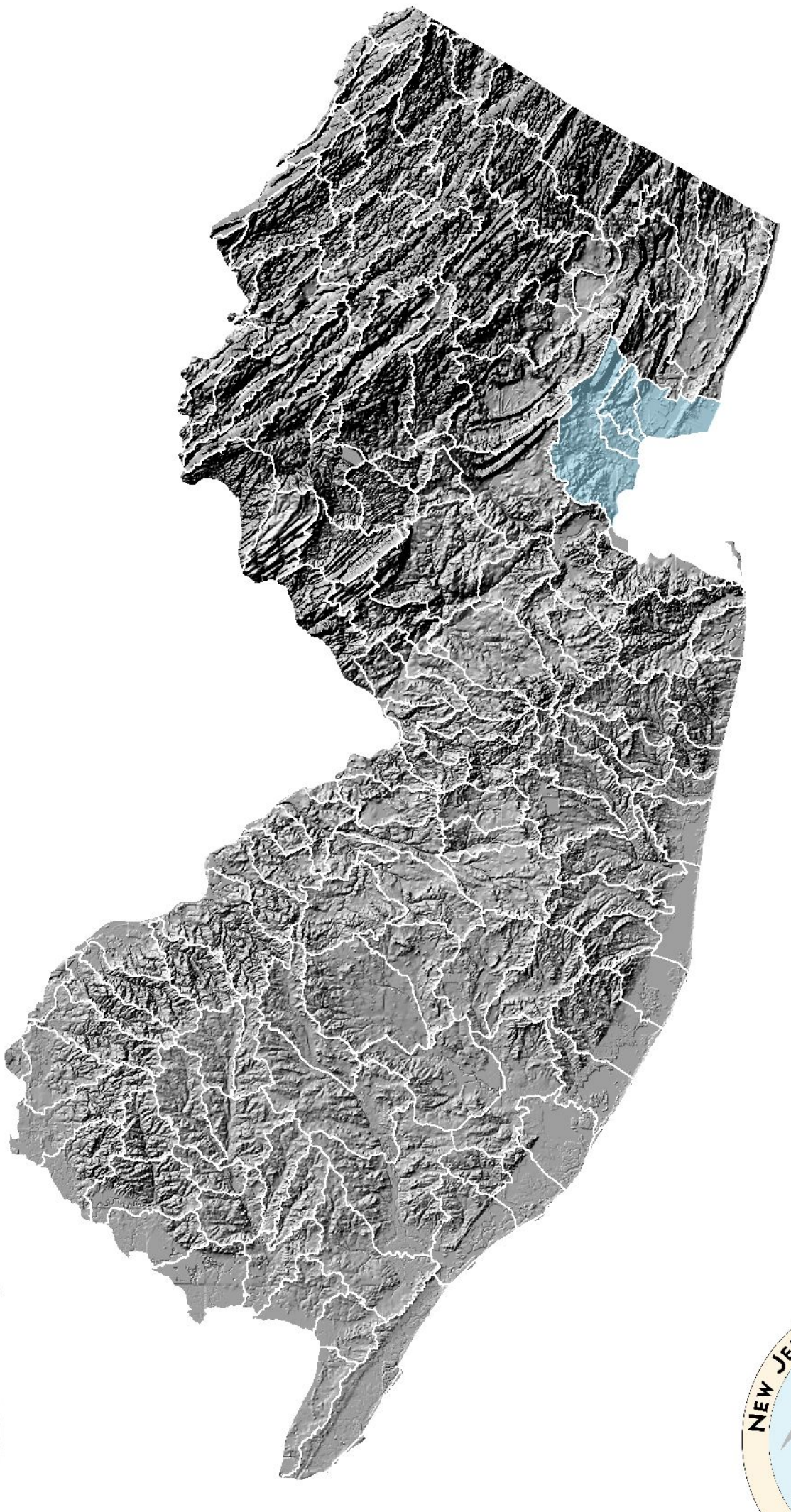
New Jersey Water Withdrawals, Uses, Transfers, and Discharges by HUC11, 1990 to 1999

Appendix 7: HUC11 Tables, Figures and Maps
WMA 7 - Arthur Kill



Let's protect our earth

NEW JERSEY DEPARTMENT
OF ENVIRONMENTAL PROTECTION

Water Withdrawals, Transfers and Discharges for NEWARK BAY / KILL VAN KULL / UPR NY BAY --- 02030104010

WMA:	**Arthur Kill**	**07**
HUC11:	**Newark Bay / Kill Van Kull / Upr NY Bay**	**02030104010**

Table 1. Freshwater[1] Withdrawals in the HUC11 (millions of gallons)

Withdrawals (Q)	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	average
surface water:[2]											
Delaware River	0	0	0	0	0	0	0	0	0	0	0
other	0	0	0	0	0	0	0	10	17	20	5
sum	0	0	0	0	0	0	0	10	17	20	5
ground-water:[3]											
confined	0	0	0	0	0	0	0	0	0	0	0
unconfined	20	11	11	17	15	114	134	136	154	201	81
sum	20	11	11	17	15	114	134	136	154	201	81
total withdrawals:	20	11	11	17	15	114	134	146	171	221	86

Table 2. Freshwater Imports To & Exports From the HUC11 (millions of gallons)

imports[11]	27,726	29,075	26,493	26,431	27,601	25,226	25,932	24,377	26,581	25,318	26,476
exports[11]	38	6	11	69	7	75	278	458	460	354	176
net	27,688	29,069	26,482	26,362	27,594	25,151	25,653	23,919	26,121	24,963	26,300

Fig 1. Average Source of Fresh Water

Fig 2. Average Destination of Fresh Water

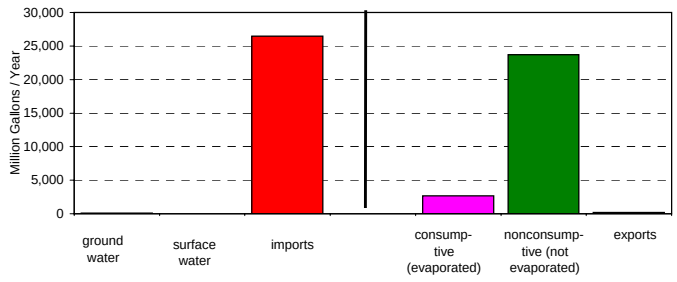


Table 3. Nonconsumptive[4] & Consumptive[5] Water Use[6] in the HUC11, by Use Type (millions of gallons)

Water use	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	average
potable purveyors											
nonconsumptive	24,870	26,092	23,868	23,716	24,749	22,607	23,080	21,338	23,458	22,409	23,619
consumptive	2,818	2,977	2,614	2,647	2,845	2,544	2,573	2,582	2,663	2,554	2,682
domestic wells											
nonconsumptive	6	6	6	6	6	6	6	6	6	6	6
consumptive	1	1	1	1	1	1	1	1	1	1	1
industrial & commercial & mining											
nonconsumptive	12	4	4	9	8	96	115	116	132	174	67
consumptive	1	0	0	1	1	11	13	13	15	19	7
agricultural & non-agricultural irrigation											
nonconsumptive	0	0	0	0	0	0	0	1	2	2	0
consumptive	0	0	0	0	0	0	0	9	15	18	4
power generation											
nonconsumptive	0	0	0	0	0	0	0	0	0	0	0
consumptive	0	0	0	0	0	0	0	0	0	0	0
SUM:											
nonconsumptive	24,888	26,102	23,878	23,731	24,763	22,709	23,201	21,461	23,598	22,591	23,692
consumptive	2,820	2,978	2,615	2,648	2,846	2,555	2,587	2,605	2,694	2,593	2,694
PERCENTAGES:											
nonconsumptive	89.8%	89.8%	90.1%	90.0%	89.7%	89.9%	90.0%	89.2%	89.8%	89.7%	89.8%
consumptive	10.2%	10.2%	9.9%	10.0%	10.3%	10.1%	10.0%	10.8%	10.2%	10.3%	10.2%

Figure 3. Consumptive & Nonconsumptive Use

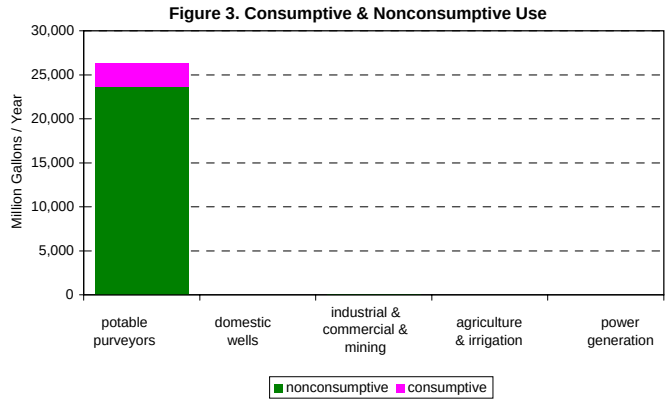


Table 4. Average Seasonal[7] Use - Nonconsumptive[4] & Consumptive[5] (millions of gallons)

