

# Economic Value of the Delaware Estuary Watershed

*“The Delaware Estuary watershed is the economic engine of the Delaware Valley”*

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*Prepared for:*

Partnership for the Delaware Estuary  
Wilmington, Del.

*Prepared by:*

Gerald Kauffman, Andrew Homsey  
Sarah Chatterson, Erin McVey, Stacey Mack  
University of Delaware - Water Resources Agency  
Institute for Public Administration  
School of Public Policy and Administration  
Newark, Del.  
302-831-4929 [jerryk@udel.edu](mailto:jerryk@udel.edu)  
[www.ipa.udel.edu](http://www.ipa.udel.edu)

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What do Boeing, Sunoco, Campbell's Soup, DuPont, Wawa, Starbucks, Iron Hill Brewery, the Philadelphia Eagles, Salem Nuclear Power Plant, and the United States Navy have in common? They all depend on the waters of the Delaware Estuary to sustain their business.

The natural resources of the Delaware Estuary watershed provide tremendous economic value to our region. This report examines that value in three distinct ways:

- **Through economic value directly related to the Delaware Estuary's water resources and habitats.** Using economic activity as a measure of value, we find that the Delaware Estuary contributes over **\$10 billion** in annual economic activity from recreation, water quality and supply, hunting and fishing, forests, agriculture and parks.
- **Through the value of the goods and services provided by the Delaware Estuary's ecosystems.** Using ecosystem goods and services as a measure of value, we find that the ecosystems of the Delaware Estuary provide **\$12 billion** annually in goods and services in 2010 dollars (\$2010), with a net present value (NPV) of **\$392 billion** calculated over a 100-year period.
- **Through employment related to the Delaware Estuary's water resources and habitats.** Using employment as a measure of value, we find that the Delaware Estuary directly and indirectly supports over **500,000 jobs** with over **\$10 billion** in wages annually. This does not include the thousands or even millions of jobs in companies and industries that rely on waters of the Delaware Estuary for their industrial and commercial processes.

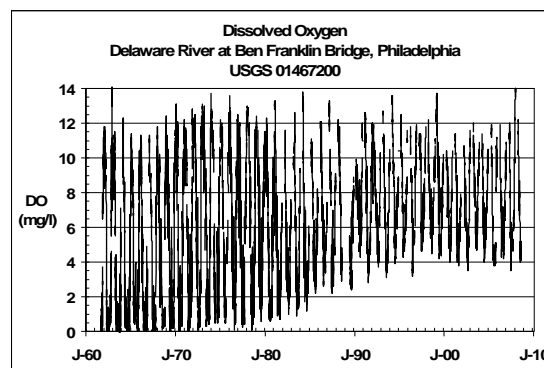


Delaware Estuary Watershed  
(inset: within context of Delaware River Basin)

Note the three economic categories above cannot be summed because there is a measure of overlap between certain values that could result in double-counting. For example, the ecosystem values of forests for water quality benefits are at least partially captured in the economic value of water supply. **However, the above estimates clearly indicate the Delaware Estuary is an economic engine that contributes over \$10 billion annually to our region's economy.**

### The Delaware River Rival

The Delaware Estuary is recovering after decades of neglect. In 1961, JFK signed the Delaware River Basin Compact as the first Federal-state watershed accord. In 1996, Congress added the Delaware Estuary as the only tri-state watershed in the National Estuary Program. With these watershed programs, the Delaware River revival is underway as depicted on the chart of dissolved oxygen at the Ben Franklin Bridge at Philadelphia.



