The Role of Knowledge in Assessing Nonuse Values for Site-Specific 316(b) Determination: Results and Implications from the National Environmental Impacts Awareness Survey

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This paper presents a summary of the 2012 Environmental Impacts Awareness survey, which provides insight into the size of household populations which are aware of the impingement and entrainment impacts of cooling water intake structures. This paper provides a brief overview of the purpose of the survey, following by an overview of the survey administration. Finally, this paper provides a summary of the survey findings.

The U.S. Environmental Protection Agency (EPA) is developing regulations under §316(b) of the Clean Water Act which requires that the location, design, construction and capacity of cooling water intake structures (CWIS) reflect the best technology available for minimizing adverse environmental impact. More than 1,500 industrial facilities use large volumes of cooling water from lakes, rivers, estuaries or oceans to cool their plants, including steam electric power plants, pulp and paper makers, chemical manufacturers, petroleum refiners, and manufacturers of primary metals like iron, steel and aluminum. In 1995, the EPA began a three-phased process to develop the rules related to §316(b). The final Phase I Rule, for new facilities, was published on 18 December 2001 (66 FR 65255) and was amended on 19 June 2003 (68 FR 36749). The final Phase II Rule, for existing electric generating facilities was published on 9 July 2004 (69 FR 41575). The Phase II Rule applied to existing facilities whose construction commenced prior to 17 January 2002 and that have cooling water intake structures with a design capacity greater than or equal to 50 million gallons per day (MGD), and use 25 % or more of the water withdrawn for cooling purposes. The Phase III rule, for smaller (<50 MGD) power plants and certain industrial facilities, was published 16 June 2006 (71 FR 35005).

EPA's regulations establishing requirements for CWIS at Phase II and III existing facilities were challenged by industry and environmental stakeholders. On judicial review, provisions were remanded to EPA. In response to the decision, EPA suspended the Phase II rule on 9 July 2007 (72 FR 37107).

EPA proposed a revised Existing Facility Rule in April 2011 (76 FR 22174, April 20, 2011). The proposed Rule applies to all existing power generating facilities and existing manufacturing and industrial facilities that withdraw more than 2 million gallons per day (MGD) of water from waters of the U.S. and use at least twenty-five (25) percent of the water they withdraw exclusively for cooling purposes. The proposed rule constitutes EPA's response to the remand of the Phase II existing facility rule and the remand of the existing facilities portion of the Phase III rule. The proposed Rule presents standards for reducing mortality resulting from impingement and entrainment of fish and shellfish.

The EPA requested public review and comment on the proposed Rule and the supporting technical documents. In addition to its proposed Rule, EPA also developed an Information Collection Request (ICR) to conduct a stated preference survey to determine how much respondents are willing to pay to reduce impingement and entrainment (I&E) impacts (USEPA 2010). As part of its ICR, EPA requested comments on it proposed Willingness to Pay Survey. EPRI provided comments on the Willingness to Pay Survey (EPRI 2010). In 2011,

EPA issued another ICR seeking approval from the Office of Management and Budget (OMB) to conduct the stated preference survey (USEPA 2011).

In the Notice of Data Availability (NODA) Related to EPA's Stated Preference Survey (Federal Register V77, N133; June 12, 2012), EPA presents the results of the stated preference survey described in its two previous ICR's and subsequently administered (USEPA 2012). EPA selected a total target sample of 2,000 completed surveys across four regions and a national sample. The EPA allocated these surveys across regions based on an experimental design which presents a set of three hypothetical choices to each respondent.

The choices presented to respondents are profiles which include a monetary payment and improvement in environmental variables including reductions in I&E (called "fish saved" and fish_saved) and improvements in fish populations ("fish populations" and fish_pop), commercial fish ("commercial fish" and com_fish) populations, and overall aquatic health ("aquatic conditions" and aq_cond). Responses to the choice experiment are modeled for a Northeast, Southeast, Inland, Pacific, and National region using mixed logit techniques. Although many environmental variables are insignificant, in all cases "fish saved" is statistically significant.