Use Group	Winter		Spring		Summer		Fall		Yearly Avg.	
	Noncon-sumptive	Consump-tive	Noncon-sumptive	Consump-tive	Noncon-sumptive	Consump-tive	Noncon-sumptive	Consump-tive	Noncon-sumptive	Consump-tive
potable purveyors	6,412	0	6,144	391	5,161	1,787	5,902	504	23,619	2,682
domestic wells	1	0	1	0	2	1	1	0	6	1
industrial & commercial & mining	15	2	16	2	19	2	17	2	67	7
agricultural & non-agricultural irrig.	0	0	0	1	0	3	0	1	0	4
power generation	0	0	0	0	0	0	0	0	0	0
SUM:	6,428	2	6,162	393	5,182	1,793	5,921	507	23,692	2,694

Figure 4. Average Seasonal Consumptive Water Loss, by Use

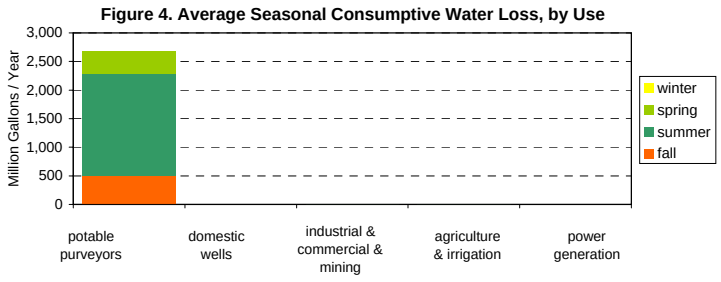


Table 5. Sewage Generation & Transfers[8] in the HUC11 (millions of gallons)

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	average
generated in HUC11	23,294	22,430	20,699	21,804	21,953	19,995	22,468	21,060	21,483	20,388	21,557
imported to HUC11	89,166	88,300	81,670	85,800	86,044	79,365	88,251	83,165	84,811	80,403	84,697
exported from HUC11	2,730	2,768	2,415	2,798	2,906	2,421	2,934	2,648	2,712	2,587	2,692

Table 6. Destination of Treated Effluent (Reclaimed-Water) Discharges[9] in the HUC11 (millions of gallons)

destination	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	average
fresh water	0	0	0	0	0	0	0	0	0	0	0
brackish water	108,872	107,814	99,719	104,762	105,060	96,905	107,755	101,544	103,554	98,172	103,416
salt water	205	148	234	44	30	34	31	33	27	32	82
sum:	109,077	107,962	99,953	104,806	105,090	96,939	107,786	101,577	103,581	98,204	103,498

Figure 5. Average Sewage Generation & Transfers

Fig 6. Average Treated-Effluent Discharge Location

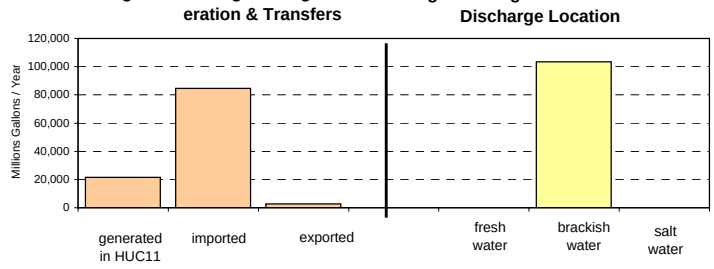


Table 7. 1999 Water Allocations[10] in HUC11 by Water Source

Water Source	MGY
surface water	18
ground water	220
total	238

Table 8. 1999 Water Allocations[10] in HUC11 by Water Use Group

Use Group	MGY
agricultural	0
commercial	0
industrial	183
irrigation	55
mining	0
potable supply	0
power generation	0
total	238

Table 9. HUC11 Descriptive Statistics

--- Area:

in this HUC11 only	43.6	sq. mi.
upstream HUC11s	923.8	sq. mi.
total watershed	967.4	sq. mi.
(this HUC11 onshore area:	31.1	sq. mi.)

--- Population of this HUC11:

Year	Population	Change	
1940	474,088	-	
1950	477,756	0.8%	
1960	446,269	-6.6%	
1970	430,050	-3.6%	
1980	378,183	-12.1%	
1990	350,723	-7.3%	
2000	360,631	2.8%	
2010	383,044	6.2%	est.[12]
2020	412,390	7.7%	est.[12]
2030	437,592	6.1%	est.[12]

--- Land Use of this HUC11:

Type	Year		Change
	1986	1995	
ag.	0.0%	0.0%	0.0%
barren	2.9%	0.5%	-2.4%
forest	4.5%	5.7%	1.3%
urban	61.3%	62.9%	1.5%
water	29.2%	29.2%	0.0%
wetlands	2.0%	1.7%	-0.4%

--- % of this HUC11 in:

Pinelands:	0.0%
Highlands:	0.0%

Table 10. Upstream and downstream HUC11s (in NJ)

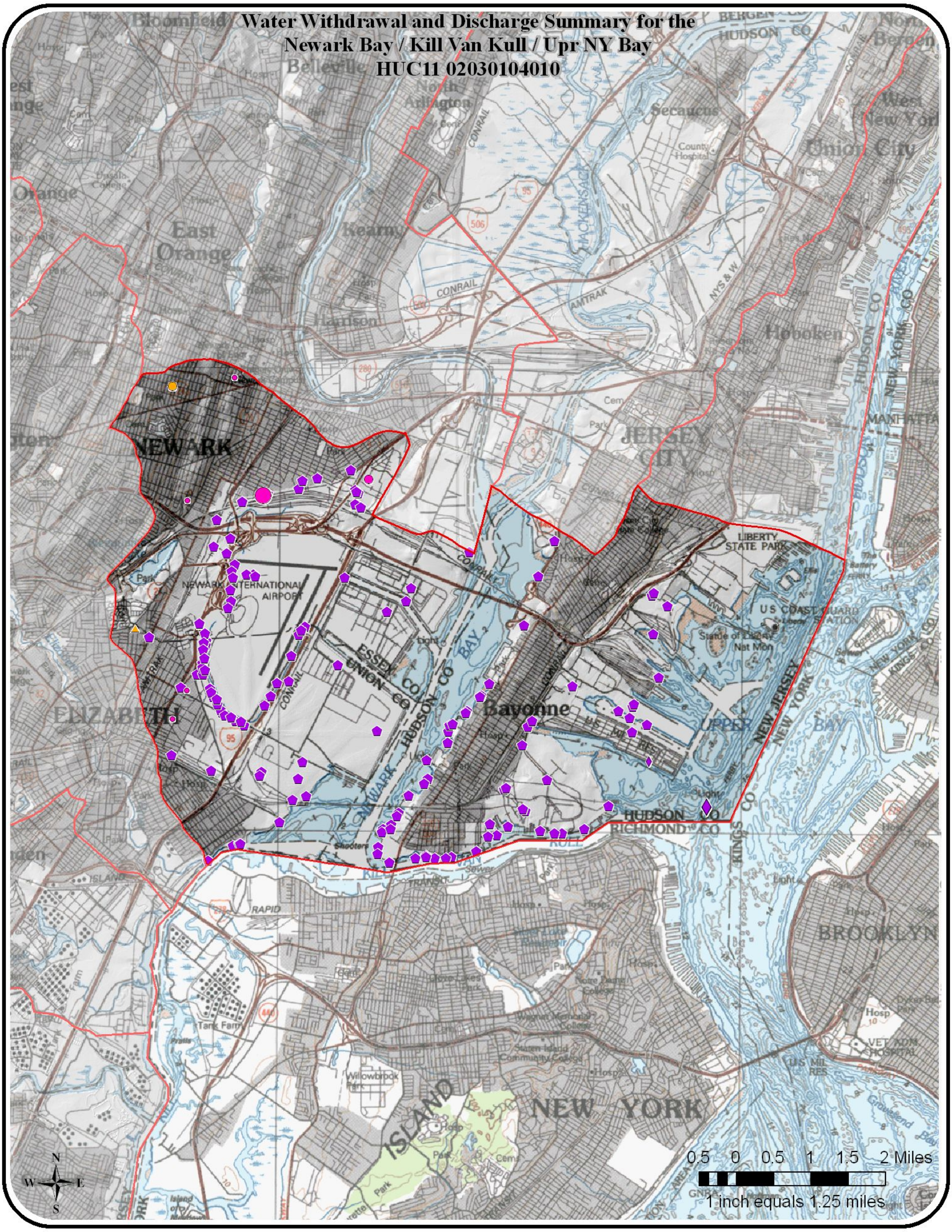
location	#	name
downstream:	#N/A	#N/A
(if any)		
upstream:	02030103010	Passaic River Upr (above Pine Bk)
(if any)	02030103020	Whippany River
	02030103030	Rockaway River
	02030103040	Passaic River Upr (Pompton to Pine Bk)
	02030103050	Pequannock River
	02030103070	Wanaque River
	02030103100	Ramapo River
	02030103110	Pompton River
	02030103120	Passaic River Lower (Saddle to Pompton)
	02030103140	Saddle River
	02030103150	Passaic River Lower (Nwk Bay to Saddle)
	02030103170	Hackensack R (above Hirshfeld Brook)
	02030103180	Hackensack R (below/incl Hirshfeld Bk)
	--	--
	--	--

Figure 7. Net Transfers

NOTES:

1 Salt and brackish water withdrawal and use is not included in this data.
2 This does not account for water released from onstream reservoirs for downstream intakes.
3 Includes both permitted ground-water withdrawals and estimated domestic well withdrawals.
4 Nonconsumptive water use refers to water used in the watershed but not evaporated.
5 Consumptive water use refers to water evaporated in the watershed. It does not include exports.
6 Use refers only to water actually used in that HUC11. It is equal to freshwater withdrawals + imports - exports.
7 Winter is Jan, Feb, Dec of the same year; spring is March-May; summer is June-Aug; fall is Sept-Nov.
8 Sewage generation and transfers are based on intersection of sewer service areas with HUC11s.
9 Based on discharge volumes reported under NJPDES program.
10 The allocated volume is calculated from allocation permits on file with the Bureau of Water Allocation, NJDEP, as of 1999.
11 Import and export volumes based on reported transfers between purveyors and on intersection of purveyor service areas with HUC11s.
12 Projected population estimates based on NJ Metropolitan Planning Organization estimates.
13 Subject to revision.
14 Withdrawals for offstream reservoirs are problematic and complicate Figures 1 and 2.