## The Delaware Estuary Watershed

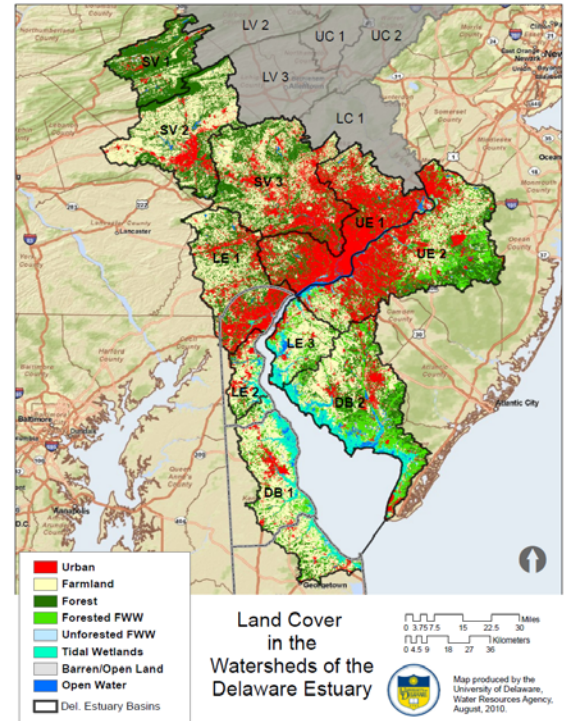
The Delaware Estuary watershed covers just 0.2% of the continental U.S. yet supplies drinking water to 2% of the U.S. population. If the Delaware Estuary watershed were considered as a state, it would be the 13<sup>th</sup> most populous after New Jersey and Virginia and ahead of Washington and Massachusetts.

The Delaware Estuary watershed occupies 6,000 sq mi including:

- Delaware (50% of land area, 72% of State's population)
- Maryland (just 8 square miles)
- New Jersey (26% of area, 19% of State's population)
- Pennsylvania (7% of area, 35% of State's population).

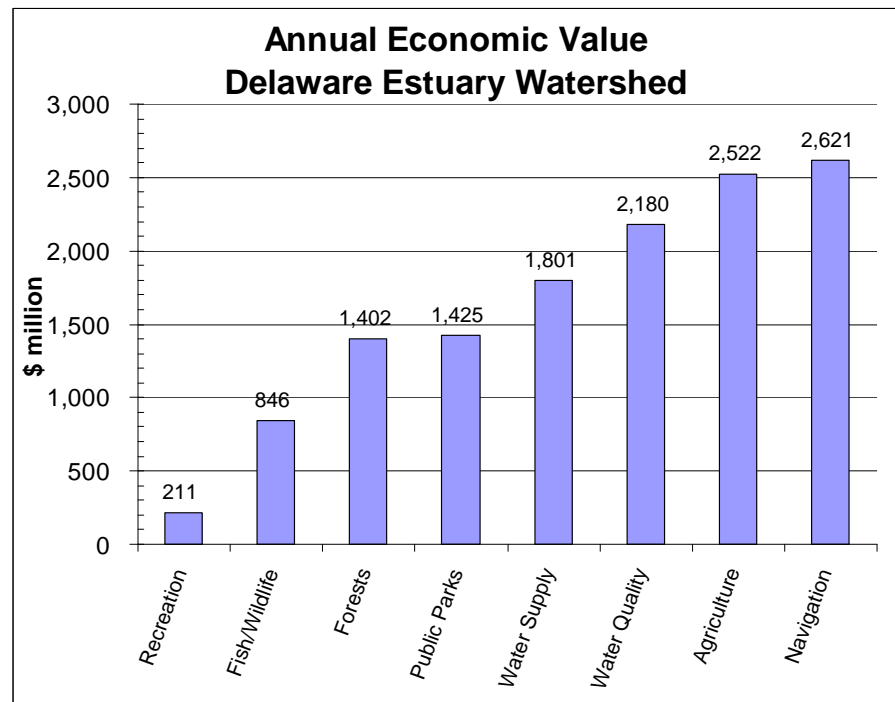
From 2000-2010, the population in the Delaware Estuary watershed grew by 5.1% or 325,000 people. The population increased by 24% in Kent and Sussex counties, Del.; 12% in Gloucester Co., NJ and 14% in Chester Co., Pa. Philadelphia gained population for the first time in half a century. Cape May Co., NJ and Schuylkill Co., Pa. lost population. In 2010, 6,700,000 residents lived in the watershed including:

- Delaware (pop. 642,000)
- Maryland (pop. 2,300)
- New Jersey (pop. 1,645,000)
- Pennsylvania (pop. 4,410,000)



