



## Largest Predator in the Delaware Estuary

Salem kills over 3 billion RIS fish a year.

Every year the Salem Nuclear Generating Station kills over 3 billion Delaware River fish including:

- Over 59 million Blueback Herring
- Over 77 million Weakfish
- Over 134 million Atlantic Croaker
- Over 412 million White Perch
- Over 448 million Striped Bass
- Over 2 billion Bay Anchovy

*(Figures provided are numbers of fish killed. Source: correspondence from US Fish & Wildlife Service to NJDEP, June 30, 2000 relying on PSE&G permit application data)*

### **The permit issued was based on data which is faulty, misleading, biased and missing information and data provided by PSE&G.**

In 1999, when PSE&G's permit came up for renewal, the company submitted over 150 volumes of information, data and arguments to support its case that it should be allowed to continue to kill Delaware River fish unimpeded. To its credit, NJDEP took the advice of environmental groups including Delaware Riverkeeper Network, ALS, NJEF, EAGLE, COA and the Coalition for Peace and Justice, and hired an independent expert to help them review PSE&G's materials. But, to its discredit, NJDEP did not require PSE&G to address the many shortcomings and DEP apparently ignored their expert's findings, just as they did with Versar in 1994.

ESSA Technologies' 154 page review of PSE&G's permit application documented ongoing problems with PSE&G's assertions and findings including bias, misleading conclusions, data gaps, inaccuracies, and misrepresentations of their findings and damage. Some examples of ESSA's findings:

- With regards to fisheries data and population trends, ESSA said "The conclusions of the analyses generally overextend the data or results." (p. ix)
- PSE&G "underestimates biomass lost from the ecosystem by perhaps greater than 2-fold." (p. xi) "... the actual total biomass of fish lost to the ecosystem ... is at least 2.2 times greater than that listed in the Application." (p. 75)
- "Inconsistency in the use of terminology, poorly defined terms, and a tendency to draw conclusions that are not supported by the information presented detract from the rigor of this section and raises

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skepticism about the results. In particular, there is a tendency to draw subjective and unsupported conclusions about the importance of Salem's impact on RIS finfish species." (p. 77)

- Referring to PSE&G's discussion and presentation of entrainment mortality rates ESSA found PSE&G's "discussion in this section of the Application to be misleading." (p. 13)

The ESSA report contains no less than 51 recommendations for actions which PSE&G needed to take on its 2001 permit application before DEP made its decision, but that did not happen. It is our understanding that while NJDEP pursued some of these (which ones we do not know because it was not referenced in the draft permit documents) many of them were never addressed, and still others were turned into permit requirements to be dealt with over the next 5 years.

In addition, NJDEP received comment from the State of Delaware and USF&W, both of whom conducted independent expert review of the permit application materials and found important problems with sampling, data, analyses and conclusions.

### **PSE&G Continues to Poison Sensitive Marshlands Annually and Does Not Mitigation Salem's Fish Kills**

To date, PSE&G has applied over 22,000 pounds of herbicides, aerially and by hand, to 2,500 acres of sensitive marsh land. (Source: NJEF 2003 glyphosate analysis) The loss of food, shelter and habitat are unacceptable.

The wetlands experiment fails to reduce the impingement and/or entrainment impacts of Salem and therefore does not fulfill the requirements of 316(b), PSE&G is unable to demonstrate that their wetlands experiment, even if successful (which is doubtful at best), actually provides benefits to the estuary ecosystem.