Water Withdrawal and Discharge Summary for the Newark Bay / Kill Van Kull / Upr NY Bay HUC11 02030104010



Key for Discharge Data

1999 Treated Effluent Discharge		
0 - 50	MGY	♦
50 - 100	MGY	♦
100 - 500	MGY	♦
> 500	MGY	♦
Other Permitted Discharge		⬟

Key for Withdrawal Data

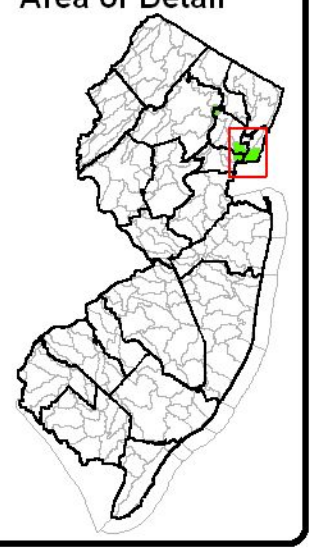
Source	
GW Confined	□
GW Unconfined	○
SW	△

1999 Withdrawal		
No 1999 Use		■●▲
1 - 50	MGY	■●▲
51 - 100	MGY	■●▲
101 - 500	MGY	■●▲
> 500	MGY	■●▲

MGY = millions of gallons per year

Use Group	
Agricultural	
Commercial	
Industrial	
Irrigation	
Mining	
Not Classified	
Potable Supply	
Power Generation	

Area of Detail



Water Withdrawals, Transfers and Discharges for ELIZABETH RIVER --- 02030104020

WMA:	**Arthur Kill**	**07**
HUC11:	**Elizabeth River**	**02030104020**

Table 1. Freshwater[1] Withdrawals in the HUC11 (millions of gallons)

Withdrawals (Q)	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	average
surface water:[2]											
Delaware River	0	0	0	0	0	0	0	0	0	0	0
other	0	0	0	0	0	0	0	0	0	0	0
sum	0	0	0	0	0	0	0	0	0	0	0
ground-water:[3]											
confined	0	0	0	0	0	0	0	0	0	0	0
unconfined	1,044	1,688	1,296	1,405	1,036	1,252	1,105	1,154	989	1,036	1,200
sum	1,044	1,688	1,296	1,405	1,036	1,252	1,105	1,154	989	1,036	1,200
total withdrawals:	1,044	1,688	1,296	1,405	1,036	1,252	1,105	1,154	989	1,036	1,200

Table 2. Freshwater Imports To & Exports From the HUC11 (millions of gallons)

imports[11]	12,888	13,000	12,262	12,542	13,268	12,778	12,683	12,273	13,016	12,678	12,739
exports[11]	1,534	2,166	1,806	1,933	1,616	1,798	1,668	1,699	1,697	1,789	1,771
net	11,353	10,834	10,456	10,609	11,652	10,980	11,015	10,574	11,320	10,888	10,968

Fig 1. Average Source of Fresh Water

Fig 2. Average Destination of Fresh Water

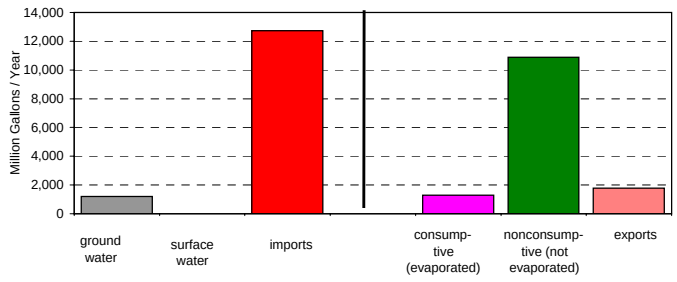


Table 3. Nonconsumptive[4] & Consumptive[5] Water Use[6] in the HUC11, by Use Type (millions of gallons)

Water use	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	average
potable purveyors											
nonconsumptive	10,706	10,848	10,175	10,307	10,923	10,528	10,439	10,078	10,768	10,449	10,522
consumptive	1,175	1,224	1,121	1,211	1,247	1,195	1,173	1,197	1,254	1,226	1,202
domestic wells											
nonconsumptive	4	4	4	4	4	4	4	4	4	4	4
consumptive	1	1	1	1	1	1	1	1	1	1	1
industrial & commercial & mining											
nonconsumptive	430	361	366	388	404	409	414	339	217	180	351
consumptive	48	40	41	43	45	45	46	38	24	20	39
agricultural & non-agricultural irrigation											
nonconsumptive	3	4	5	6	6	5	4	7	4	5	5
consumptive	30	40	41	54	58	46	40	64	37	41	45
power generation											
nonconsumptive	0	0	0	0	0	0	0	0	0	0	0
consumptive	0	0	0	0	0	0	0	0	0	0	0
SUM:											
nonconsumptive	11,143	11,217	10,549	10,705	11,337	10,946	10,861	10,428	10,993	10,636	10,882
consumptive	1,254	1,305	1,203	1,309	1,350	1,287	1,259	1,300	1,316	1,288	1,287
PERCENTAGES:											
nonconsumptive	89.9%	89.6%	89.8%	89.1%	89.4%	89.5%	89.6%	88.9%	89.3%	89.2%	89.4%
consumptive	10.1%	10.4%	10.2%	10.9%	10.6%	10.5%	10.4%	11.1%	10.7%	10.8%	10.6%

Figure 3. Consumptive & Nonconsumptive Use

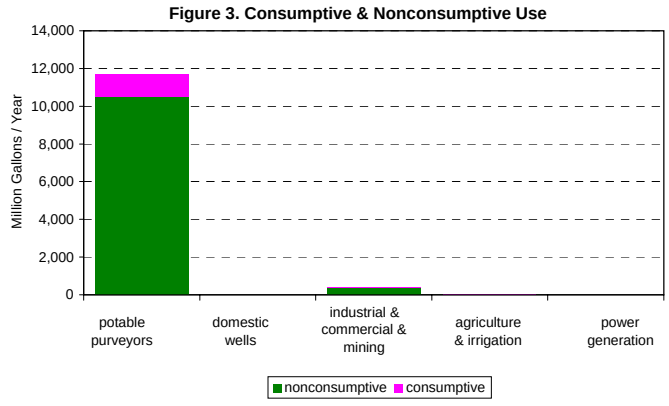


Table 4. Average Seasonal[7] Use - Nonconsumptive[4] & Consumptive[5] (millions of gallons)

Use Group	Winter		Spring		Summer		Fall		Yearly Avg.	
	Noncon-sumptive	Consump-tive	Noncon-sumptive	Consump-tive	Noncon-sumptive	Consump-tive	Noncon-sumptive	Consump-tive	Noncon-sumptive	Consump-tive
potable purveyors	2,851	0	2,748	177	2,325	805	2,598	220	10,522	1,202
domestic wells	1	0	1	0	1	0	1	0	4	1
industrial & commercial & mining	80	9	89	10	93	10	88	10	351	39
agricultural & non-agricultural irrig.	1	6	1	10	2	19	1	10	5	45
power generation	0	0	0	0	0	0	0	0	0	0
SUM:	2,933	15	2,839	197	2,421	835	2,688	240	10,882	1,287

Figure 4. Average Seasonal Consumptive Water Loss, by Use

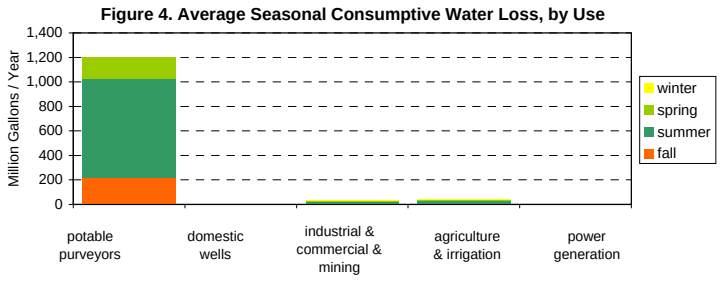


Table 5. Sewage Generation & Transfers[8] in the HUC11 (millions of gallons)