## Annual Economic Value

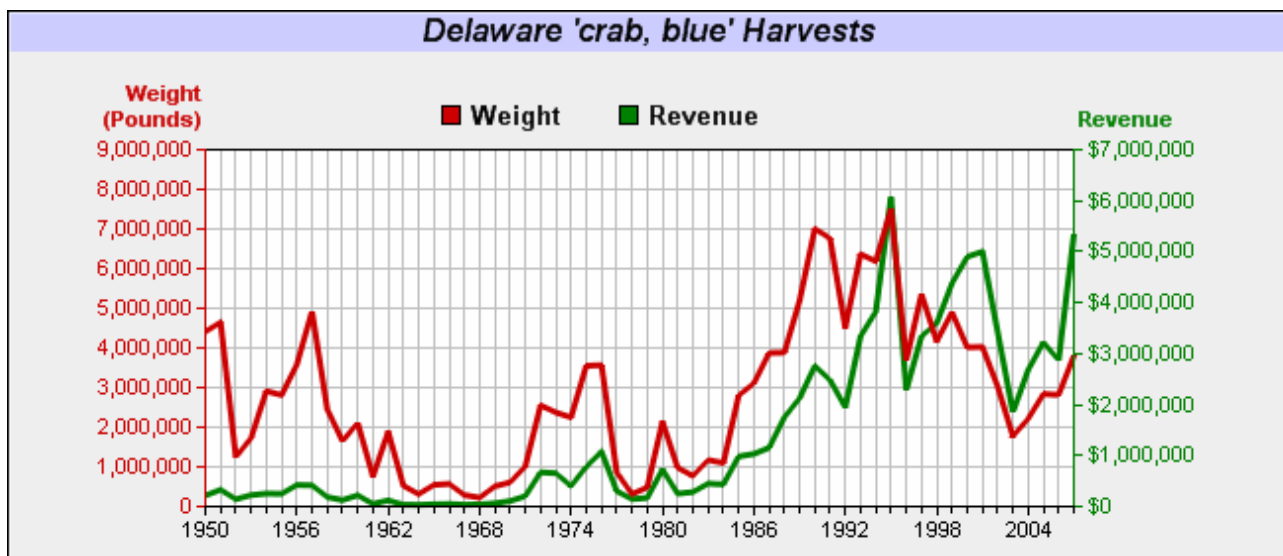
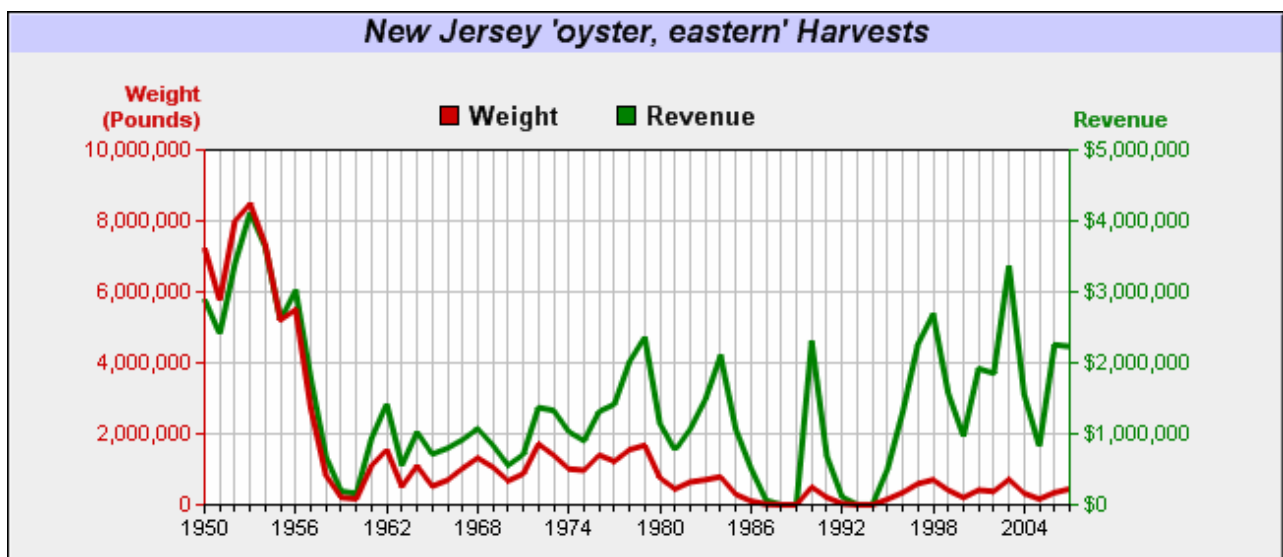
The Delaware Estuary watershed contributes over \$10 billion in annual market and non-market value. Market value is determined by the sale/purchase of watershed goods such as drinking water, fish, or hunting supplies. Nonmarket value is provided by ecosystems such as pollution removal by forests, public willingness to pay for improved water quality, forest carbon storage benefits, and health benefits of parks. Note that totals are rounded down to avoid double counting (Table E1).



