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# Volunteer fish and invertebrate surveys: what makes recreational SCUBA divers want to participate?

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## **Volunteer fish and invertebrate surveys: what makes recreational SCUBA divers want to participate?**

*Abigail Sine and Joseph K. Gaydos\**

*The SeaDoc Society, UC Davis Wildlife Health Center – Orcas Island Office, 1016 Deer Harbor Road, Eastsound, WA 98245*

*\*Corresponding author: [jkgaydos@ucdavis.edu](mailto:jkgaydos@ucdavis.edu)*

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### **Abstract**

Monitoring of species abundance, composition and distribution is essential for management and conservation of regional marine fish and invertebrate populations. The Reef Environmental Education Foundation's Fish Survey Project promotes resource stewardship and helps support more rigorous scientific monitoring by enabling recreational SCUBA divers to survey for fish and invertebrate presence and abundance while diving. As volunteer survey effort increases, so does the value of these data. To solicit ideas for increasing voluntary survey efforts in the region we queried certified SCUBA divers to determine what motivated and prevented people from conducting Fish Survey Project surveys. We received 395 completed questionnaires. An interest in becoming more familiar with local species was cited as the number one reason for participation by people who had previously conducted fish and invertebrate surveys as well as for people who had never performed them but were interested. People who had never performed a SCUBA survey and were not interested in doing so indicated that their lack of confidence in identifying fish and invertebrates was the number one reason, but most indicated that free fish and invertebrate identification classes would change their mind. These data suggest that a focused advertising campaign and free fish and invertebrate identification classes are probably the best ways to solicit more recreational SCUBA divers to perform fish and invertebrate surveys in the Puget Sound Georgia Basin region.

### **Introduction**

A comprehensive understanding of ecosystem trends is critical to effectively manage living marine resources in the Puget Sound Georgia Basin. Gradual changes in species composition, size, abundance, and distribution are difficult to notice, but the cumulative effects can be dramatic over time. Three species of marine invertebrates and over 24 species of marine fishes in the Puget Sound Georgia Basin marine ecosystem are listed as threatened or endangered or are candidates for listing by one or more jurisdiction (Gaydos and Gilardi 2003). The task of monitoring the distribution and abundance of these and other declining species throughout region is monumental as monitoring in marine environments is often expensive, time and work intensive, and access limited.

A citizen-based volunteer fish and invertebrate monitoring program exists that promotes resource stewardship and helps supplement more rigorous census work being conducted (such as trawling or seining and linear transect surveys). The Reef Environmental Education Foundation's (REEF) Fish Survey Project (the Project) enables SCUBA divers in the Puget Sound Georgia Basin to monitor fish and invertebrate presence and abundance while diving recreationally (Pattengill-Semmens and Semmens, 2003). During the survey, divers swim freely throughout the dive site (known as the Roving Diver Technique) and record every observed and identifiable fish species and a suite of select invertebrate species. At the conclusion of the survey, divers assign one of four log<sub>10</sub> abundance categories (single [1], few [2-10], many [11-100] and abundant [>100]) to each species observed. Species data, survey site, bottom time, dive depth, water temperature, habitat type surveyed and other environmental information are recorded on data sheets provided by REEF. The surveyor then returns the completed forms to REEF, paying only the cost of return postage. The data are ranked based on diver experience level and entered in to an electronic database, which can be accessed by anyone through the REEF website ([www.reef.org](http://www.reef.org)).

Volunteer-based dive survey data have been found to be beneficial in monitoring marine ecosystems in Hispaniola (Schmitt et al., 2002), the United States (Schmitt and Sullivan, 1996), and Tanzania (Darwall and Dulvy, 1996). Although the advantages of the Fish Survey Project have become apparent, their applications in the Pacific Northwest are still minimal. Of the nearly 75,000 surveys conducted through the project since 1993, only 3% of them have been conducted in the Puget Sound Georgia Basin region. The Fish Survey Project was not expanded to the Pacific Northwest until 1999, but the relatively small number of surveys that have been conducted in the region still suggests more effort needs to be made to involve more recreational divers.