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	average
generated in HUC11	8,668	8,843	7,800	8,913	9,218	7,796	9,353	8,452	8,690	8,263	8,600
imported to HUC11	16,428	16,657	14,535	16,836	17,490	14,571	17,654	15,935	16,322	15,566	16,199
exported from HUC11	1,149	1,218	1,147	1,207	1,213	1,127	1,272	1,158	1,219	1,138	1,185

Table 6. Destination of Treated Effluent (Reclaimed-Water) Discharges[9] in the HUC11 (millions of gallons)

destination	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	average
fresh water	0	0	0	0	0	0	0	0	0	0	0
brackish water	0	0	0	0	0	0	0	0	0	0	0
salt water	23,947	24,281	21,188	24,542	25,495	21,241	25,734	23,229	23,793	22,691	23,614
sum:	23,947	24,281	21,188	24,542	25,495	21,241	25,734	23,229	23,793	22,691	23,614

Figure 5. Average Sewage Generation & Transfers

Fig 6. Average Treated-Effluent Discharge Location

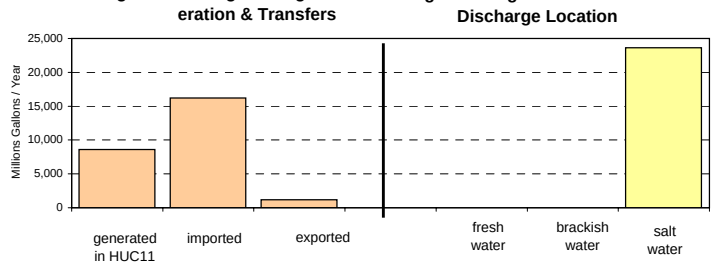


Table 7. 1999 Water Allocations[10] in HUC11 by Water Source

Water Source	MGY
surface water	0
ground water	2,692
total	2,692

Table 8. 1999 Water Allocations[10] in HUC11 by Water Use Group

Use Group	MGY
agricultural	0
commercial	0
industrial	607
irrigation	84
mining	0
potable supply	2,000
power generation	0
total	2,692

Table 9. HUC11 Descriptive Statistics

--- Area:

in this HUC11 only	22.9	sq. mi.
upstream HUC11s	0.0	sq. mi.
total watershed	22.9	sq. mi.
(this HUC11 onshore area:	22.8	sq. mi.)

--- Population of this HUC11:

Year	Population	Change	
1940	219,169	-	
1950	241,635	10.3%	
1960	245,956	1.8%	
1970	245,908	0.0%	
1980	236,010	-4.0%	
1990	227,667	-3.5%	
2000	234,293	2.9%	
2010	243,779	4.0%	est.[12]
2020	256,471	5.2%	est.[12]
2030	270,564	5.5%	est.[12]

--- Land Use of this HUC11:

Type	Year		Change
	1986	1995	
ag.	0.0%	0.0%	0.0%
barren	0.0%	0.1%	0.1%
forest	4.0%	3.7%	-0.3%
urban	93.2%	93.5%	0.3%
water	0.7%	0.7%	0.0%
wetlands	2.0%	2.0%	-0.1%

--- % of this HUC11 in:

Pinelands:	0.0%
Highlands:	0.0%

Table 10. Upstream and downstream HUC11s (in NJ)

location	#	name
downstream:	#N/A	#N/A
(if any)		
upstream:	--	--
(if any)	--	--
	--	--
	--	--
	--	--
	--	--
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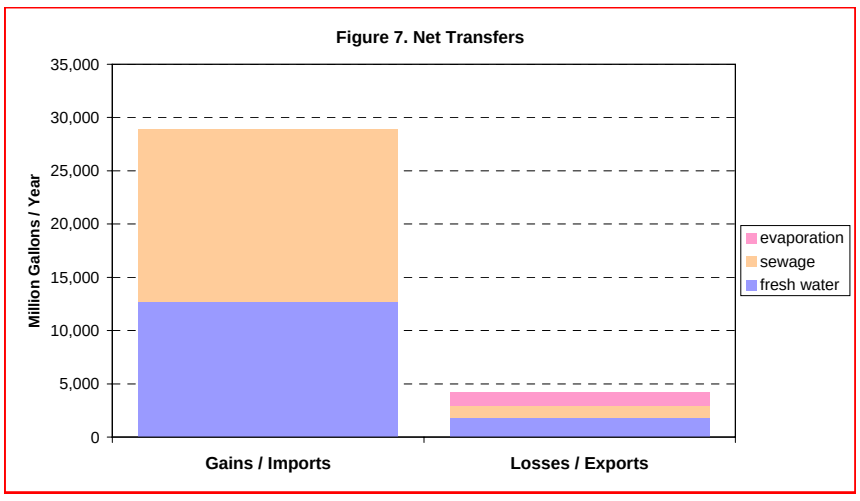
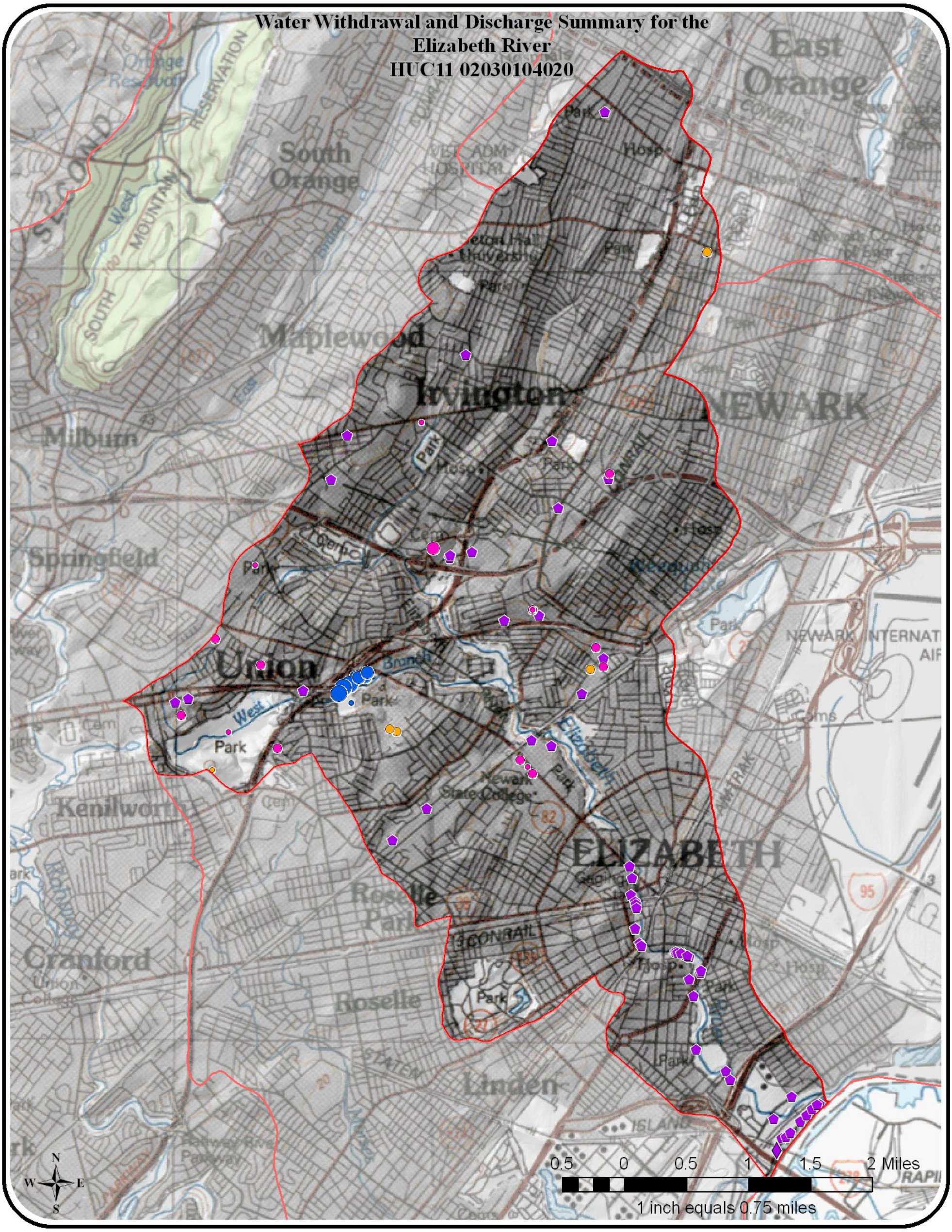
Figure 7. Net Transfers



NOTES:

1 Salt and brackish water withdrawal and use is not included in this data.
2 This does not account for water released from onstream reservoirs for downstream intakes.
3 Includes both permitted ground-water withdrawals and estimated domestic well withdrawals.
4 Nonconsumptive water use refers to water used in the watershed but not evaporated.
5 Consumptive water use refers to water evaporated in the watershed. It does not include exports.
6 Use refers only to water actually used in that HUC11. It is equal to freshwater withdrawals + imports - exports.
7 Winter is Jan, Feb, Dec of the same year; spring is March-May; summer is June-Aug; fall is Sept-Nov.
8 Sewage generation and transfers are based on intersection of sewer service areas with HUC11s.
9 Based on discharge volumes reported under NJPDES program.
10 The allocated volume is calculated from allocation permits on file with the Bureau of Water Allocation, NJDEP, as of 1999.
11 Import and export volumes based on reported transfers between purveyors and on intersection of purveyor service areas with HUC11s.
12 Projected population estimates based on NJ Metropolitan Planning Organization estimates.
13 Subject to revision.
14 Withdrawals for offstream reservoirs are problematic and complicate Figures 1 and 2.