**Table E1.** Annual economic value of the Delaware Estuary watershed

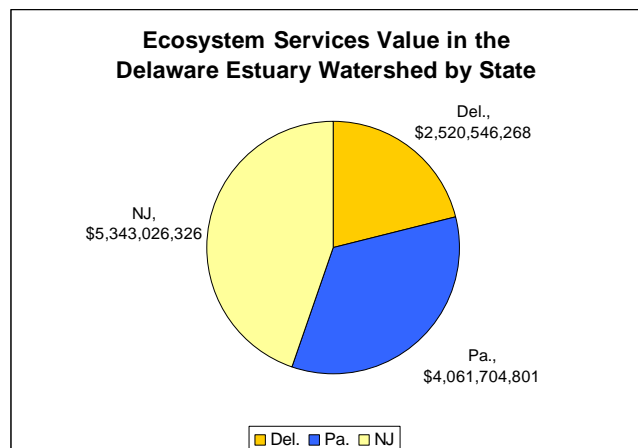
<b>Economic Value</b>	<b>\$ million</b>
<b>Market Value</b>	<b>&gt; 8 billion</b>
<b>Water Quality</b>	
Water Treatment by Forests (\$62/mgd)	17
Wastewater Treatment (\$4.00/1000 gal)	1,490
Increased Property Value (+8% over 20 years)	13
<b>Water Supply</b>	
Drinking Water Supply (\$4.78/1000 gal)	1,333
Irrigation Water Supply (\$300/ac-ft)	30
Thermoelectric Power Water Supply (\$44/ac-ft)	298
Industrial Water Supply (\$200/ac-ft)	140
<b>Fish/Wildlife</b>	
Commercial Fish Landings (\$0.60/lb)	34
Fishing (11-18 trips/angler, \$17-\$53/trip)	334
Hunting (16 trips/hunter, \$16-50/trip)	171
Wildlife/Bird-watching (8-13 trips/yr, \$15-\$27/trip)	306
<b>Agriculture</b>	
Crop, poultry, livestock value (\$2,300/ac)	2,522
<b>Maritime Transportation</b>	
Navigation (\$15/ac-ft)	221
Port Activity	2,400
<b>Non-Market Value</b>	<b>&gt;2 billion</b>
<b>Recreation (Boating, Fishing, Swimming)</b>	
Swimming (\$13.40/trip)	9
Boating (\$30/trip)	47
Fishing (\$62.79/trip)	52
Wildlife/bird watching (\$77.73/trip)	104
<b>Water Quality</b>	
Willing to Pay for Clean Water (\$38/nonuser-\$121/user)	660
<b>Forests</b>	
Carbon Storage (\$827/ac)	981
Carbon Sequestration (\$29/ac)	34
Air Pollution Removal (\$266/ac)	316
Building Energy Savings (\$56/ac)	66
Avoided Carbon Emissions (\$3/ac)	4
<b>Public Parks</b>	
Health Benefits (\$9,734/ac)	1,057
Community Cohesion (\$2,383/ac)	259
Stormwater Benefit (\$921/ac)	100
Air Pollution Control (\$88/ac)	9





## Ecosystem Services

The Delaware Estuary watershed is rich in natural resources and habitat as measured by the economic value of ecosystem goods and services. Ecosystem goods are benefits provided by sale of watershed products such as drinking water and fish. Ecosystem services are economic benefits provided to society by nature such as water filtration, flood reduction, and carbon storage. The value of natural goods and services from ecosystems in the Delaware Estuary watershed is \$12 billion (\$2010) with net present value (NPV) of \$392 billion using a discount rate of 3% over 100 years (Table E2). Ecosystem services by state include Delaware (\$2.5 billion, NPV \$81.9 billion), New Jersey (\$5.3 billion, NPV \$173.6 billion), Pennsylvania (\$4.1 billion, NPV \$132.0 billion).