As volunteer survey effort increases, so does the value of the data. Using a simple questionnaire, we attempt to determine the most effective way of encouraging greater regional participation in volunteer fish and invertebrate surveys.

## Materials and Methods

A short and simple questionnaire was developed (Fig. 1) and certified SCUBA divers were targeted. Over 1,000 questionnaires were distributed to dive shops and dive clubs in Washington State (USA) and British Columbia (Canada). Questionnaires also were made available on various local SCUBA-related websites, on-line dive magazines, and electronic discussion lists. Only questionnaires that were filled out correctly and completely were considered.

Questions were multiple choice and designed to determine an individual's motivation for conducting or not conducting surveys. Individuals that had previously done surveys were asked where they originally learned about the program and what prompted them to begin participating. Individuals that had not previously conducted surveys were introduced to the concept of surveying, the methods of submitting the data that they collect and the general extent to which the data is utilized and stored. After this brief introduction, people were asked if they would be interested in participating in such an activity. If they responded "yes", they were asked what their primary motivation was for participating. If they responded "no", they were asked for which reasons were they not interested and also what might encourage them to participate.

Figure 1: Survey form



## SCUBA Divers needed to help monitor and restore fish and invertebrate populations in the Pacific Northwest

Around the world, volunteer recreational SCUBA divers are helping to survey fish and invertebrate populations. These data are used to recover declining species and help ensure that common species stay abundant. The SeaDoc Society is trying to learn how we can encourage more SCUBA divers to help with these dives in the Pacific Northwest. We appreciate you taking a few minutes to fill out this survey.

1. Have you ever conducted a roving diver fish or invertebrate survey?
  - a. Yes – ( go to question #2)
  - b. No – ( go to questions #4)
2. How did you initially learn about conducting surveys?
  - a. through a friend
  - b. through my local dive shop/ dive club
  - c. through the REEF website
  - d. through another website (please specify)
  - e. other (please specify)
3. What reason prompted you to conduct these surveys? (check all that apply)
  - a. To become more familiar with local species
  - b. To give your recreational diving a purpose
  - c. Because a friend was doing them and encouraged you to participate
  - d. Because it was part of a dive club or group activity
  - e. Because you could help restore declining fish and invertebrate populations
  - f. Other – please explain

You're done! Thank you for participating in this survey and for helping to monitor and restore fish and invertebrate populations.

4. A program exists whereby recreational SCUBA divers can record what they see while diving. Survey forms are mailed to interested parties upon request (at no cost). After a dive, they fill out a form (takes approximately 5 minutes) and mail it in. The program is entirely free, except for the cost of the stamp it takes to mail in the survey. The data are then entered into an international database that is available for free via the internet. Over the last 10 years, 1,468 surveys have been done in the Puget Sound and 691 have been done in British Columbia's Georgia strait. These data are being used to help monitor and recover declining fish and invertebrate populations like rockfish and abalone. Local citizens and divers also can access this database to learn more about where people are seeing which species. Would you be interested in conducting surveys while diving?
  - a. Yes - (go to question #6)
  - b. No - go to question # 5
  
5. For which reason(s) are you not interested in conducting fish and invertebrate surveys while diving? (check all that apply)
  - a. Not confident with identifying local fish and invertebrates
  - b. Too much of a hassle to get survey forms
  - c. Too much of a hassle to fill out survey forms
  - d. Too much of a hassle to mail in survey forms
  - e. Not interested in helping restore declining fish and invertebrate populations
  - f. Other - (please explain)
  
6. Would the following items encourage you to conduct fish and invertebrate surveys while diving? (check all that apply)
  - a. Free fish and invertebrate identification classes
  - b. Fish and invertebrate identification classes that cost a small fee (\$25-\$30)
  - c. The ability to fill in and submit dive survey information electronically (on-line)
  - d. Joining organized trips where there are other SCUBA divers conducting surveys
  - e. Other - (please explain)

You're done! Thank you for participating in our survey and for helping us learn what we might be able to do to help encourage more divers to participate in monitoring local fish and invertebrate populations.
  