- PSE&G failed to conduct any baseline data that would demonstrate whether or not food and habitat were limiting factors for the aquatic communities of the Delaware River system and therefore whether or not wetlands restoration could have contributed positively to their numbers.
- PSE&G is unable to demonstrate that the wetlands it is seeking to restore are superior, in terms of food and habitat for fish and other aquatic populations, than *phragmites*. Scientific studies are documenting that *phragmites* in fact is not of inferior value to *spartina*, that it does provide usable and used food, shelter and cover to both aquatic and terrestrial species. Therefore, PSE&G's entire wetlands experiment is based on a false premise.
- The sustainability of the wetlands *phragmites* reduction is dependent on annual herbicide treatment.
- PSE&G has failed to demonstrate that even if it is successful at replacing the existing *phragmites* in the Cohansey and Alloway sites with other species of plants, that this change in vegetation is sustainable and will not be overrun by neighboring stands of *phragmites* within a matter of years.
- At the Alloways site the interim goal was met through the removal of approximately 1,000 acres of *Phragmites* dominated wetlands from the restoration program—an action which then skewed the perceived results by removing from the program a problematic site
- Actions by PSE&G in the *phragmites* dominated sites is not increasing fish utilization of those areas. PSE&G monitoring at Alloway Creek includes sites (a) dominated by *Phragmites*, (b) dominated by *Spartina* or (c) under treatment for *phragmites* removal ("Treated" sites). PSE&G 2000 monitoring showed that within the Alloway Creek study area, fish abundance was similar at all three types of sites. In 2002, fish abundance at the *phragmites* dominated site at Alloway Creek was approximately twice as great as that seen at *Spartina* dominated site and the treated site at Alloway Creek. Reproduction of mummichog and Atlantic silverside was seen in the *phragmites* dominated sites both prior to and following the treatment of *phragmites* and growth patterns were seen to be similar for mummichog and Atlantic silverside both pre and post treatment as well. Studies also indicate that mummichog use *phragmites* as a food source in *phragmites* dominated sites. These results indicate that *Phragmites* eradication has not demonstrated an increased utilization of the site by fish and/or increased fish production.

- Tidal flow has successfully returned to the New Jersey salt hay farms. Not all sites have attained percent coverage goals for *spartina* coverage but *spartina* and other target species do dominate the three sites. The restored salt hay farms that were originally dominated by *Spartina* have reached the set goal of marsh coverage after repeated herbicide applications (Dennis Township and Maurice River) but the one farm that was dominated by *phragmites* (Commercial Township) has not yet reached the interim goal of 45% *spartina* coverage and doesn't come close to the vegetative coverage of the reference marsh at Moores Beach.
- Young of the year fish assemblages in the salt hay farms were similar between the restored salt marshes and the reference marshes including size composition, seasonal patterns of occurrence and species composition. While predator species such as striped bass and white fish were found to be utilizing the restored salt hay farm marshes with a higher diversity of species and a higher density of predator fish as compared to the reference marshes, forage studies indicated that food habits of the fish were similar between the restored salt marshes and the reference marshes.
- According to PSE&G data 2000-2002 there has been little to no usage of fish ladders installed at Garrison Lake or Coopers Lake. While evidence of spawning was seen in all sites except Garrison Lake, it does not appear that the stocking efforts have been successful in establishing the return of offspring to the fish ladder sites. Three of the four sites with large numbers of fish utilizing the ladders received limited stocking, indicating that the fish utilizing the fish ladders are most likely pioneers, rather than either returning stocked fish or offspring of stocked fish. The sites that have received the largest numbers of stocked fish continue to show limited use of the fish ladders by adults.

**PSE&G's mitigation/restoration efforts are not mitigating the impingement and entrainment impacts of the Salem facility.**

PSE&G data and analysis on the record as of 2003 does not demonstrate an increase in baywide abundance values of the representative important species or Atlantic silverside since PSEG completed the marsh restoration and fish ladder installations. Striped bass data is difficult to interpret as the abundance numbers in the Delaware are apparently linked to abundance in Chesapeake Bay. Overall, it appears that striped bass have increased, although this increase is not statistically significant. Weakfish and white perch declined in numbers after 1997, although the decline was not statistically significant. A decline was also seen for spot, bay anchovy, Atlantic silverside (1994-2001), and American shad, with the decline being statistically significant for American shad when comparing 1991-1994 data to 1997-2001 data. Increases have been seen in blueback herring, although these increases are not statistically significant. PSE&G's mitigation/restoration efforts are not mitigating the impingement and entrainment impacts of the Salem facility.

**The costs of closed cycle cooling at Salem has not been demonstrated to outweigh its benefits.**

It would cost only about \$13 a year per rate-payer (assuming an average electric bill of \$100 a month) to install closed cycle cooling at Salem. This \$13 would benefit the health of our fisheries as well as commercial and recreational fishing organizations and businesses.

PSE&G has been given over a decade to carry out its alternative strategy for "mitigating" the impacts of Salem. It has been unable to demonstrate this program is beneficial to the environment and residents of New Jersey. It is time to hold PSE&G accountable and to require implementation of closed cycle cooling at Salem