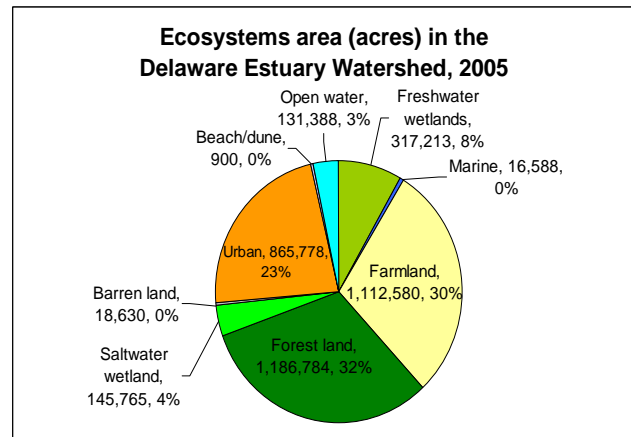
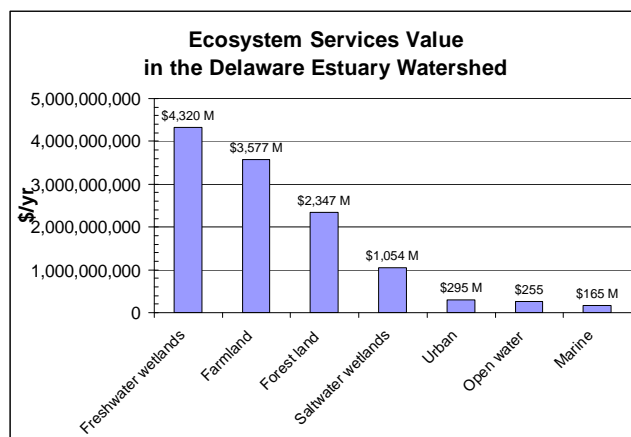




**Table E2.** Ecosystem goods and services value of the Delaware Estuary watershed

Ecosystem	Area (ac)	\$/ac/yr 2010 <sup>1</sup>	\$/yr 2010	NPV \$
Freshwater wetlands	317,213	13,621	4,320,647,087	140,421,030,319
Marine	16,588	10,006	165,982,947	5,394,445,767
Farmland	1,112,580	3,215 <sup>2</sup>	3,577,486,604	116,268,314,632
Forest land	1,186,784	1,978	2,347,605,465	76,297,177,613
Saltwater wetland	145,765	7,235	1,054,617,851	34,275,080,170
Barren land	18,630	0	0	0
Urban	865,778	342	295,761,123	9,612,236,487
Beach/dune	900	48,644	43,758,633	1,422,155,566
Open water	131,388	1,946	255,655,983	8,308,819,443
<b>Total</b>	<b>3,795,626</b>		<b>12,061,000,000</b>	<b>391,999,000,000</b>

1. NJDEP 2004. 2. USDA 2009



## Jobs and Wages

The Delaware Estuary watershed is a jobs engine that supports over 500,000 direct and indirect jobs with \$10 billion in annual wages in the coastal, farm, ecotourism, water/wastewater, recreation, and port industries. Note total jobs and wages are rounded down to avoid double counting (Table E3).

**Table E3.** Jobs and wages related to the Delaware Estuary watershed

Sector	Jobs	Wages (\$ million)	Data Source
Direct Basin Related	192,785	4,280	U.S. Bureau of Labor Statistics (2009)
Indirect Basin Related	231,342	3,420	U.S. Census Bureau (2009)
Coastal	44,658	947	National Coastal Economics Program (2009)
Farm	28,276	1,159	USDA Census of Agriculture (2007)
Fishing/Hunting/Birding	24,713	812	U.S. Fish and Wildlife Service (2008)
Water Supply Utilities	2,290	127	UDWRA and DRBC (2010)
Wastewater Utilities	1,021	51	UDWRA and DRBC (2010)
Watershed Organizations	150	8	UDWRA and DRBC (2010)
Port Jobs	12,121	772	Economy League of Greater Phila. (2008)
<b>Delaware Estuary watershed</b>	<b>&gt; 500,000</b>	<b>&gt;\$10 billion</b>	

