



Firefly Watch Project

Survey Findings





Program and evaluation overview

- The *Firefly Watch* project is a citizen science program where a network of volunteers across the country observe and collect data on fireflies. Participants are able to post their results to the project website, where they can share aspects of their own experiences and learn about sightings in other locations.
- For more information about this project, visit:
https://www.mos.org/fireflywatch/about_firefly_watch
- To evaluate this program, a brief survey was conducted that probed for participant interactions with the program, learning due to project involvement, and areas for potential project growth.



Program objectives

- To give participants an opportunity to investigate what might be affecting the firefly population and gather data for scientists.
- To give participants insight into how science works.
- To make participants aware that their actions can have an impact on the environment and organisms in it.
- To give participants a better understanding of the natural history of fireflies and other animals they see in nature.



Methods

Sample

- 1,336 individuals randomly selected from the *Firefly Watch* email database.

Criteria

- Individual must have had a meaningful or sustained engagement with the program and collected data for at least one season over the past three years.

Response

- 255 survey responses (19.1%)



Demographics

- Over two-thirds of respondents were female (68.2%).
- The majority of respondents were not Museum of Science members (89.0%).
- Collection by location:
 - 36 states represented, along with Washington, DC and countries outside the United States.
 - Greatest participation in Massachusetts (n=36; 14.1%).
 - Strong representation from the following states (n=9 or more; 3.5% or more): Michigan, Pennsylvania, New York, Ohio, Virginia, Missouri, Texas, Illinois, Maryland, New Jersey, and North Carolina.



Collection by state

States with most participation

State	Count (N=255)	%
Massachusetts	36	14.1
Michigan	20	7.8
Pennsylvania	19	7.5
New York	17	6.7
Ohio	16	6.3
Virginia	14	5.5
Missouri	13	5.1
Texas	11	4.3
Illinois	10	3.9
Maryland	9	3.5
New Jersey	9	3.5
North Carolina	9	3.5

States with least participation (less than 3.0%):

- Florida (n=6)
- Connecticut, Georgia, Indiana, New Hampshire, Wisconsin, & Outside the United States (n=5)
- Alabama, Arkansas, Louisiana, Minnesota, Nebraska, & West Virginia (n=3)
- Colorado, Iowa, Kentucky, Rhode Island, & South Carolina (n=2)
- Arizona, Delaware, Kansas, Maine, Mississippi, Tennessee, Vermont, & Washington, DC (n=1)



Project participation

Years of participation

Years Participated	Count (n=254)	%
Less than 1 year	70	27.6
1 year	51	20.1
2 years	100	39.4
3 or more years	33	13.0

Most recent involvement

Most Recent Year	Count (N=255)	%
2011	188	73.7
2010	54	21.2
2009	13	5.1

- The majority of respondents have been involved for 2 years (39.4%) or less than 1 year (27.6%).
- Most respondents have participated within the last year (73.7%).



