EVALUATION OF U.S. EPA'S SCREENER QUESTIONNAIRE FOR THE AQUATIC ANIMAL PRODUCTION INDUSTRY AND COMPARISON TO USDA DATA

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Abstract

In August 2002, the U.S. Environmental Protection Agency (EPA) proposed national regulations to control pollutant discharges from the wastewaters of the aquatic animal production (AAP) industry. In developing this proposed rule, EPA collected information from the AAP industry by using a two-phase sample design. In the first phase, EPA conducted a census of the industry using a screener questionnaire that requested basic information to better identify and define the population. In the second phase, EPA used a second questionnaire to collect detailed site-specific technical and financial information from a sample of the screener questionnaire respondents. After adjusting for nonresponse in the screener questionnaire responses, EPA estimated that 3,075 facilities conducted AAP in 2000 compared to 4,028 facilities identified by the 1998 Census of Aquaculture conducted by the U.S. Department of Agriculture (USDA). This paper evaluates EPA's screener questionnaire design and compares its results to the USDA Census of Aquaculture and other data sources from the USDA.

Introduction

This paper describes data that the U.S. Environmental Protection Agency (EPA) is using to develop national regulations to control pollutant discharges from the wastewaters of the aquatic animal production (AAP) industry. In developing these regulations, EPA used a two-phase survey to collect information from the AAP industry. In the first phase, EPA used a census to collect basic information that would allow EPA to better identify and define the population. In the second phase, EPA collected detailed site-specific technical and financial information from a sample of the first-phase respondents. After adjusting for nonresponse in the screener questionnaire responses, EPA estimated that 3,075 facilities conducted AAP in 2000 compared to 4,028 facilities identified by the U.S. Department of Agriculture (USDA) *1998 Census of Aquaculture*. This paper evaluates EPA's screener questionnaire in the first phase of the survey and compares those results to data sources from the USDA.

Background and Definition

During the last 30 years, EPA has conducted surveys of numerous industrial sectors. The information from these surveys has been used to develop national regulations for water pollution control. For each industry, EPA selects an appropriate technology control, by determining its availability within the industry, the potential costs to the industry, the economic impacts of the costs on businesses, as well as the degree to which it effectively prevents the generation of pollutants, or removes, controls, or reduces specific pollutants. EPA then applies the technology control to determine appropriate numerical limits on the amount of specific pollutants that can be discharged in wastewater by facilities in each industry. Since 1974, this program has been very successful, resulting in a combined reduction of over 690 billion pounds of pollutants each year to the nation's waters due to regulations on more than 55 industrial categories.

Although some AAP facilities currently have permits to discharge their wastewater, EPA has not promulgated *national* regulations for this particular industry. The AAP industry includes fish hatcheries and farms that grow finfish (such as trout, catfish, salmon, tilapia, hybrid striped bass, ornamentals), shrimp, and other aquatic animals. Some AAP facilities can contribute nutrients to environmentally sensitive areas in estuaries, rivers, lakes, and streams throughout the country. In addition, the facilities use and potentially discharge drugs (e.g., antibiotics) and other chemicals. During its examination of this industry, EPA has observed improvements in wastewater treatment within the AAP industry by some facilities to reduce nutrients and other pollutants. By examining the cost and performance of pollution control technologies and practices, EPA is investigating whether more facilities could employ these technologies to reduce pollutant discharges to surface waters.

Data Collection

To support its evaluation of the AAP industry, EPA has gathered, and continues to gather, technical and economic data to define the industry, develop the industry profile, develop technology options, estimate the environmental benefits of regulation, evaluate economic achievability of the regulatory options, and determine practices leading to pollutant reductions. The major sources of information are EPA's two-phase survey, the USDA *1998 Census of Aquaculture*, EPA visits to AAP facilities, literature searches, and information provided by industry experts (including a Task Force chaired by the USDA and the National Oceanic and Atmospheric Administration (NOAA)). This paper focuses on the data from the first phase of EPA's survey and the USDA Census.

EPA: Screener Questionnaire for the Aquatic Animal Production Industry

In August 2001, EPA conducted the first-phase of its two-phase survey of the AAP industry. In this first phase, EPA mailed the *Screener Questionnaire for the Aquatic Animal Production Industry* ("screener") to approximately 6000 facilities. Response was mandatory under Section 308 of the Clean Water Act. Because the questionnaire required only one hour to complete, EPA requested that responses be returned within 15 days. The questionnaire consisted of 11 questions about the type of facility (e.g., commercial, government, tribal), the quantities of animals produced by species and size category, the production methods that were used, water discharges from the property, and description of pollutant control practices.

USDA: 1998 Census of Aquaculture

The USDA notes that the *1998 Census of Aquaculture* ("Census") was the first census to take a comprehensive snapshot of all species produced throughout the 50 states.[1] This survey was conducted by USDA's National Agricultural Statistics Service (NASS) to respond to "the intense need for an accurate measurement of the aquaculture sector, which grew from $45 million for value of products sold in 1974 to over $978 million in the 1998."[2] The USDA Census collected information about on-farm aquaculture practices in 1998 including the size of the operation based on water area, production, sales, sources of water, point of first sale outlets, cooperative agreements and contracts, and aquaculture distributed for restoration or conservation practices.