7. What are your motivations for conducting fish and invertebrate surveys while you are diving recreationally? (check all that apply)
  - a. It is an opportunity to become more familiar with local species
  - b. It gives my recreational diving a purpose
  - c. It would be fun to go out with a dive club or group doing this
  - d. It gives me an opportunity to help restore declining fish and invertebrate populations
  - e. Other - please explain

You're done! Thank you for participating in our survey and for helping us learn what we might be able to do to help encourage more divers to participate in monitoring fish and invertebrate populations.

Thank you for your time. Please mail this completed survey to:

Abby Sine  
The SeaDoc Society, 1016 Deer Harbor Road, Eastsound, WA 98245

## Results

The majority of the 395 completed questionnaires returned (n=345) were taken electronically. Only 5% (n=50) of the paper questionnaires sent were returned and none were returned from Canada. We were unable to track the origin of surveys taken and submitted electronically.

Of 395 completed questionnaires, 44% (n=174) of people reported previously participating in the Fish Survey Project (Fig. 2). Most of these people had learned about the volunteer monitoring from a friend or through a dive shop (Fig. 3) and cited their interest in becoming more familiar with local species and giving their recreational diving a purpose as the two most common reasons for performing surveys (Fig. 4). Of the people who never performed a fish and invertebrate survey, 75% expressed interest in doing so (Figure 5) with becoming more familiar with local species and helping to restore declining populations being the two most commonly cited reasons for their interest (Fig. 6). Of the 25% of people who had never done a roving diver survey and were not interested in conducting them, lack of confidence in identifying fish and invertebrates was cited as the number one reason (Fig. 7) and free fish and invertebrate identification classes was the number one response for what would encourage them (Figure 8).

Figure 2: Questionnaires completed by individuals that had participated in the Project and those that had not

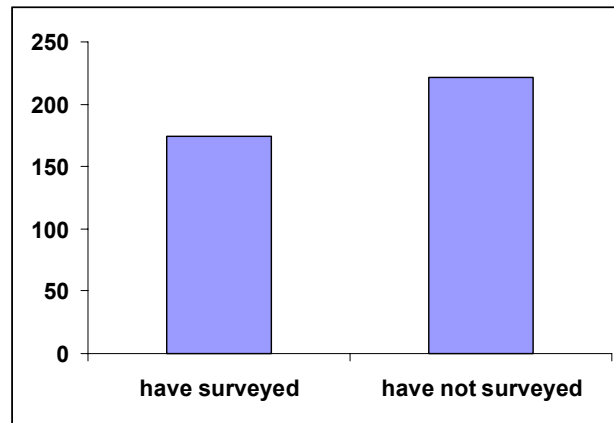


Figure 3: Responses listed by individuals who had previously participated in the Project to how they initially learned about conducting surveys

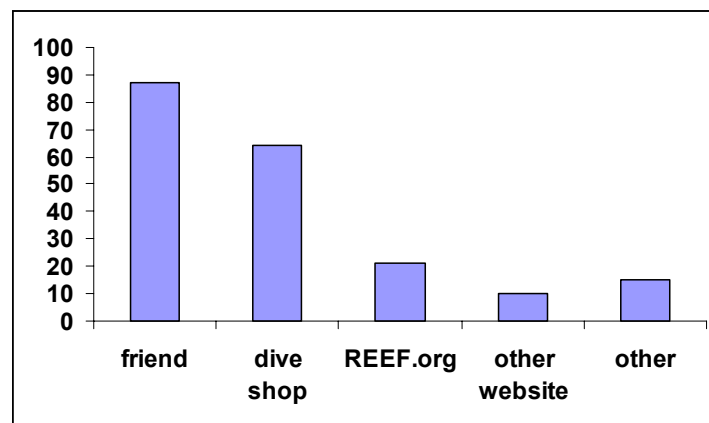


Figure 4: Reasons listed by individuals who had previously participated in the Project for why they conduct fish and invertebrate surveys