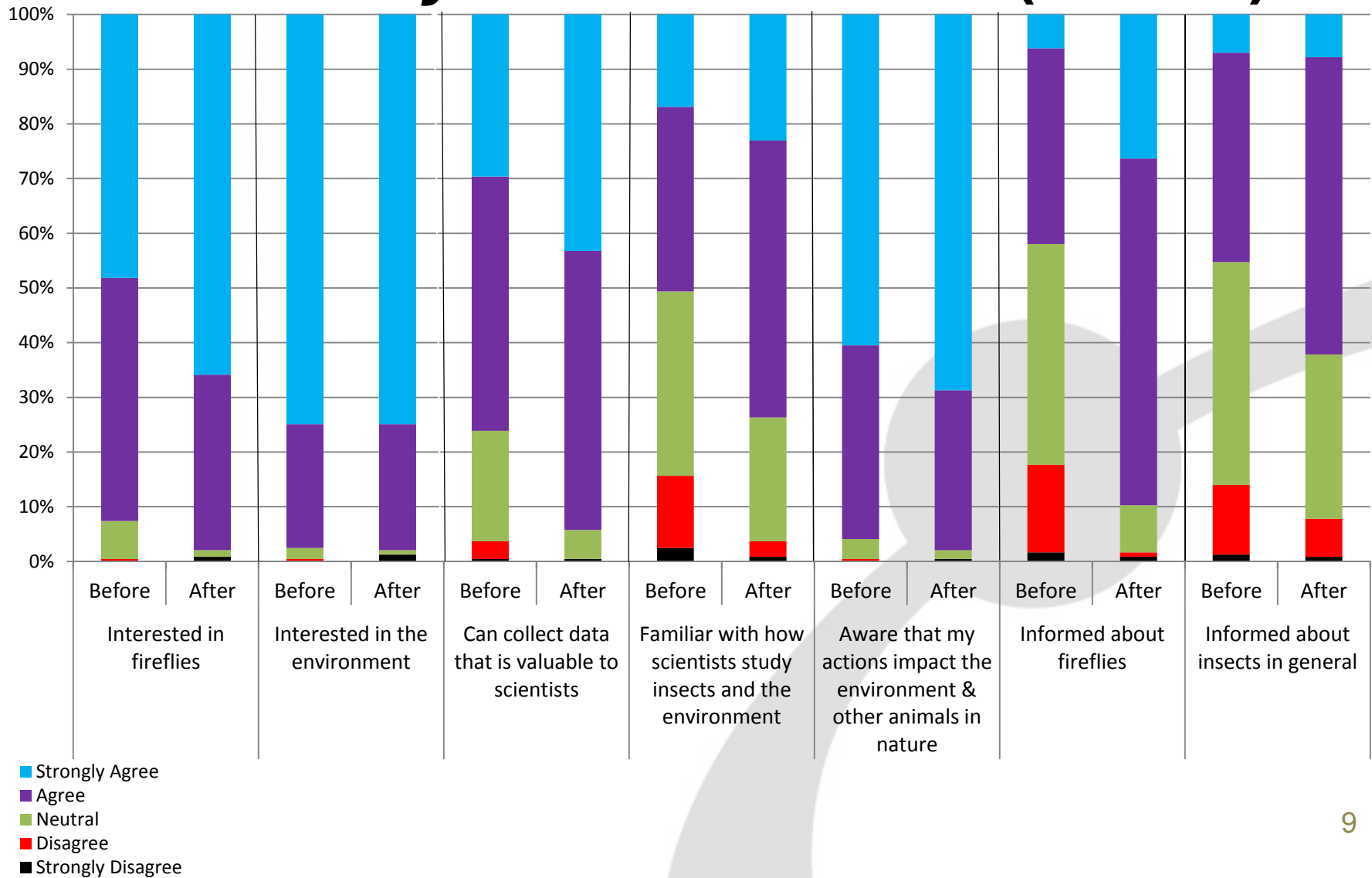
Data collection habits

- Most respondents collected data by themselves (n=160; 62.7%).

Data Collectors	Count (N=255)	%
I collected data by myself	160	62.7
Other adult(s)	32	12.5
Child(ren) and adult(s)	31	12.2
Child(ren)	28	11.0
I did not collect data	4	1.6



Pre/Post knowledge of *Firefly Watch* content (n=243)