EPA's discussion on extrapolation suggests that these survey results could potentially be directly applied to the unsurveyed population. Based on such an approach, an I&E reduction associated with EPA Policy Options 2 and 3 in the proposed Rule (i.e., an approximately 90% reduction in I&E resulting from closed-cycle cooling) is worth over $100 per household per year. This implies $10 billion in annual benefits across all US households and over $200 billion in present-value benefits if the annual benefits are discounted at 3% over 30 years.

There is substantial evidence that awareness of I&E impacts among the general public is quite low, suggesting that the Stated Preference Survey's results are not applicable to the great majority of U.S. residents. However, no efforts have been undertaken by EPA in this or other survey efforts to identify demographic groups who are aware that I&E occurs. That information is required for producing reliable extrapolations of survey results to the unsurveyed population.

There is no utility theoretic foundation known that allows unaware nonusers to experience welfare increases.[1] Therefore, we undertook the 2012 Environmental Impacts Awareness survey. The results from the 2012 Environmental Impacts Awareness survey provide insight into the size of the aware population. The results of the survey indicate that approximately 10 percent of the population is aware of aquatic impacts from steam electric

[1] By comparison, recreational anglers who are unaware of improvements might nevertheless experience catch rate improvements resulting in improved welfare.

plants. No respondents specifically mentioned impingement and entrainment and only one respondent was aware that fish could be impacted through cooling water intakes

1. Overview of Environmental Impacts Awareness Survey

The National Environmental Impacts Awareness survey (EIAS) was administered in July 2012 to provide insight into the size of household populations which are aware of the impingement and entrainment impacts of cooling water intake structures. The survey was administered by Harris Interactive as a QuickQuery. A QuickQuery is an online omnibus research product that lets you ask questions and get accurate, projectable answers from more than 2,000 adult respondents nationwide within two business days. The results are representative of the United States population and can be weighted to the general U.S. adult population or to the U.S. online adult population

The EIAS asks respondents about their current awareness of environmental impacts, including impacts from power plants. The following text presents the question in the survey:

> There are many activities that affect the quality of the environment. In this question, we are interested in learning your current awareness of the environmental impacts associated with power plants that make electricity.
>
> We are interested in learning your current awareness without consulting any external sources such as the Internet, books, family, or friends.
>
> In the spaces below, please list and describe each environmental impact associated with power plants that make electricity that you, personally, are aware of. Please be as specific as possible when you describe each impact, one per line below. For example, if you list air impacts, in your description please provide as much detail as possible about the air impacts.
>
> If you are unaware of any environmental impacts associated with power plants that make electricity, please enter “Not at all sure” in the first box to continue.

Respondents were able to provide ten environmental impacts. Harris Interactive captured the responses and provided them to Veritas as a raw Excel file. Harris Interactive also provided Veritas with demographic data for each respondent (i.e., age, race, gender, income, education).

2. Summary of Results

Almost 2,250 U.S. residents responded to the National Environmental Impacts Awareness Survey. Table 1 provides an overview of the sample's demographics. Fifty-two percent of the sample is male, while 48-percent is female. The sample is spread fairly evenly across age and gender combinations. Two-fifths of the sample has received a high school education or less, and the majority of the population makes an annual household income of $75,000 or less. Almost 75 percent of the population is white (not Hispanic). The sample is fairly representative of the U.S. population (i.e., within two or three percent)