Information Collected by Both Surveys

While the USDA Census collected more information than the EPA screener, both agencies obtained information on production methods, species produced, and production levels.

Comparisons

Because it relied on both data sources for its analyses, EPA compared the EPA screener estimates to the USDA Census counts. Because the population sizes appeared to differ without obvious explanations in some cases, EPA investigated the differences between the two data sources. The following sections describe the population estimates, the definition of the target population, the frame, and base year.

Population Estimates

From the screener responses, EPA estimated 3075 facilities conducted AAP. This estimate was derived from adjusting the 2329 in-scope respondents for nonresponse on a state-by-state basis. (EPA determined that using a state-by-state adjustment was appropriate because the type of aquaculture and production practices would tend to be similar within a state.) In contrast, the USDA counted 4028 farms. The USDA had an extensive follow-up campaign for its 1998 Census, and, as a result, assumed that all farms responded to the Census. The two sources also differed in the number of facilities growing each species and using different production methods.

Species. In terms of the number of facilities growing particular species, the ratio of the USDA's count to EPA's estimate varied from 0.17 to 6.78, as shown in Table 1. In addition, the 95 percent confidence intervals for the EPA estimates do not overlap with the USDA counts for any of the species.

Table 1. Number of Facilities Growing Species

[1]U.S. Department of Agriculture (2000), *1997 Census of Agriculture: Census of Aquaculture (1998)*, Volume 3, Special Studies, Part 3, AC97-SP-3, page v.

[2]*Ibid.*

Species	USDA Census (count)	EPA Screener		Ratio (USDA/EPA)
		Estimated Number	Standard Error	
Trout	561	818	28	0.69
Catfish	1370	901	30	1.52
Salmon	47	277	16	0.17
Tilapia	148	178	15	0.83
Crawfish	563	83	9	6.78

Production Method. The two data sources again displayed different values for the production methods, with ratios ranging from 0.27 to 1.55, as shown in Table 2. In addition, the 95 percent confidence intervals for the EPA estimates do not overlap with the USDA counts for any of the production methods.

Table 2. Number of Facilities Using Production Method

Production Method	USDA Census (count)	EPA Screener		Ratio (USDA/EPA)
		Estimated Number	Standard Error	
Ponds	2878	1860	43	1.55
Flow through systems	617	1358	36	0.45
Net pens and cages	167	610	26	0.27
Recirculating systems	328	262	17	1.25
Other	569	403	not calc.	1.41

Definition of Target Population

Because EPA and USDA defined the target populations differently, EPA investigated the impact of those definitions on the values. EPA defined the AAP industry to include all "facilities" that answered "Yes" to the question "Do you produce (grow) aquatic animals (fish, shellfish, or other aquatic animals) at this facility?" The USDA defined the target population as "any commercial or noncommercial place from which $1,000 or more of aquaculture products were sold or normally would have been sold during the census year." Thus, one difference between the two target populations was that the USDA required that facilities sell their products, while EPA did not. As a result of this exclusion, the USDA generally excluded facilities such as state hatcheries. Consequently, EPA would have expected its total population estimate to exceed the USDA count, which was not the case. However, for certain species typically grown in state hatcheries (such as trout and salmon), EPA's estimates exceeded the USDA counts. Another difference in the target population definitions was that the USDA included 20 farms[3] that sold "algae and sea vegetables", which EPA excluded because its target population focused on aquatic animals only.

Frame

[3] *Ibid*., Table 19.

Because the definitions of the target population lead to different expectations than observed, EPA then evaluated the sources used to develop the frame. The USDA's frame for the 1998 Census consisted of farms that identified themselves as having "fish and other aquaculture products" in the *1997 Census of Agriculture*. This frame was supplemented by other USDA information, and lists of state and federal fish hatcheries. Because of confidentiality restrictions, the USDA was unable to share its frame with EPA. As a consequence, at the start of its regulatory activities in 2000, EPA relied primarily on the Dun & Bradstreet (D&B) database. From this database, EPA selected all facilities with Standard Industrial Classification (SIC) codes for animal aquaculture (0273), animal specialties (0279), and fish hatcheries and preserves (0921). In addition, EPA requested lists from states, tribes, and various associations. EPA also consulted aquaculture journals and conducted searches through the internet. These requests were only partly successful because some state agencies were unable to share their lists of aquaculture facilities with EPA. Finally, as a result of mailing the questionnaire to facilities, they, in turn, identified other facilities that did not receive the questionnaire. As a result of consolidating the lists and eliminating the obvious duplicates, EPA's frame consisted of approximately 6000 facilities. However, of the 4214 returned questionnaires, only 2329 were in-scope (i.e., facilities that conducted AAP). Because the USDA frame would have excluded farms with less than $1,000 of agricultural products produced and sold, EPA expected that the EPA frame would be more comprehensive. It is possible that EPA's other sources of information did not identify all of the facilities in states that were unable to provide EPA with information about AAP facilities.[4] Perhaps, the USDA, a non-regulatory agency, was able to compile a frame that includes these facilities.