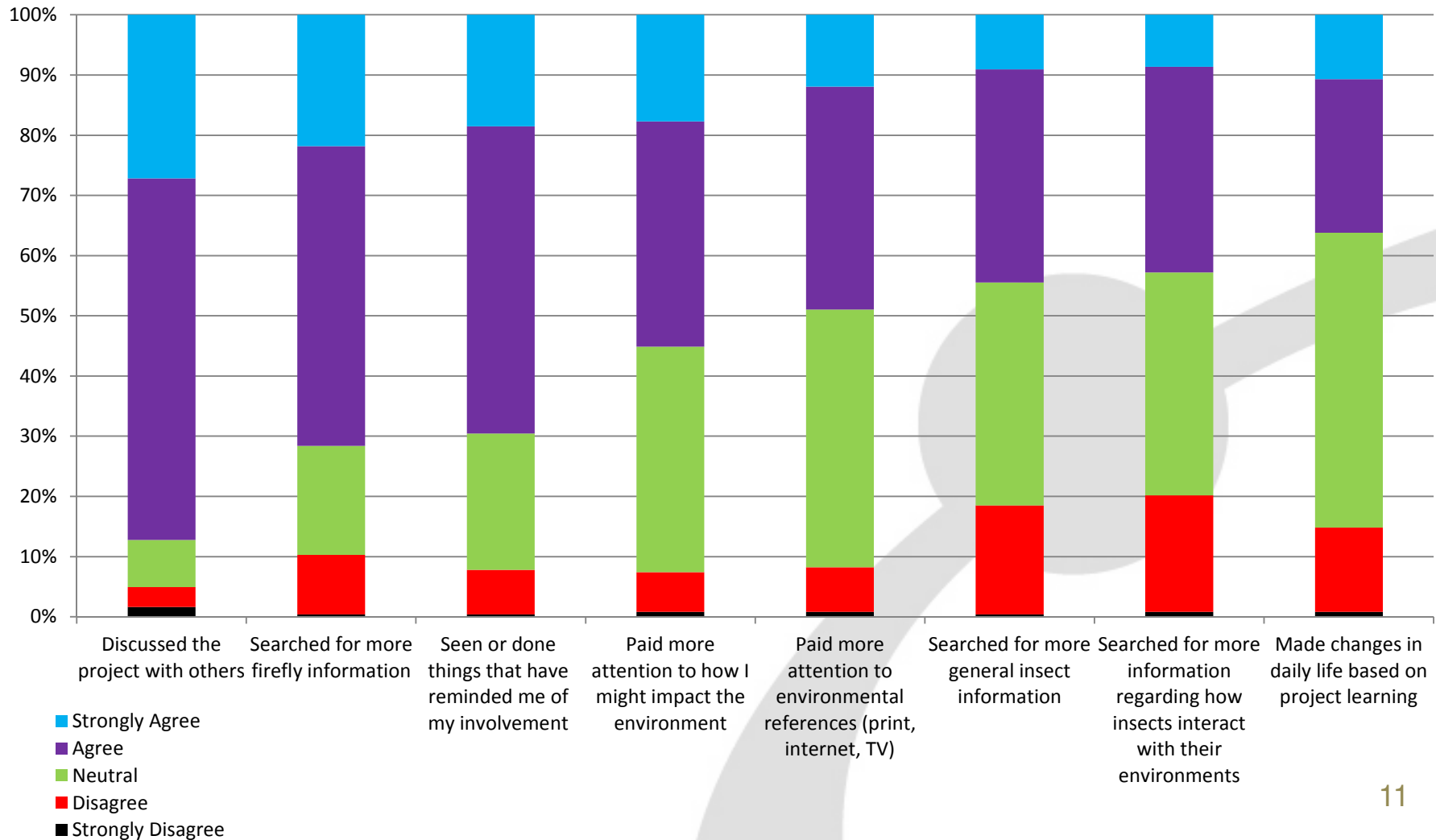


Pre/Post knowledge percentage table (n=243)

	Interested in fireflies		Interested in the environment		Can collect data that is valuable to scientists		Familiar with how scientists study insects and the environment		Aware that my actions impact the environment & other animals in nature		Informed about fireflies		Informed about insects in general	
	Before %	After %	Before %	After %	Before %	After %	Before %	After %	Before %	After %	Before %	After %	Before %	After %
Strongly Agree	48.1	65.8	74.9	74.9	29.6	43.2	16.9	23.0	60.5	68.7	6.2	26.3	7.0	7.8
Agree	44.4	32.1	22.6	23.0	46.5	51.0	33.7	50.6	35.4	29.2	35.8	63.4	38.3	54.3
Neutral	7.0	1.2	2.1	0.8	20.2	5.3	33.7	22.6	3.7	1.6	40.3	8.6	40.7	30.0
Disagree	0.4	0.0	0.4	0.0	3.3	0.0	13.2	2.9	0.4	0.0	16.0	0.8	12.8	7.0
Strongly Disagree	0.0	0.8	0.0	1.2	0.4	0.4	2.5	0.8	0.0	0.4	1.6	0.8	1.2	0.8



Since my participation in *Firefly Watch* I have... (n=243)





Since my participation percentage table (n=243)

	Discussed the project with others %	Searched for more firefly information %	Seen or done things that have reminded me of my involvement %	Paid more attention to how I might impact the environment %	Paid more attention to environmental references (print, internet, TV) %	Searched for more general insect information %	Searched for more information regarding how insects interact with their environments %	Made changes in daily life based on project learning %
Strongly Agree	27.2	21.8	18.5	17.7	11.9	9.1	8.6	10.7
Agree	60.1	49.8	51.0	37.4	37.0	35.4	34.2	25.5
Neutral	7.8	18.1	22.6	37.4	42.8	37.0	37.0	49.0
Disagree	3.3	9.9	7.4	6.6	7.4	18.1	19.3	14.0
Strongly Disagree	1.6	0.4	0.4	0.8	0.8	0.4	0.8	0.8



Trends in years participated and actions taken

- Chi-square tests were run to determine if the number of years of involvement were related to the different types of actions taken due to project participation. These tests indicate the following:
 - Respondents with at least 2 years of involvement were significantly more likely to have discussed the project with others.
 - Respondents with at least 2 years of involvement were significantly more likely to have searched for more information about fireflies.
 - Respondents participating 3 or more years were significantly more likely to have seen or done things that have reminded them of their involvement in the project.
 - Respondents participating 3 or more years were significantly more likely to have made changes in their daily lives based on what they've learned from the project.