Table 1
Survey Sample Demographic Overview

Demographic	Respondents	Percent of Total
Gender	**2,243**	
Male	1,164	52%
Female	1,079	48%
Age by Gender	**2,243**	
Male 18-29	240	11%
Male 30-39	169	8%
Male 40-49	210	9%
Male 50-64	290	13%
Male 65+	170	8%
Female 18-29	234	10%
Female 30-39	201	9%
Female 40-49	213	10%
Female 50-64	305	14%
Female 65+	212	9%
Education	**2,243**	
HS Graduate or less	928	41%
Some College	454	20%
Associates Degree	207	9%
College 4 Years	421	19%
Post Graduate	234	10%
Income	**2,243**	
Less than $35,000	573	26%
$35,000-$49,999	266	12%
$50,000-$74,999	376	17%

Table 1, continued

Demographic	Respondents	Percent of Total
Income, continued		
$75,000-$99,999	260	12%
$100,000 or over	461	21%
Decline to answer	307	14%
Race	**2,243**	
Hispanic	274	12%
Not Hispanic	1,969	88%
White	1,611	72%
Black	227	10%
Asian or Pacific Islander	39	2%
Native American or Alaskan Native	22	1%
All Other	23	1%
Decline to answer	47	2%

Respondents were given the option of providing up to ten impacts of power plants or they could state they do not know or are unsure of any impacts associated with power plants that make electricity. Figure 1 provides a high-level breakdown of responses.

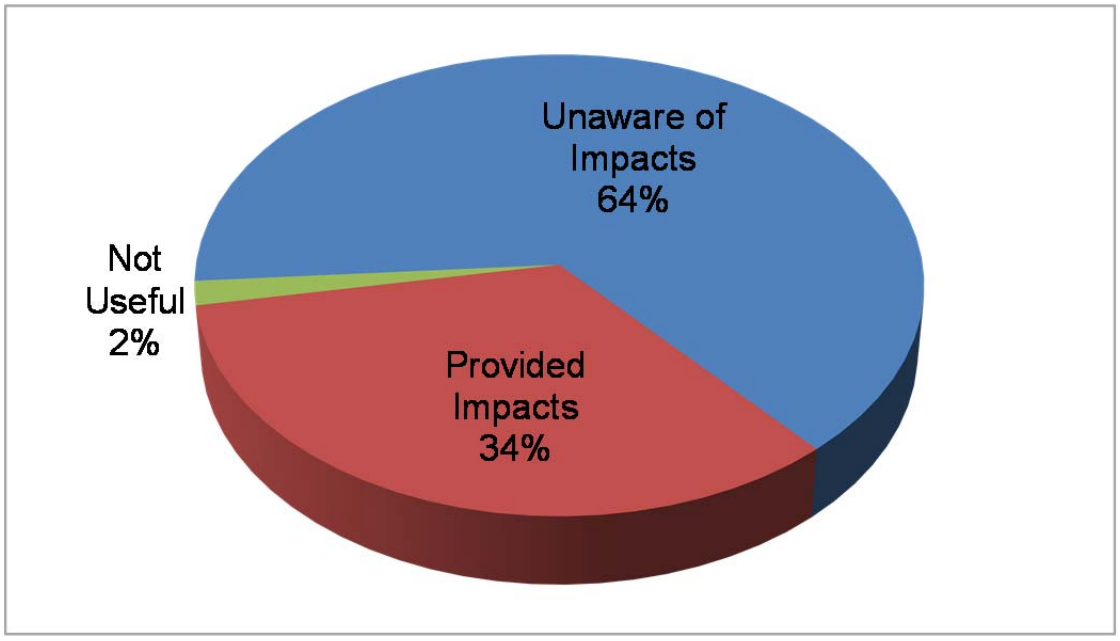

Figure 1: High-level Overview of Survey Responses

As Figure 1 illustrates, 64 percent of respondents stated they are unaware of any impacts of power plants or they stated there are no impacts of power plants. Two percent of respondents provided answers that are not useful (e.g., they inserted a string of letters instead of opting not to complete the survey), and are therefore dropped from the results. Thirty-four percent of respondents provided impacts associated with power plants.