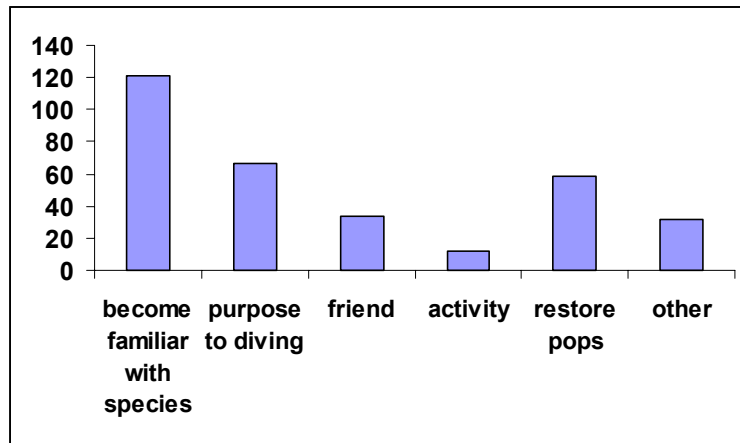


Figure 5: Interest in participating in the project from people who had previously participated

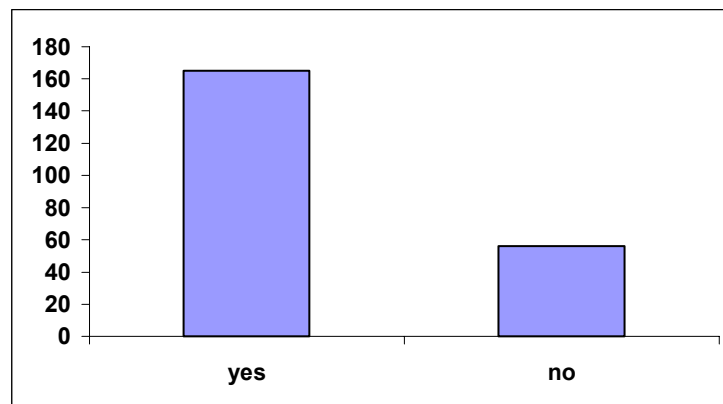


Figure 6: Responses from individuals who had not yet, but were interested in participating in the Project when asked about their motivations for participating

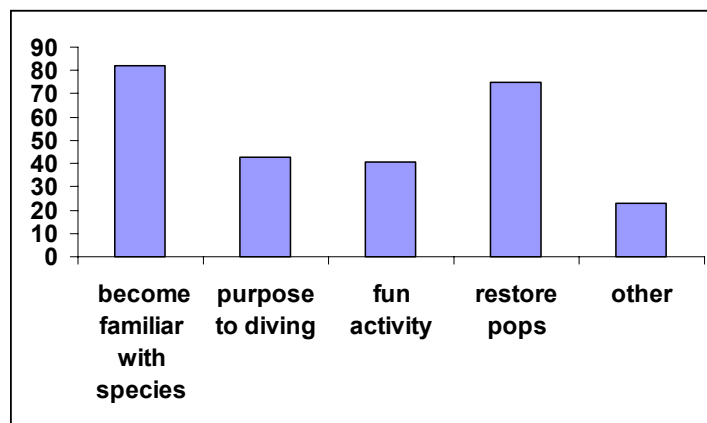


Figure 7: Responses from individuals who had never participated in the Project and were not interested in doing so