Involvement with children

- **Many respondents took the following actions with children:**
 - Discussed the project topic with a child (45.5%)
 - Encouraged a child to learn more about topics, such as fireflies, insects or the environment (38.4%)
 - Helped a child develop a stronger interest in fireflies, insects or the environment (29.4%)
 - Engaged a child in collection activities (29.4%)
- **One-third of respondents did not involve children (35.3%).**

Action Taken	Count (n=243)	%
I have discussed the project topic with a child.	116	45.5
I have encouraged a child to learn more about topics, such as fireflies, insects or the environment.	98	38.4
I have helped a child develop a stronger interest in fireflies, insects or the environment.	81	31.8
I have engaged a child in collection activities.	75	29.4
I have helped a child with homework assignments related to fireflies, insects or the environment.	22	8.6
None of the above	22	8.6
Other	15	5.9
Not applicable- there were no children involved.	90	35.3

Note. Respondents could select more than one response.



What respondents remember most about their experience

- Most respondents' comments fell into three categories:
 - I remember learning content or findings (n=127).
 - I remember the emotional experience (n=87).
 - I remember my actions (n=65).

Additional comments fell into “other” (n=18). These comments were primarily about the program logistics (n=10) or miscellaneous experiences (n=8).



I remember learning content or findings (n=127).

Code	Selected Quotes
I learned about flashing patterns (n=27)	<ul style="list-style-type: none">“Learning that that are different patterns of firefly signaling.”
I noticed a decline in the firefly number (n=22)	<ul style="list-style-type: none">“That this year the hot weather plummeted the number of fireflies and disrupted the season.”
I remember reviewing and/or contributing to population data (n=19)	<ul style="list-style-type: none">“Learning how the firefly population has changed over the years.”
I learned about differences in species (n=14)	<ul style="list-style-type: none">“...Discovering different types of fireflies, that we didn't even know existed before!”
I learned about differences in color (n=12)	<ul style="list-style-type: none">“And how many different colors we could spot.”
I learned in general/specific fact (n=10)	<ul style="list-style-type: none">“I enjoyed learning more about fireflies specifically...”
I remember becoming more aware of fireflies (n=9)	<ul style="list-style-type: none">“...There is a new awareness in the neighborhood about apparent increases in firefly populations in the neighborhood.”
I learned about gender differences and mating behaviors (n=8)	<ul style="list-style-type: none">“How to identify male and female fireflies.”
I learned about the J flight pattern (n=6)	<ul style="list-style-type: none">“Through time exposure photos I had noticed the J pattern before it was noted on the watch site.”



I remember the emotional experience (n=87).

Code	Selected Quote
I remember the atmosphere while taking in the project (n=39)	<ul style="list-style-type: none">▪ “Sitting outside at sunset with a beautiful evening sky and little flashes all over. This peaceful time watching the fireflies as well as filling out the evening count is absolutely one of the most wonderful times during warm weather. “▪ “...but I most enjoyed the "excuse" to get out in the early evening to just look around and appreciate our planet/nature.”
It reminded me of past experiences (n=19)	<ul style="list-style-type: none">▪ “...Chasing fireflies was one of my fond childhood memories.”▪ “When I was a teen (60 now) there were hundreds and hundreds of fireflies where I grew up at.”
I remember the excitement/enjoyment of participating (n=13)	<ul style="list-style-type: none">▪ “Excitement of students when they report seeing the fireflies!”
I remember reinforcing my relationship with the person(s) I collected data with (n=12)	<ul style="list-style-type: none">▪ “I love that it connected my teenage daughters and I in spending an evening collecting firefly data and just watching the spectacle of lights!”
I remember feeling like I was benefiting the project (n=4)	<ul style="list-style-type: none">▪ “I liked the idea that my observations could help scientists understand the current state of fireflies and how they are impacted by light pollution.”



I remember my actions (n=65).