Base year

EPA also considered whether the AAP population changed from 1998, the USDA Census base year, to 2000, the EPA base year. For this evaluation, EPA used two additional USDA sources. The first additional source was the USDA *Census of Agriculture* which provides data for 1997, and was used to develop the USDA's frame for the *1998 Census of Aquaculture*. The second additional source was the USDA report *Catfish and Trout Production* ("report") which provides data for 2000, which is the same as EPA's base year. (The USDA developed this report through monthly catfish processing, quarterly catfish production, and annual catfish and trout surveys.)

Trout. For trout production, the numbers of facilities increased over time in the three USDA data sources, but even the most recent USDA value of 690 facilities was less than the EPA screener estimate of 818 facilities. EPA's larger estimate may include state hatcheries and others that were not part of the USDA target population for its Censuses.

Catfish. For catfish production, the three USDA data sources provided population values that decreased over time from 1457 to 1252. The EPA estimate of 901 facilities growing catfish is lower than any of these USDA values. Unlike trout which is sometimes grown by noncommercial facilities such as state hatcheries, EPA has found only commercial growers of catfish, and thus, EPA had expected its estimate and the USDA values to be similar because the target populations would be the same. Table 3 summarizes the number of facilities growing trout and catfish according to the three USDA sources and the EPA screener. The table also provides the standard error of the EPA estimates.

Table 3. Number of Facilities Producing Trout and Catfish in 2000

Species	USDA Agriculture Census (1997)	USDA Aquaculture Census (1998)	USDA Report (2000)	EPA Screener (2000)	
				Estimate	Std. error
Trout	411	561	690	818	28
Catfish	1457	1370	1252	901	30

Assessment of EPA Screener

In addition to evaluating the differences between the surveys, EPA also assessed its screener by examining the response rate and the scoping question.

Response Rate

[4]However, for one state, EPA and USDA values were similar. (EPA has only reviewed the data for this one state at this time.)

The response rate was 76 percent for the screener, which is lower than similar surveys conducted by this program. As is its usual practice, after mailing the screener, EPA conducted a follow-up campaign that included reminder letters and telephone calls (when the phone numbers were readily available). Even with its follow-up campaign, EPA believes that the response rate for the AAP industry was affected by the large out-of-scope component in its frame, with some out-of-scope facilities unaware of the importance of returning the survey. EPA also encountered some resistance to the requirement to respond to the screener. While some facilities contacted EPA to express their concerns and their refusals, EPA expects that other facilities merely ignored the requirement. EPA expects that the USDA would encounter less resistance to its surveys, because the USDA is not primarily a regulatory agency.

Scoping Question

EPA also noted that some respondents expressed some confusion about the term "produced" that was used in the scoping question "Do you produce (grow) aquatic animals (fish, shellfish, or other aquatic animals) at this facility?" For example, some respondents questioned whether "produced" meant "sales." Also, respondents for aquariums did not always consider that the facility "produced" or "grew" any aquatic animals because they were not breeding the animals in any concentrated manner. As a result of this confusion, some respondents considered themselves to be out-of-scope, when EPA later identified them as in-scope facilities.

In addition, EPA is concerned that facilities may have been confused about the time period covered by the screener, because the scoping question did not explicitly identify the base year. Thus, some facilities may have assumed that the screener was asking about conditions when they received the screener rather than the conditions during any period in 2000. As a result, facilities with seasonal production may have considered themselves to be out-of-scope.

Conclusions

EPA did not find any factors that would fully explain the differences between the USDA counts and EPA estimates. Although the EPA estimated total population size was lower, the EPA target population was more inclusive than the USDA Census. Despite its incorporation of mailing addresses from many sources, some facilities were apparently still missing from EPA's frame. While the base year was different for the USDA Census and the EPA screener, EPA examined other USDA data sources and found that the USDA values were more similar to each other than the EPA screener estimated values. In examining the response rate, EPA noted that some facilities refused to respond to the questionnaire and some out-of-scope facilities may have failed to realize the importance of responding. EPA also noted some confusion about the scoping question that lead some facilities to conclude that their operations were out-of-scope for the screener. Because these factors do not appear to fully explain the differences, EPA concludes that there are still other possible explanatory factors. Partly as a consequence of these discrepancies, EPA does not intend to rely solely on the USDA data or EPA survey data to develop its regulations for the AAP industry. EPA is supplementing these data with other sources such as literature searches, visits to AAP facilities, and industry experts (such as the Joint Subcommittee on Aquaculture's Aquaculture Effluents Task Force (JSA/AETF) which includes experts from various government agencies, industry and trade associations, academia, and other interested stakeholders). In addition, the preamble to the proposed rule (August 2002) solicited information, comment, and data about a number of aspects considered in development of the proposed regulations.

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