Figure 2 summarizes the main categories of impacts of which respondents are aware.[2] Many of the impacts fell into the following categories:

- Air impacts
- Water impacts
- Groundwater or soil impacts
- Noise impacts
- Visual impacts

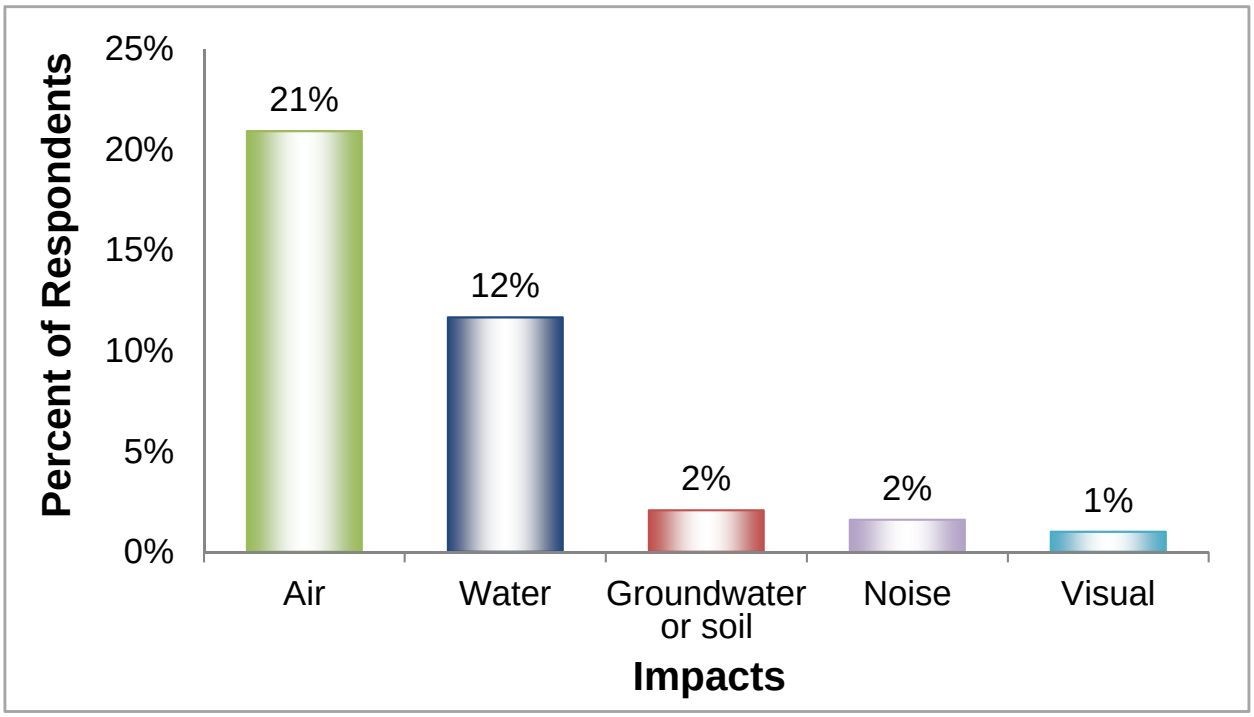

Figure 2: Summary of Impact Categories

Air impacts were the impacts that respondents stated the most out of any impacts. Water impacts were the next most frequently stated impacts. Two percent of respondents

[2] Responses are non-mutually exclusive because respondents could provide up to ten impacts.

mentioned groundwater and soil impacts and noise impacts; and 1-percent mentioned visual impacts of power plants (e.g., they are ugly).

Figures 3 and 4 provide a more detailed breakdown of specific air and water impacts. As Figure 3 illustrates, 4 percent of respondents specifically mentioned they are aware of increases in carbon emissions. Two percent of respondents stated power plants cause global warming and acid rain, following by one percent of respondents who stated that power plants contribute to ozone depletion.