Jobs directly associated with the Delaware Estuary watershed (i.e. water/sewer construction, water utilities, fishing, recreation, tourism, and ports) employ 192,785 people with \$4.3 billion in wages:

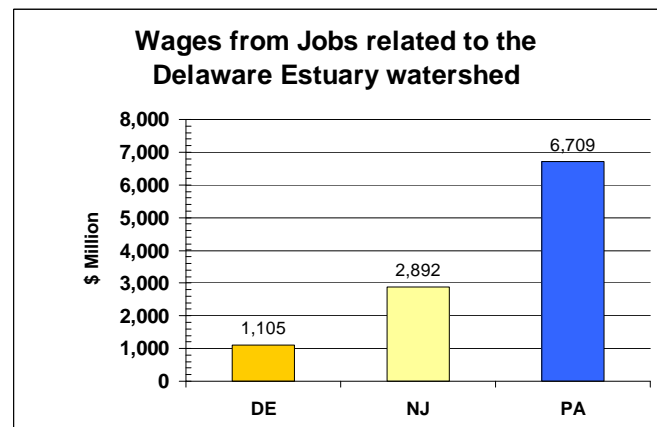
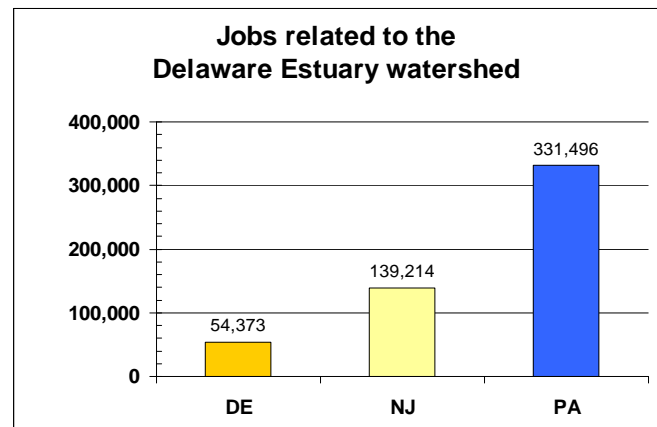
- Delaware (15,737 jobs, \$340 million wages)
- New Jersey (52,007 jobs, \$1.1 billion wages)
- Pennsylvania (125,041 jobs, \$2.8 billion wages)

Jobs indirectly related to the waters of the Delaware Estuary watershed (based on multipliers of 2.2 for jobs and 1.8 for salaries) employ 231,342 people with \$3.4 billion in wages in:

- Delaware (18,884 jobs, \$270 million wages)
- New Jersey (52,007 jobs, \$0.9 billion wages)
- Pennsylvania (150,049 jobs, \$2.2 billion in wages)

The National Coastal Economy Program (2009) reports coastal employment in the Delaware Estuary watershed provides 44,658 jobs earning \$947 million in wages in:

- Delaware (12,139 jobs, \$214 million wages)
- New Jersey (4,423 jobs, \$140 million wages)
- Pennsylvania (28,096 jobs, \$593 wages).



**Table E4.** Jobs and wages in the Delaware Estuary watershed by state.

Sector	DE Jobs	NJ Jobs	PA Jobs	DE Wages (\$M)	NJ Wages (\$M)	PA Wages (\$M)
Direct Basin Related	15,737	52,007	125,041	340	1,100	2,800
Indirect Basin Related	18,884	62,408	150,049	270	900	2,200
Coastal	12,139	4,423	28,096	214	140	593
Farm	3,289	8,287	16,700	135	340	685
Fishing/Hunting/Birding	4,092	11,365	9,256	134	373	304
Water Supply Utilities	126	509	1,654	7	28	92
Wastewater Utilities	106	215	700	5	11	35
<b>Delaware Estuary watershed</b>	<b>54,373</b>	<b>139,214</b>	<b>331,496</b>	<b>1,105</b>	<b>2,892</b>	<b>6,709</b>



