

*Today's Energy Mix:  
Impacts on Ocean  
and Coastal  
Resources*

Stories from the  
Delaware Experience

June, 2010



# *Agenda*

- The Past—coal powered plants with once through cooling water intakes—Indian River Power Plant
  - Temperature and 316a
  - Impingement and Entrainment issues related to CWA 316b
- The Future method for addressing energy needs
  - Offshore wind

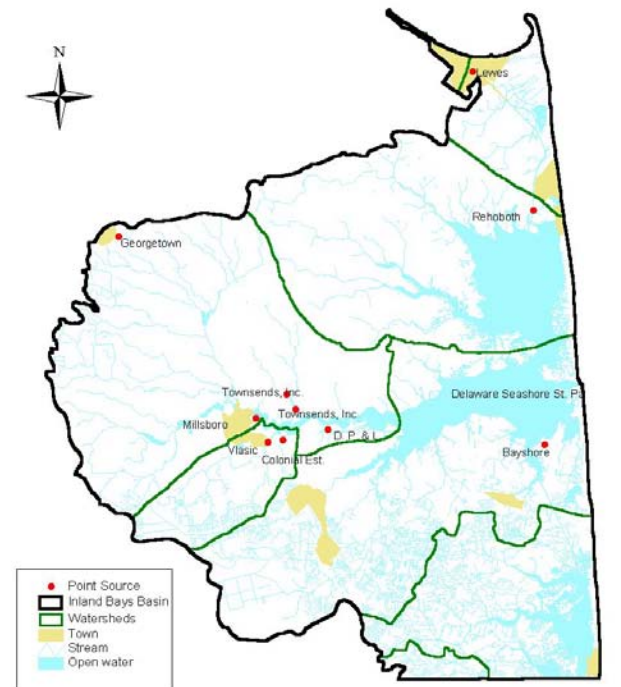
# *Delaware Energy Context*

- 2000 Square miles: 825,000 pop.
- De-regulated 1999
- Three LSE's (70:20:10), one regulated
- SOS typical Load – 1200 MW
- Peak Load – 4600+ MW
- In-state generation – 3000 MW – 85% coal
- Electricity cost - \$0.14 all-in residential
- ~40% electricity imports
- Congested grid – worst in PJM

# *Indian River Power Plant*

- Located in a water of exceptional ecological and/or recreational significance
- 4 units
  - 3 once-through cooling
  - 1 cooling tower
- Temperature TMDL
- I and E issues

Figure 2.5 Point Source Discharges in the Inland Bays Sub-basin



This map is prepared for the DAREC Inland Bays Sub-basin. The information in this map is subject to change or modification at any time. Use of the information by others is at their own risk and the DAREC is not responsible or warrants the accuracy and/or completeness of the information. The information depicted is provided for general and approximate graphical representation only.

December 1998

# ***Total Maximum Daily Load***

- Temperature violations of water quality standards
- Issued by EPA Region 3
- Only applies to Unit 3 (and not Unit 4)

# ***Thermal TMDL***

<u>Season</u>	<u>Wasteload Allocation</u>
October – May	<b>1.26 x 10<sup>10</sup> BTU/day</b>
June – September	No increase of the true daily mean ambient temperature above 84 F
	No increase of the daily maximum ambient temperature above 87 F

**Must be met at the discharge outfall**

# *Closed-cycle Reduces Impacts of Intake and Discharge*

Summer, With IRGS Effects



Areas with temperatures above the June-through-September temperature maximum criterion of 87 °F, July 22, 1998

Summer, Without IRGS Effects



Evaluation of non-human-induced conditions on July 22, 1998 (yellow areas exceed 87°F maximum water quality criterion)