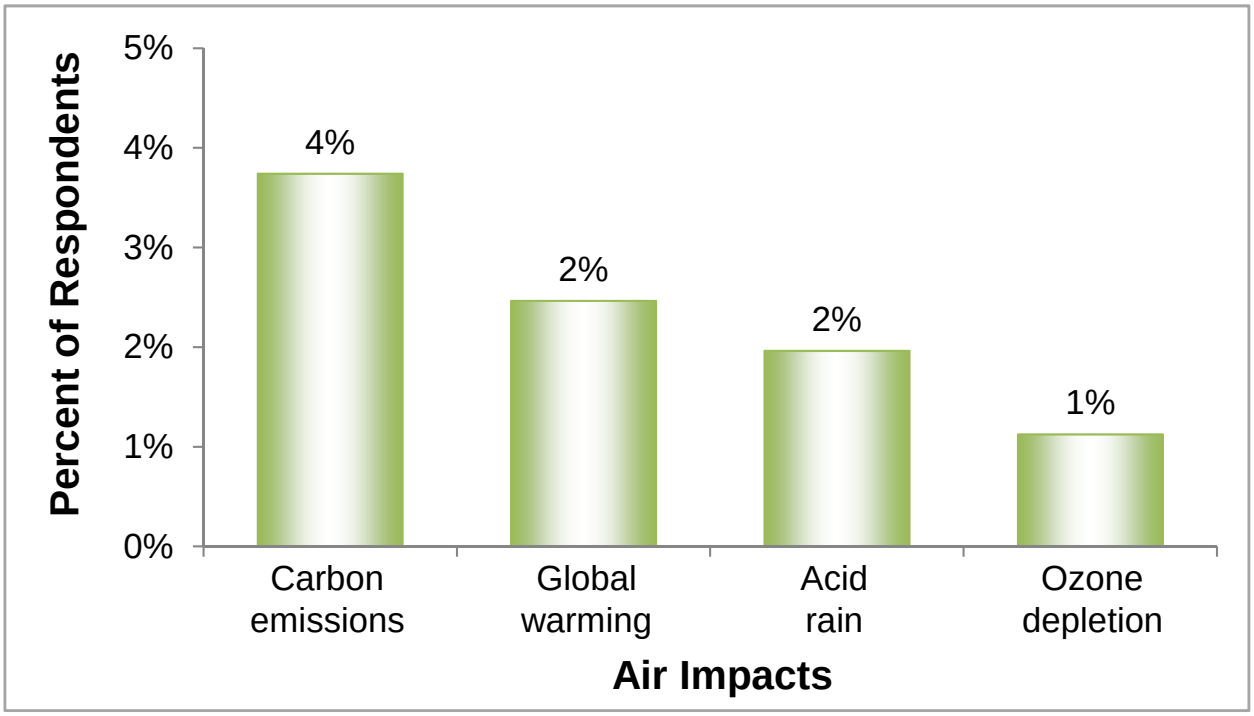

Figure 3: Air Impacts

As Figure 4 illustrates, the results of the survey indicate that approximately 10 percent of the respondents is aware of aquatic impacts from steam electric plants. These include impacts such as water pollution, thermal discharge (3 percent of respondents), wastewater impacts, and impacts to fish. Two percent of respondents is aware of aquatic impacts from hydroelectric plants. One percent of respondents specifically mentioned impacts from cooling water; however, no respondents specifically mentioned impingement and entrainment. Only one respondent was aware that fish could be impacted through cooling water intakes. This respondent is a 34-year old male with a graduate degree. A little less than one percent of respondents stated that they are aware of fish impacts from thermal discharge.