Water Withdrawal and Discharge Summary for the Elizabeth River HUC11 02030104020



Key for Discharge Data

1999 Treated Effluent Discharge	
0 - 50	MGY
50 - 100	MGY
100 - 500	MGY
> 500	MGY
Other Permitted Discharge	

Key for Withdrawal Data

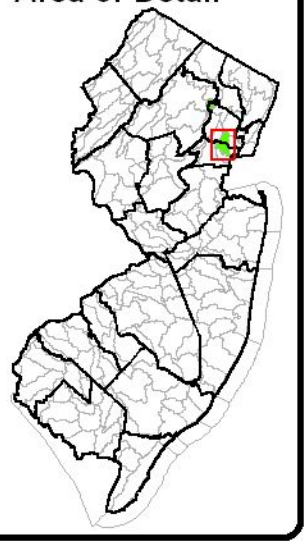
Source	
GW Confined	□
GW Unconfined	○
SW	△

1999 Withdrawal	
No 1999 Use	
1 - 50	MGY
51 - 100	MGY
101 - 500	MGY
> 500	MGY

Use Group
Agricultural
Commercial
Industrial
Irrigation
Mining
Not Classified
Potable Supply
Power Generation

MGY = millions of gallons per year

Area of Detail



Water Withdrawals, Transfers and Discharges for MORSES CREEK / PILES CREEK --- 02030104030

WMA:	**Arthur Kill**	**07**
HUC11:	**Morses Creek / Piles Creek**	**02030104030**

Table 1. Freshwater[1] Withdrawals in the HUC11 (millions of gallons)

Withdrawals (Q)	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	average
surface water:[2]											
Delaware River	0	0	0	0	0	0	0	0	0	0	0
other	3,065	4,666	2,984	2,535	2,577	2,794	2,078	1,840	1,460	1,327	2,532
sum	3,065	4,666	2,984	2,535	2,577	2,794	2,078	1,840	1,460	1,327	2,532
ground-water:[3]											
confined	0	0	0	0	0	0	0	0	0	0	0
unconfined	549	443	417	309	331	308	288	406	400	320	377
sum	549	443	417	309	331	308	288	406	400	320	377
total withdrawals:	3,614	5,109	3,401	2,845	2,908	3,102	2,366	2,246	1,859	1,646	2,910

Table 2. Freshwater Imports To & Exports From the HUC11 (millions of gallons)

imports[11]	2,315	2,327	2,236	2,410	2,728	2,726	2,642	2,705	2,728	2,781	2,560
exports[11]	841	832	840	852	920	905	885	862	876	852	867
net	1,474	1,495	1,396	1,557	1,808	1,821	1,757	1,844	1,853	1,928	1,693

Fig 1. Average Source of Fresh Water

Fig 2. Average Destination of Fresh Water

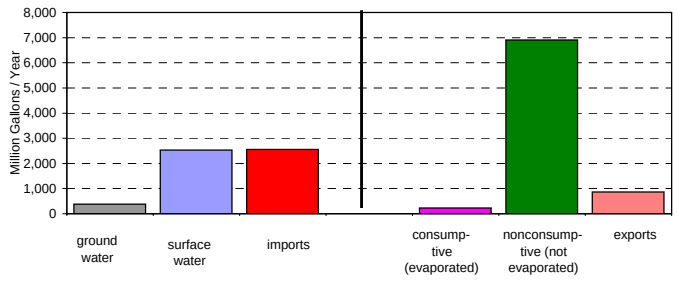


Table 3. Nonconsumptive[4] & Consumptive[5] Water Use[6] in the HUC11, by Use Type (millions of gallons)

Water use	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	average
potable purveyors											
nonconsumptive	4,454	6,067	4,302	3,946	4,263	4,486	3,726	3,564	3,203	3,113	4,112
consumptive	154	159	146	180	200	205	192	213	219	227	190
domestic wells											
nonconsumptive	1	1	1	1	1	1	1	1	1	1	1
consumptive	0	0	0	0	0	0	0	0	0	0	0
industrial & commercial & mining											
nonconsumptive	419	328	301	247	220	198	179	272	260	200	262
consumptive	47	36	33	27	24	22	20	30	29	22	29
agricultural & non-agricultural irrigation											
nonconsumptive	1	1	1	0	1	1	0	1	0	1	1
consumptive	11	12	13	0	7	9	4	8	0	9	7
power generation											
nonconsumptive	3,065	4,666	2,984	2,535	2,577	2,794	2,078	1,840	1,460	1,327	2,532
consumptive	0	0	0	0	0	0	0	0	0	0	0
SUM:											
nonconsumptive	7,941	11,063	7,589	6,729	7,061	7,481	5,985	5,678	4,924	4,642	6,909
consumptive	212	207	193	208	232	236	216	251	248	259	226
PERCENTAGES:											
nonconsumptive	97.4%	98.2%	97.5%	97.0%	96.8%	96.9%	96.5%	95.8%	95.2%	94.7%	96.8%
consumptive	2.6%	1.8%	2.5%	3.0%	3.2%	3.1%	3.5%	4.2%	4.8%	5.3%	3.2%

Figure 3. Consumptive & Nonconsumptive Use

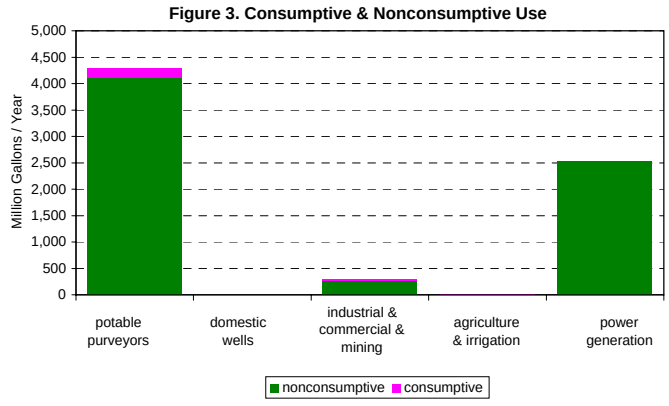


Table 4. Average Seasonal[7] Use - Nonconsumptive[4] & Consumptive[5] (millions of gallons)

Use Group	Winter		Spring		Summer		Fall		Yearly Avg.	
	Noncon-sumptive	Consump-tive	Noncon-sumptive	Consump-tive	Noncon-sumptive	Consump-tive	Noncon-sumptive	Consump-tive	Noncon-sumptive	Consump-tive
potable purveyors	416	0	413	28	374	129	378	33	1,580	190
domestic wells	0	0	0	0	0	0	0	0	1	0
industrial & commercial & mining	54	6	64	7	78	9	67	7	262	29
agricultural & non-agricultural irrig.	0	0	0	1	1	5	0	2	1	7
power generation	682	0	580	0	631	0	640	0	2,532	0
SUM:	1,152	6	1,056	36	1,084	143	1,085	42	4,377	226

Figure 4. Average Seasonal Consumptive Water Loss, by Use

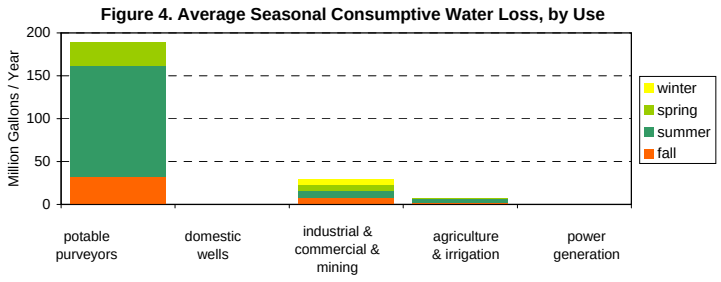


Table 5. Sewage Generation & Transfers[8] in the HUC11 (millions of gallons)

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	average
generated in HUC11	1,879	3,880	3,791	4,003	4,079	3,873	4,569	3,614	4,321	3,782	3,779
imported to HUC11	0	0	0	0	0	0	0	0	0	0	0
exported from HUC11	1,879	3,880	3,791	4,003	4,079	3,873	4,569	3,614	4,321	3,782	3,779

Table 6. Destination of Treated Effluent (Reclaimed-Water) Discharges[9] in the HUC11 (millions of gallons)

destination	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	average
fresh water	0	0	0	0	0	0	0	0	0	0	0
brackish water	0	0	0	0	0	0	0	0	0	0	0
salt water	0	0	0	0	0	0	0	0	0	0	0
sum:	0	0	0	0	0	0	0	0	0	0	0