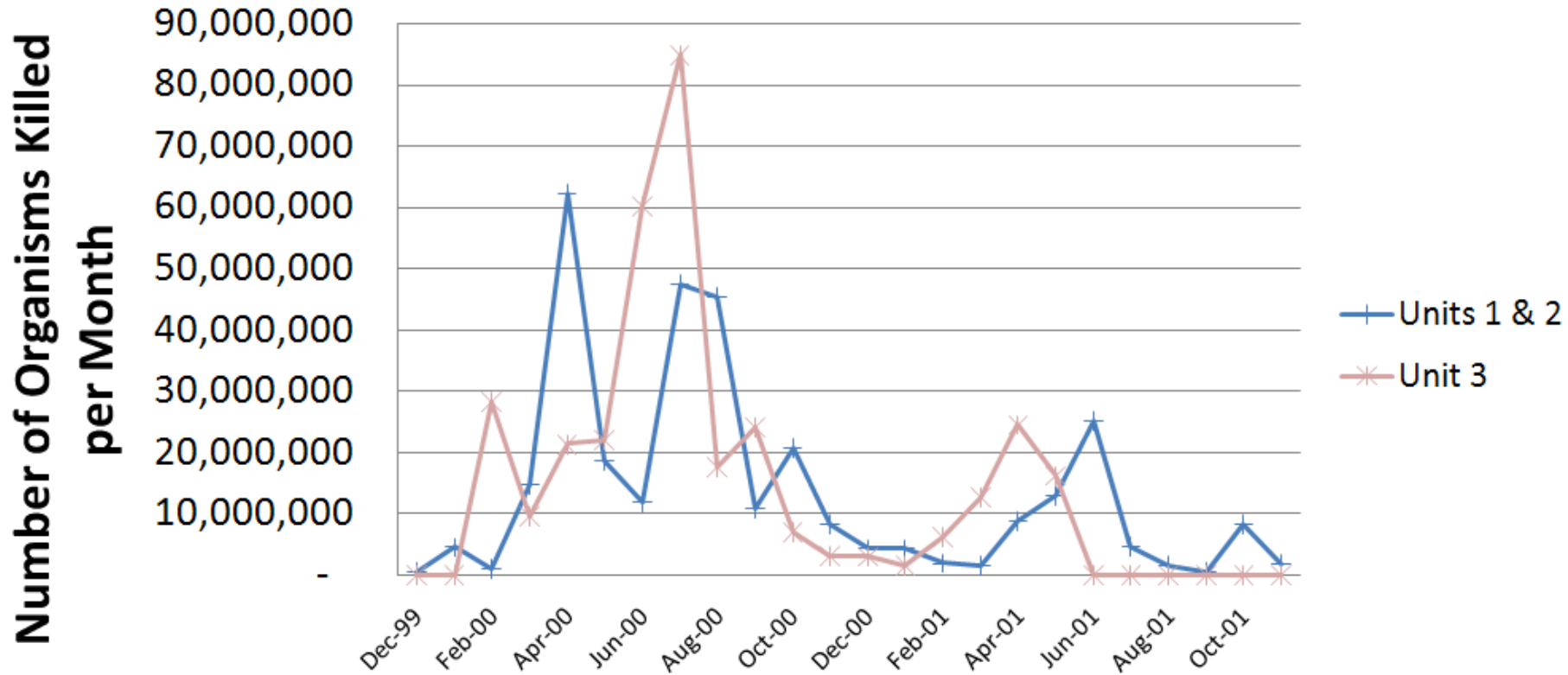
Area violating October-through-May temperature criteria, March 18, 1998

Winter, With IRGS Effects

# *IRPP: Impacts of Cooling Water Intake*

- Impingement & Entrainment – 411 mgd intake destroyed over a billion organisms per year in Inland Bays
- Intake Study in 2000 & 2001 (“equivalent adults” nos.):
  - Blue Crab – 200,000 to 400,000 per year, 1-2x’s recreational harvest in De. from the much larger De. Bay stock
  - Winter Flounder – 800,000 in Year 2000
  - Atlantic Croaker – 500,000 in year 2000, order of magnitude higher than recreational harvest for Inland Bays
  - Atlantic Menhaden – Are forage for weakfish, younger striped bass, bluefish, etc.  
Menhaden have Declined coast-wide in recent years.
  - Bay Anchovy – Are forage for Atlantic croaker, weakfish, and other important species.