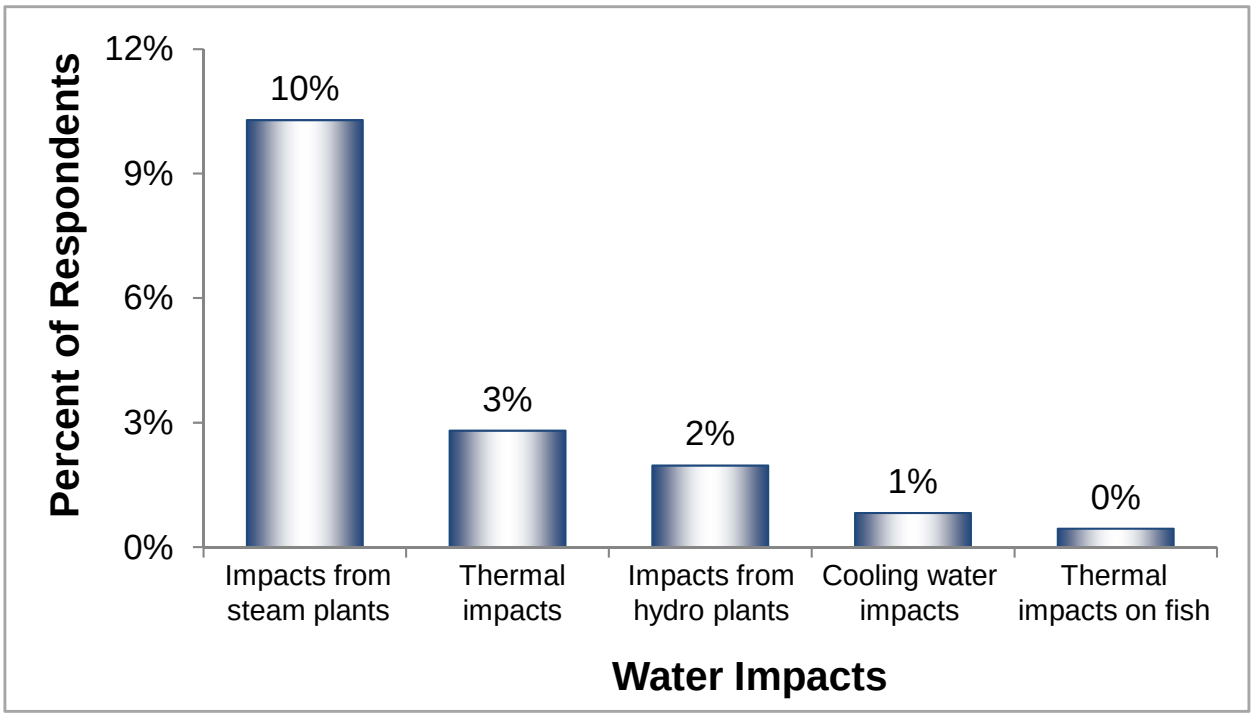

Figure 4: Water Impacts

In addition to the impacts mentioned in Figure 4, respondents also stated that they are aware of impacts to aquatic wildlife (3 percent). Aquatic wildlife includes aquatic plant and animals. Four respondents mentioned impacts on recreations (i.e., fishing and swimming).

Unsafe byproducts (8 percent), destruction of the environment (5 percent), and health impacts (4 percent) are the next three impacts that respondents are aware of following water and air impacts. Unsafe byproducts include nuclear waste and leaks and coal ash. The destruction of the environment impacts range from impacts of strip mining to reduction of natural resources to impacts on non-aquatic plant and animal wildlife habitats. Asthma and cancer were two of the most frequently mentioned health impacts of power plants.

Numerous respondents specifically mentioned a type of power source for power plants. Nine percent of respondents specifically mentioned impacts for coal-fired power plants. Eight percent mentioned nuclear power; two-percent mentioned wind power; and one-percent mentioned solar power.

3. References

Electric Power Research Institute. 2010. Comments on the USEPA's Supporting Statement for Information Collection Request for Willingness to Pay Survey for §316(b) Existing Facilities Cooling Water Intake Structures: Instrument, Pre-Test, and Implementation. EPRI, Palo Alto, CA. Product ID Number E232094.

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