Figure 5. Average Sewage Generation & Transfers

Fig 6. Average Treated-Effluent Discharge Location

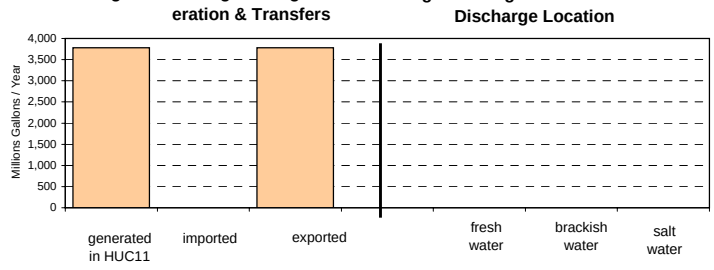


Table 7. 1999 Water Allocations[10] in HUC11 by Water Source

Water Source	MGY
surface water	3,060
ground water	590
total	3,650

Table 8. 1999 Water Allocations[10] in HUC11 by Water Use Group

Use Group	MGY
agricultural	0
commercial	0
industrial	487
irrigation	37
mining	0
potable supply	66
power generation	3,060
total	3,650

Table 9. HUC11 Descriptive Statistics

--- Area:

in this HUC11 only	12.0	sq. mi.
upstream HUC11s	0.0	sq. mi.
total watershed	12.0	sq. mi.
(this HUC11 onshore area:	11.8	sq. mi.)

--- Population of this HUC11:

Year	Population	Change	
1940	40,895	-	
1950	51,812	26.7%	
1960	63,219	22.0%	
1970	67,553	6.9%	
1980	62,135	-8.0%	
1990	60,430	-2.7%	
2000	63,861	5.7%	
2010	65,764	3.0%	est.[12]
2020	70,054	6.5%	est.[12]
2030	74,182	5.9%	est.[12]

--- Land Use of this HUC11:

Type	Year		Change
	1986	1995	
ag.	0.0%	0.0%	0.0%
barren	0.5%	0.5%	0.1%
forest	5.9%	5.5%	-0.4%
urban	86.6%	86.9%	0.4%
water	3.5%	3.7%	0.2%
wetlands	3.5%	3.4%	-0.2%

--- % of this HUC11 in:

Pinelands:	0.0%
Highlands:	0.0%

Table 10. Upstream and downstream HUC11s (in NJ)

location	#	name
downstream:	#N/A	#N/A
(if any)		
upstream:	--	--
(if any)	--	--
	--	--
	--	--
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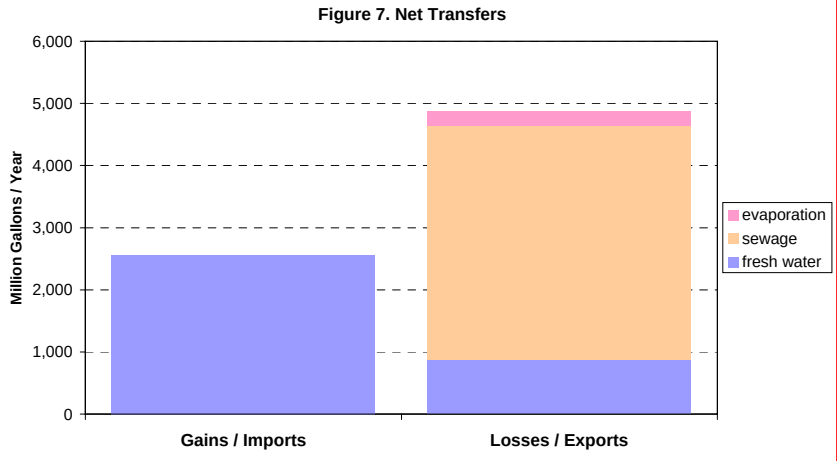
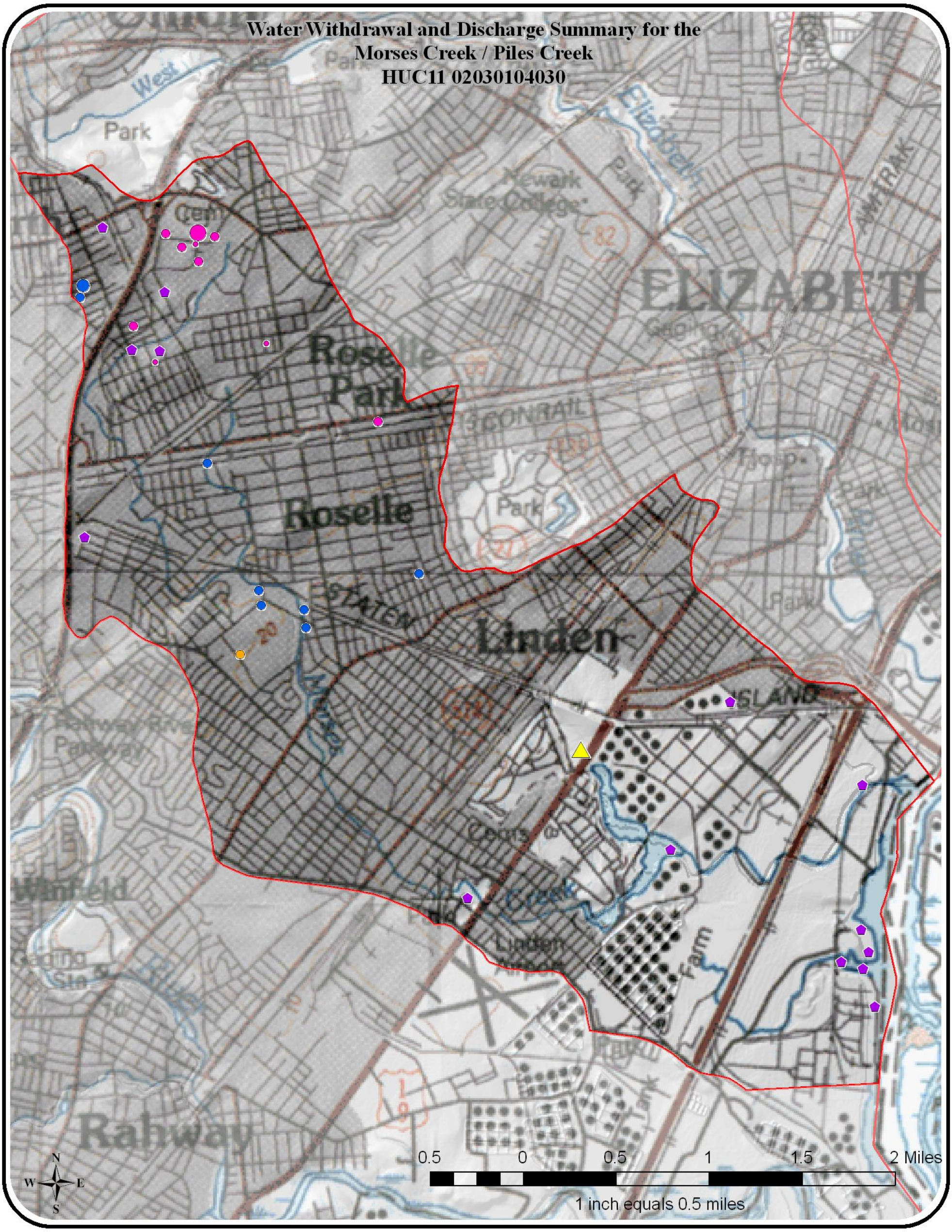
Figure 7. Net Transfers



NOTES:

1 Salt and brackish water withdrawal and use is not included in this data.
2 This does not account for water released from onstream reservoirs for downstream intakes.
3 Includes both permitted ground-water withdrawals and estimated domestic well withdrawals.
4 Nonconsumptive water use refers to water used in the watershed but not evaporated.
5 Consumptive water use refers to water evaporated in the watershed. It does not include exports.
6 Use refers only to water actually used in that HUC11. It is equal to freshwater withdrawals + imports - exports.
7 Winter is Jan, Feb, Dec of the same year; spring is March-May; summer is June-Aug; fall is Sept-Nov.
8 Sewage generation and transfers are based on intersection of sewer service areas with HUC11s.
9 Based on discharge volumes reported under NJPDES program.
10 The allocated volume is calculated from allocation permits on file with the Bureau of Water Allocation, NJDEP, as of 1999.
11 Import and export volumes based on reported transfers between purveyors and on intersection of purveyor service areas with HUC11s.
12 Projected population estimates based on NJ Metropolitan Planning Organization estimates.
13 Subject to revision.
14 Withdrawals for offstream reservoirs are problematic and complicate Figures 1 and 2.

