seek appropriate compensation since the Commonwealth is the trustee of the people's property. We appreciate the acknowledgement of the PFBC's role in the water use fee conversation and stand ready to provide our agencies' assistance and expertise as this process moves forward. Thank you again for the opportunity to review and comment on the Feasibility Study.

Sincerely,



John A. Arway
Executive Director

Liess, Matthias, Kaarina Foit, Saskia Knillman, Ralf B. Schafer, and Hans-Dieter Leiss. 2016. "Predicting the Synergy of Multiple Stress Effects." Scientific reports 6:32965. Doi: 10.1038/srep32965.

June 4, 2018

Ms. Patricia A. Berger
Executive Director
Legislative Budget and Finance Committee
Finance Building
613 North St., Room 400
Harrisburg, PA 17105

Dear Ms. Berger:

Thank you for providing the draft copy of the “Feasibility of Establishing a Water Use Fee in Pennsylvania” for the Department of Environmental Protection’s (DEP) review. As a result of this review, DEP has the following comments specific to the technical portion of the report:

- On page 2 in the Methodology section, the report relies on consumptive use coefficients to estimate consumptive use. It is worth noting that other methods are available for estimating consumptive use, such as the balancing equation method using data collected by DEP’s water use program in accordance with 25 *Pa Code* Chapter 110. The overall estimates generated by either method would produce comparable results at a statewide scale. However, in cases where the number of facilities is small, the coefficient method is less likely to produce accurate results.
- The water use figures provided in the report correctly reflect the water use data collected by DEP for calendar year 2015. However, DEP routinely maintains the data, and any summaries of this data may change over time as overdue reports are submitted and existing reports are corrected.

If you have any questions regarding this comment, please contact Michael Hill by e-mail at mihill@pa.gov, or by telephone at 717.787.0630.

Sincerely,



Patrick McDonnell
Secretary

Secretary

cc: R. Ziadeh
T. Schaeffer
J. Shirley
S. Clark
J. Orr
M. Hill
H. Reim