# Monthly Fish Kill



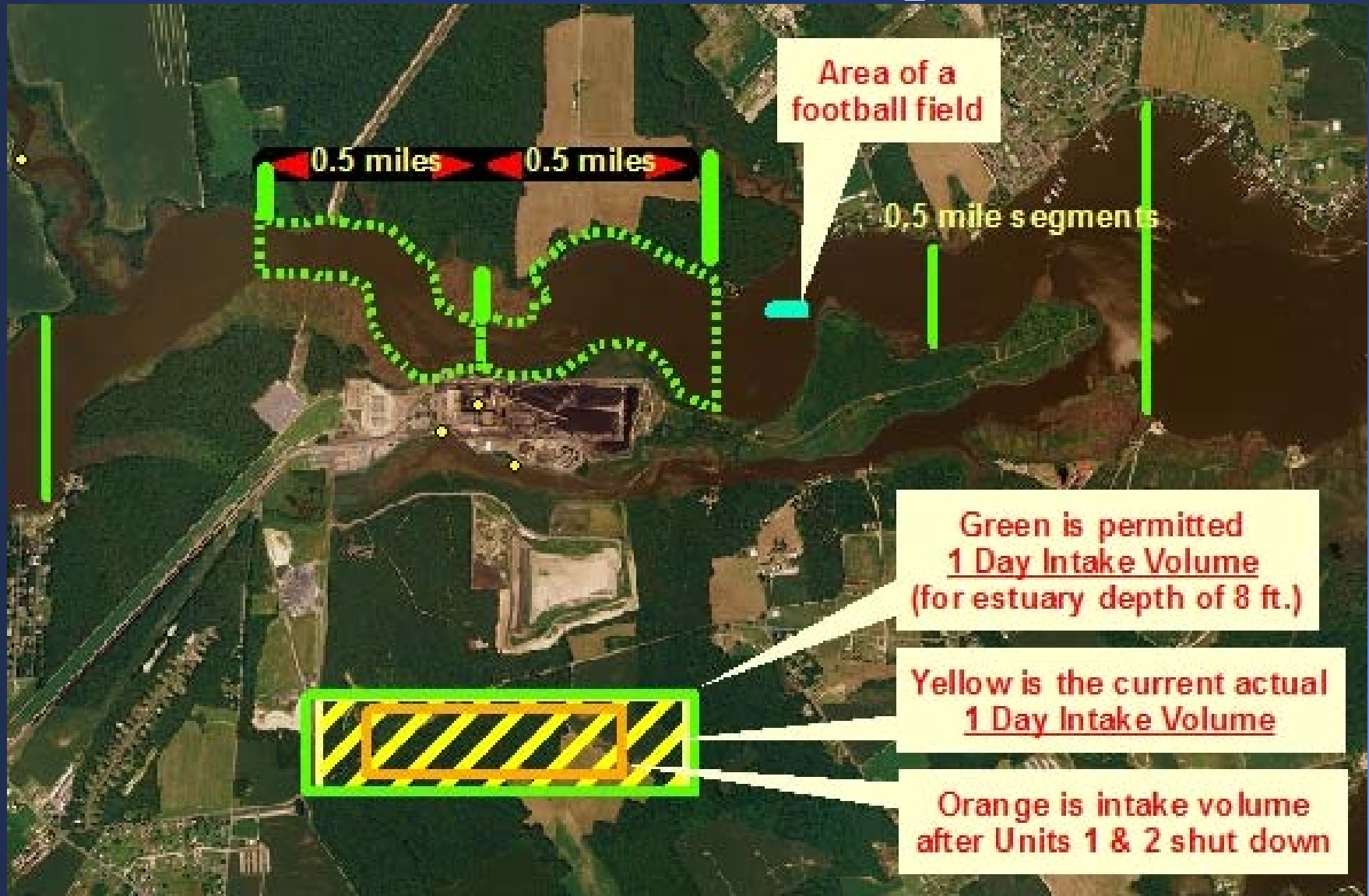
*Best Technology Available (BTA)*  
*Determination*  
*Site-Specific*

- What does “a billion fish” mean?
  - “Body Count”, can argue I&E numbers for years
  - “Significance”, relative to what “population”: Mid-Atlantic Coast, Inland Bays, ...?\*
- What does “too expensive” mean?