Water Withdrawal and Discharge Summary for the Morses Creek / Piles Creek HUC11 02030104030



Key for Discharge Data

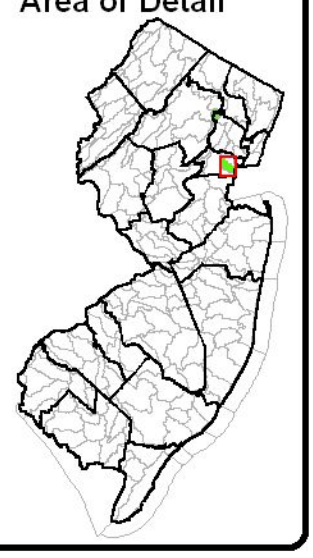
1999 Treated Effluent Discharge		
0 - 50	MGY	♦
50 - 100	MGY	♦
100 - 500	MGY	♦
> 500	MGY	♦
Other Permitted Discharge		⬟

Key for Withdrawal Data

Source		1999 Withdrawal		Use Group	
GW Confined	□	No 1999 Use	■●▲	Agricultural	●
GW Unconfined	○	1 - 50 MGY	■●▲	Commercial	●
SW	△	51 - 100 MGY	■●▲	Industrial	●
		101 - 500 MGY	■●▲	Irrigation	●
		> 500 MGY	■●▲	Mining	●
				Not Classified	●
				Potable Supply	●
				Power Generation	●

MGY = millions of gallons per year

Area of Detail



Water Withdrawals, Transfers and Discharges for RAHWAY RIVER / WOODBRIDGE CREEK --- 02030104050

WMA:	**Arthur Kill**	**07**
HUC11:	**Rahway River / Woodbridge Creek**	**02030104050**

Table 1. Freshwater[1] Withdrawals in the HUC11 (millions of gallons)

Withdrawals (Q)	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	average
surface water:[2]											
Delaware River	0	0	0	0	0	0	0	0	0	0	0
other	1,925	1,941	1,858	1,908	1,971	1,918	1,946	1,767	1,662	1,703	1,860
sum	1,925	1,941	1,858	1,908	1,971	1,918	1,946	1,767	1,662	1,703	1,860
ground-water:[3]											
confined	13	13	4	3	5	4	5	4	5	3	6
unconfined	4,147	4,172	4,325	3,971	4,422	3,800	3,454	4,061	3,063	3,020	3,843
sum	4,159	4,185	4,329	3,974	4,427	3,804	3,458	4,065	3,068	3,023	3,849
total withdrawals:	6,084	6,126	6,187	5,882	6,398	5,722	5,405	5,832	4,730	4,726	5,709

Table 2. Freshwater Imports To & Exports From the HUC11 (millions of gallons)

imports[11]	24,206	24,624	24,436	26,831	27,754	28,168	26,330	26,757	27,258	27,928	26,429
exports[11]	8,797	9,286	9,817	10,199	10,315	10,599	10,189	10,777	10,207	9,921	10,011
net	15,409	15,338	14,619	16,633	17,440	17,569	16,142	15,980	17,051	18,008	16,419

Fig 1. Average Source of Fresh Water

Fig 2. Average Destination of Fresh Water

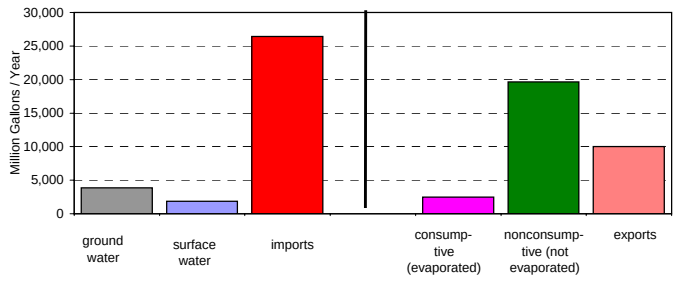


Table 3. Nonconsumptive[4] & Consumptive[5] Water Use[6] in the HUC11, by Use Type (millions of gallons)

Water use	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	average
potable purveyors											
nonconsumptive	18,841	18,682	18,220	19,511	20,837	20,368	18,870	19,005	18,937	19,767	19,304
consumptive	2,091	2,183	2,060	2,447	2,434	2,420	2,210	2,294	2,383	2,497	2,302
domestic wells											
nonconsumptive	11	11	11	11	11	11	12	12	12	12	11
consumptive	2	2	2	2	2	2	2	2	2	2	2
industrial & commercial & mining											
nonconsumptive	433	407	366	318	380	317	326	320	263	236	336
consumptive	51	52	44	40	47	39	39	40	36	31	42
agricultural & non-agricultural irrigation											
nonconsumptive	6	13	10	19	13	14	9	13	14	16	13
consumptive	58	115	94	168	114	121	80	114	130	141	114
power generation											
nonconsumptive	0	0	0	0	0	0	0	0	0	0	0
consumptive	0	0	0	0	0	0	0	0	0	0	0
SUM:											
nonconsumptive	19,291	19,112	18,607	19,858	21,241	20,709	19,216	19,349	19,226	20,031	19,664
consumptive	2,202	2,352	2,199	2,657	2,597	2,582	2,330	2,450	2,550	2,670	2,459
PERCENTAGES:											
nonconsumptive	89.8%	89.0%	89.4%	88.2%	89.1%	88.9%	89.2%	88.8%	88.3%	88.2%	88.9%
consumptive	10.2%	11.0%	10.6%	11.8%	10.9%	11.1%	10.8%	11.2%	11.7%	11.8%	11.1%

Figure 3. Consumptive & Nonconsumptive Use

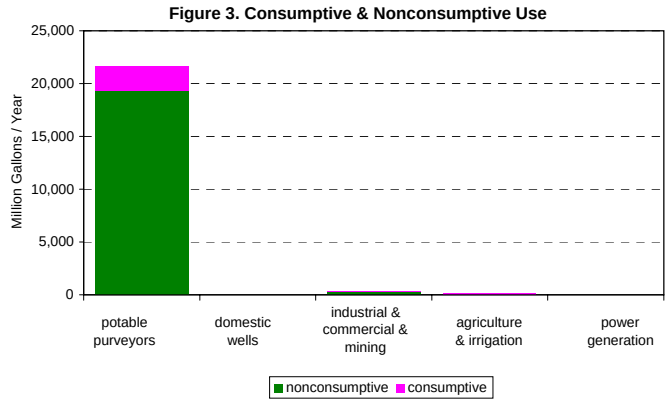


Table 4. Average Seasonal[7] Use - Nonconsumptive[4] & Consumptive[5] (millions of gallons)

Use Group	Winter		Spring		Summer		Fall		Yearly Avg.	
	Noncon-sumptive	Consump-tive	Noncon-sumptive	Consump-tive	Noncon-sumptive	Consump-tive	Noncon-sumptive	Consump-tive	Noncon-sumptive	Consump-tive
potable purveyors	5,066	0	4,954	330	4,510	1,562	4,779	410	19,309	2,302
domestic wells	3	0	3	0	3	1	3	0	11	2
industrial & commercial & mining	73	8	83	9	93	15	87	10	336	42
agricultural & non-agricultural irrig.	0	1	2	16	8	74	2	22	13	114
power generation	0	0	0	0	0	0	0	0	0	0
SUM:	5,141	9	5,042	355	4,614	1,652	4,872	443	19,669	2,459

Figure 4. Average Seasonal Consumptive Water Loss, by Use

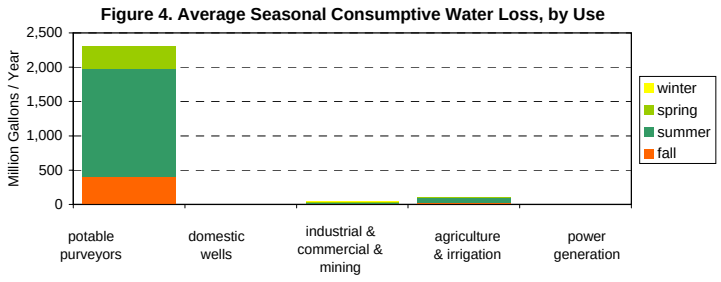


Table 5. Sewage Generation & Transfers[8] in the HUC11 (millions of gallons)

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	average
generated in HUC11	24,045	21,985	21,568	24,126	24,749	21,737	26,403	23,561	24,619	23,476	23,627
imported to HUC11	1,812	5,276	7,094	8,134	8,758	7,744	10,802	9,100	8,635	10,860	7,822
exported from HUC11	11,215	11,799	10,932	12,469	12,900	11,004	13,150	11,955	12,234	11,567	11,923

Table 6. Destination of Treated Effluent (Reclaimed-Water) Discharges[9] in the HUC11 (millions of gallons)

destination	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	average
fresh water	0	0	0	0	0	0	0	0	0	0	0
brackish water	1,408	6,280	8,271	9,391	10,091	9,020	12,444	10,335	10,021	12,347	8,961
salt water	13,152	9,183	9,459	10,400	10,516	9,456	11,612	10,371	10,999	10,423	10,557
sum:	14,559	15,463	17,730	19,792	20,607	18,476	24,056	20,706	21,020	22,770	19,518

Figure 5. Average Sewage Generation & Transfers

Fig 6. Average Treated-Effluent Discharge Location

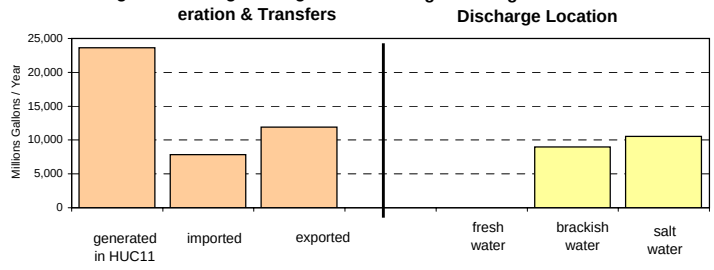


Table 7. 1999 Water Allocations[10] in HUC11 by Water Source

Water Source	MGY
surface water	1,503
ground water	5,600
total	7,103

Table 8. 1999 Water Allocations[10] in HUC11 by Water Use Group

Use Group	MGY
agricultural	0
commercial	42
industrial	505
irrigation	393
mining	0
potable supply	6,162
power generation	0
total	7,103

Table 9. HUC11 Descriptive Statistics

--- Area:

in this HUC11 only	101.1	sq. mi.
upstream HUC11s	0.0	sq. mi.
total watershed	101.1	sq. mi.
(this HUC11 onshore area:	99.1	sq. mi.)