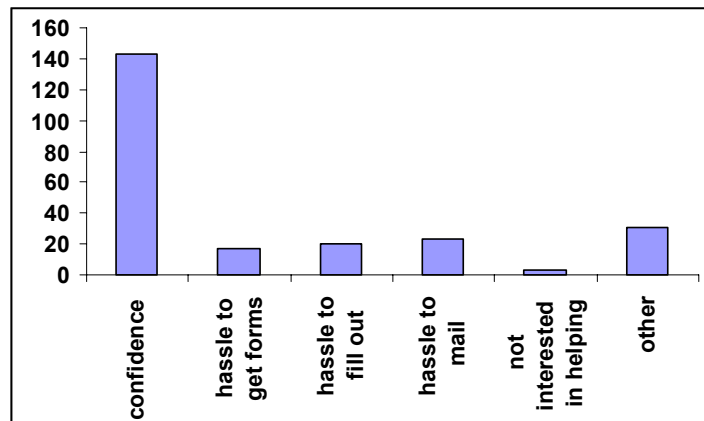
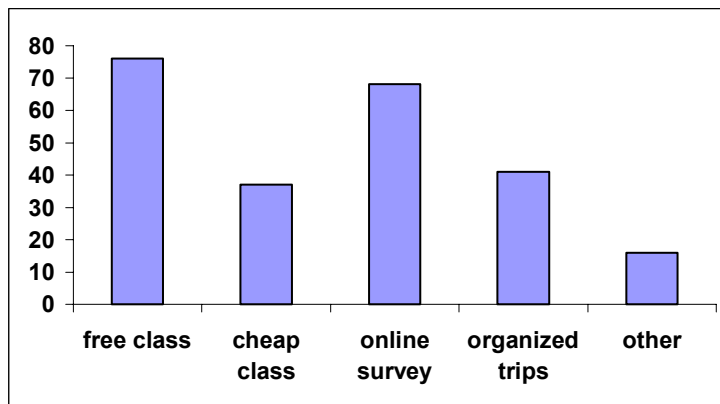


Figure 8: Responses from individuals who had never participated in the Project and were not interested in doing so when asked what they thought would motivate them to participate



## Discussion

From the standpoint of increasing volunteer participation in the Fish Survey Project, the results are encouraging. Since approximately 75% of individuals who had not previously participated in the Fish Survey Project were interested in surveying, there is a need to increase awareness of the Project. These data indicate that 50% of individuals that had previously conducted surveys heard about the Project through a friend and 37% heard about the Project through a dive shop, suggesting that a focused advertising campaign using dive shops and dive clubs and possibly other focused venues such as aquariums would help spread awareness of REEF's activities and the Fish Survey Project. Individuals that responded "other" typically cited a dive club or local REEF trainer as their source of awareness.

Of the individuals that responded that they were not interested in participating in the Project, 60% cited "lack of confidence in identification skills" as a reason for their decision. Corresponding to this, free or inexpensive fish and invertebrate identification classes were the most popular (47%) means of encouraging individuals who initially said no. Encouraging dive clubs and other focused venues such as aquariums to host fish and invertebrate identification classes should increase voluntary diver participation in the Project.

Twenty-five percent of individuals not interested in participating felt that it was too much of a hassle to obtain forms, fill them out, or send them in. There was strong interest in an online version of the survey to cut back on paper use and to facilitate data submission. One individual felt very strongly that the trade-off between species conservation and paper consumption was not enough to encourage his participation (and was in favor of the

electronic submission option). There was also an interest by many individuals to see real results and data that reflected the success of the Project. While this information is available on the REEF website, perhaps routine review of the data with electronic communication of regional results to Project participants would encourage more participation.

The Reef Environmental Education Foundation's Fish Survey Project promotes resource stewardship and helps support more rigorous scientific monitoring by enabling recreational SCUBA divers to survey for fish and invertebrate presence and abundance while diving. As volunteer participation in fish and invertebrate surveys increases, so does the value of diver data. Our work suggests that targeted advertising of the Project via dive clubs and aquariums, free or inexpensive fish and invertebrate identification classes, and electronic submission of surveys should increase awareness of and participation in the Fish Survey Project.

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