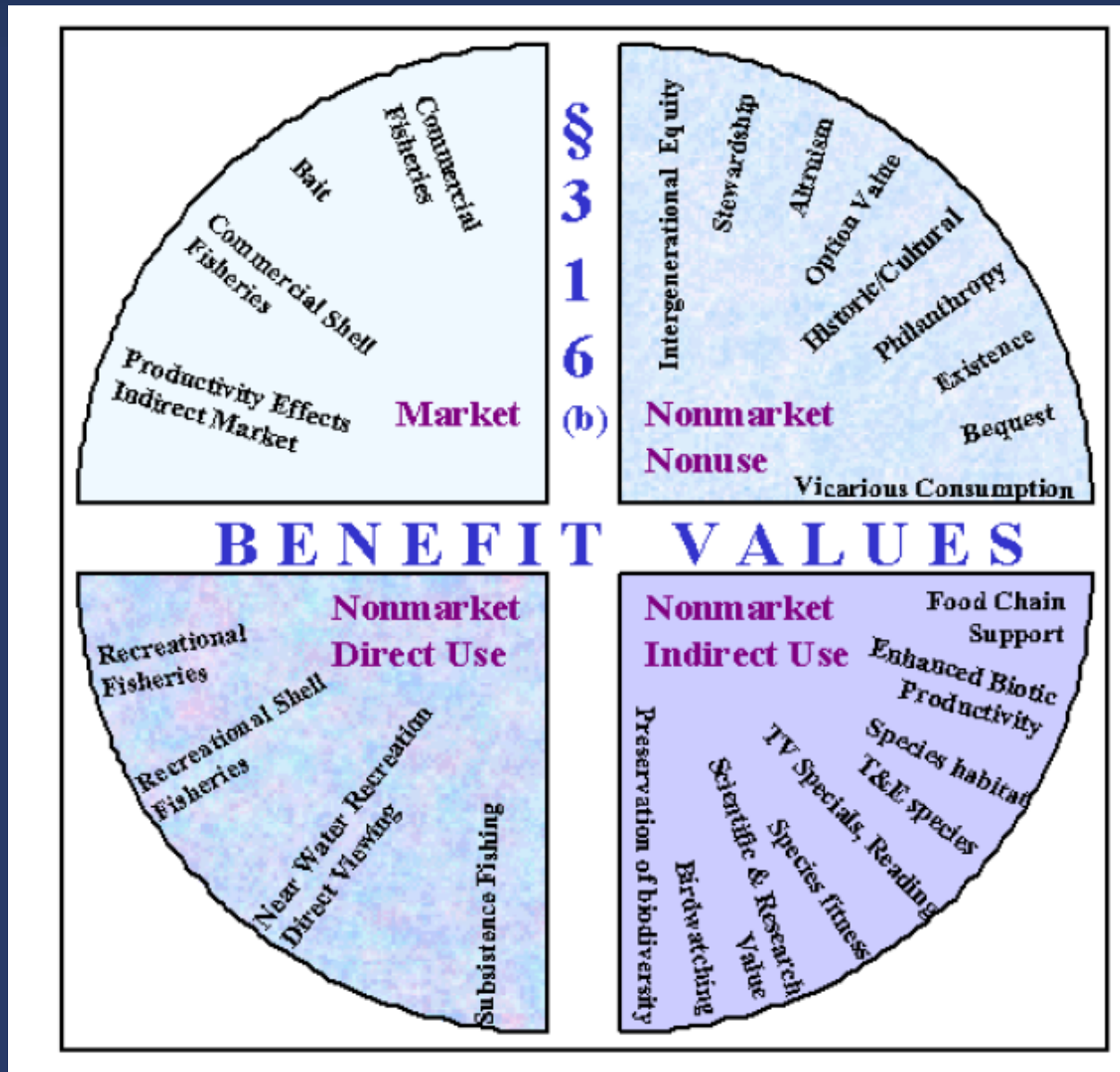
# Elements of a BTA Determination

1. Age of Equipment and Facilities Involved,
2. Process Employed/Engineering Aspects of the Application of Various Types of Control Techniques/Process Changes,
3. Economic Achievability,
4. Non-Water Quality Environmental Impacts, and
5. Other Factors Permitting Jurisdiction Deems Appropriate.

# Intake Volume, at Local Depth & Width



# Direct And Indirect Effects Of CWIS<sup>6</sup>



# Why Offshore Wind in Mid Atlantic U.S.?

- The Mid-Atlantic region will be the first offshore wind market in the U.S.
- Close to population and load centers
- Huge offshore resource:
  - 835 GW capacity & 330 GW average output
  - 185 GW output can supply all East Coast states (electricity, cars, and building heating/cooling)
  - Potential to reduce carbon emissions 68%
- Large, shallow continental shelf
- Expensive fossil fuel electricity regionally



# Delaware's Approach: RFP to PPA

- Deregulation had an unplanned result – freezing consumer prices sparked “balloon payment” in 2006 – leading to call for local generation
- RFP for long-term Power Purchase Agreement allowed offshore wind to measure up against coal/natural gas
- Offshore wind won the day in light of fossil fuel costs & expected carbon fees - RGGI was a factor
- Perfect storm: Strong citizen support/academic leadership, supportive State Treasurer (current Governor), Local government support and private sector entrepreneurship



# *Offshore Wind - Public Perceptions*

## *Key to Success*

- Generally
  - “Clean Energy” appeal
  - Carbon Free – response to global warming
  - Transformative economy – future focused
  - Jobs/new industry
  - Foreign dependency argument
- Delaware
  - 12 miles offshore – visual impacts minimal
  - Retirement communities/leisure perspective
  - Alternative to aged, uncontrolled existing coal plant
  - Health data/cancer cluster perceptions
  - Blackout (1999)/congestion insurance
  - UD Research added credibility/local ownership

# Delaware's Offshore Project

- **Result:** Delmarva and Bluewater Wind agreement for 200-450 MW
  - Only offshore wind PPA in USA (still?)
  - Stable pricing over 25 years
  - 30% of residential demand
- Project currently in Delaware & Federal permitting processes (MET tower approved)
- BWW recently bought by NRG
- MD agrees to join in project purchase
- Delmarva Power likely to meet 20% RPS goal 5 years ahead of schedule (2019)



# *Comments and Questions*

Katherine Bunting-Howarth

DNREC-Division of Water Resources

[Katherine.howarth@state.de.us](mailto:Katherine.howarth@state.de.us)

(302)739-9949