--- Population of this HUC11:

Year	Population	Change	
1940	217,418	-	
1950	267,812	23.2%	
1960	386,322	44.3%	
1970	433,442	12.2%	
1980	399,867	-7.7%	
1990	396,781	-0.8%	
2000	421,624	6.3%	
2010	438,943	4.1%	est.[12]
2020	466,346	6.2%	est.[12]
2030	488,721	4.8%	est.[12]

--- Land Use of this HUC11:

Type	Year		Change
	1986	1995	
ag.	0.3%	0.1%	-0.1%
barren	0.6%	0.6%	0.0%
forest	12.3%	11.8%	-0.5%
urban	77.3%	78.2%	0.9%
water	3.0%	3.0%	0.0%
wetlands	6.5%	6.2%	-0.3%

--- % of this HUC11 in:

Pinelands:	0.0%
Highlands:	0.0%

Table 10. Upstream and downstream HUC11s (in NJ)

location	#	name
downstream:	#N/A	#N/A
(if any)		
upstream:	--	--
(if any)	--	--
	--	--
	--	--
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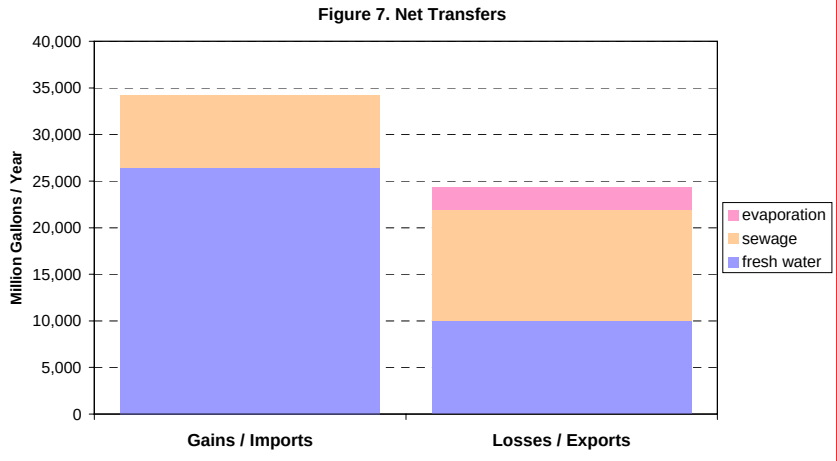
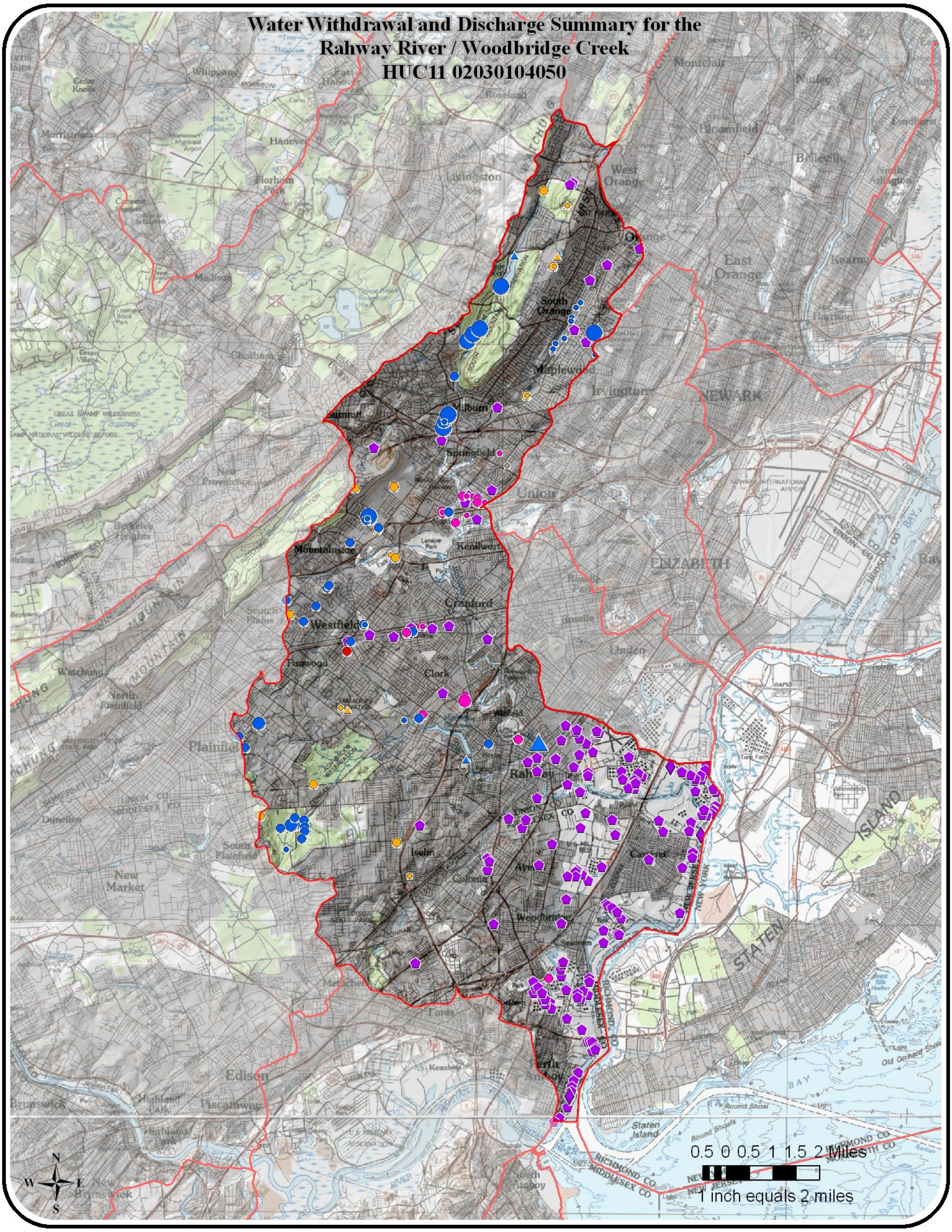
Figure 7. Net Transfers



NOTES:

1 Salt and brackish water withdrawal and use is not included in this data.
2 This does not account for water released from onstream reservoirs for downstream intakes.
3 Includes both permitted ground-water withdrawals and estimated domestic well withdrawals.
4 Nonconsumptive water use refers to water used in the watershed but not evaporated.
5 Consumptive water use refers to water evaporated in the watershed. It does not include exports.
6 Use refers only to water actually used in that HUC11. It is equal to freshwater withdrawals + imports - exports.
7 Winter is Jan, Feb, Dec of the same year; spring is March-May; summer is June-Aug; fall is Sept-Nov.
8 Sewage generation and transfers are based on intersection of sewer service areas with HUC11s.
9 Based on discharge volumes reported under NJPDES program.
10 The allocated volume is calculated from allocation permits on file with the Bureau of Water Allocation, NJDEP, as of 1999.
11 Import and export volumes based on reported transfers between purveyors and on intersection of purveyor service areas with HUC11s.
12 Projected population estimates based on NJ Metropolitan Planning Organization estimates.
13 Subject to revision.
14 Withdrawals for offstream reservoirs are problematic and complicate Figures 1 and 2.

Water Withdrawal and Discharge Summary for the Rahway River / Woodbridge Creek HUC11 02030104050



Key for Discharge Data

1999 Treated Effluent Discharge	
0 - 50	MGY
50 - 100	MGY
100 - 500	MGY
> 500	MGY
Other Permitted Discharge	

Key for Withdrawal Data

Source	1999 Withdrawal	Use Group
GW Confined	No 1999 Use	Agricultural
GW Unconfined	1 - 50 MGY	Commercial
SW	51 - 100 MGY	Industrial
	101 - 500 MGY	Irrigation
	> 500 MGY	Mining
		Not Classified
		Potable Supply
		Power Generation

MGY = millions of gallons per year

Area of Detail