Code	Selected Quote
I remember reviewing and/or contributing to population data (n=19)	<ul style="list-style-type: none">▪ “The sheer joy of watching the fireflies with a purpose in mind.”
I remember taking part in data collection (observing/watching fireflies) (n=15)	<ul style="list-style-type: none">▪ “Sharing observations and pointing out presence of fireflies where no one thought they lived (desert environments)...”
I remember counting the fireflies (n=10)	<ul style="list-style-type: none">▪ “My children and I loved going outside at dusk and counting the fireflies...”
I remember taking extra efforts beyond what's expected in the <i>Firefly Watch</i> (n=9)	<ul style="list-style-type: none">▪ “We use it to teach the scientific method at our school. All of our sixth grade students participate and collect data.”▪ “I also remember getting interviewed by the Washington Post about my involvement in the project.”
I remember having difficulty identifying the fireflies (n=7)	<ul style="list-style-type: none">▪ “...But it was hard to follow particular flies because there were so many. It was also hard sometimes to distinguish color.”
I remember changing or considering changing some of my land to accommodate fireflies (n=5)	<ul style="list-style-type: none">▪ “...I recently purchased vacant land in order to recreate firefly habitat.”▪ “Most of all we changed how we use our farm. We purposely do not mow areas during firefly season and make sure that no pesticides are used anywhere on our land.”



Respondents' recommendations for program improvements (n=158)

Code	Selected Quote
Make it easier to take part in the project/more user-friendly (n=18)	<ul style="list-style-type: none">▪ "Possibly an easier way to record the information?"▪ "How about participants submitting pictures?"
Give more direction on data collection/how to collect accurately (n=15)	<ul style="list-style-type: none">▪ "Give more pictures of the different colors and diagrams of flashing patterns"▪ "Still feel confused about observing flight pattern. Maybe additional information or "quizzes" online to help give greater confidence in accurately reporting the information."
Include references/resources to get further info if interested (n=15)	<ul style="list-style-type: none">▪ "I would like to know more in depth of the results of the surveys and more about the life cycle."▪ "I would like more education before each season; more information about fireflies and how they fit into the scheme of our environment, how to identify the different types of firefly activity could be made clearer and why you are doing the project."
Do more advertising/outreach (n=13)	<ul style="list-style-type: none">▪ "Perhaps have the State Wildlife Offices include mention of your project in their Spring newsletters. There were a lot of States with no one reporting, and I thought there were fireflies all over the United States."▪ "Engage college students in firefly experiments and have them share info with younger children to boost interest for future studies."
Send out reminders (n=11)	<ul style="list-style-type: none">▪ "Send email/text prompts to collect data!"▪ "More frequent updates and tips."
Change the scientific data collected (n=9)	<ul style="list-style-type: none">▪ "The project should expand to other species of fireflies and post results about where and when specific species have been observed."
Have a mobile app (n=6)	<ul style="list-style-type: none">▪ "A mobile app would make data collection easier/more convenient."
I can't think of anything that should be changed (n=45)	<ul style="list-style-type: none">▪ "Nothing comes to mind."
Not sure (n=14)	<ul style="list-style-type: none">▪ "Don't know. If you're happy then I'm happy."
Other (n=12)	<ul style="list-style-type: none">▪ "Bring back the firefly!"



Future involvement

- Almost all respondents plan on continuing the project next year (94.5%).
- Over one-fifth of respondents are interested in participating in other citizen science projects.

Future Involvement	Count (N=255)	%
I will participate in the <i>Firefly Watch</i> next year	241	94.5
I will get involved in other citizen science projects	57	22.4
I will participate in other projects led by the Museum of Science	42	16.5
I do not plan on returning	7	2.7

Note. Respondents could select more than one response.

Appendix A: Survey Instrument

Firefly Watch Project

Thank you for agreeing to complete our survey.
Your feedback will help us learn more about the *Firefly Watch* project.

Tell us a little about yourself....

- 1) **What is your gender?**
 - a. Female
 - b. Male

- 2) **Are you a member of the Museum of Science?**
 - a. Yes
 - b. No

- 3) **In which state did you collect data? _____**

- 4) **How many years have you participated in the *Firefly Watch* project?**
 - a. Less than 1 year
 - b. 1 year
 - c. 2 years
 - d. 3 or more years

- 5) **When was your most recent involvement?**
 - a. 2011
 - b. 2010
 - c. 2009
 - d. Before 2009

- 6) **Who collected data with you?**
 - a. Child(ren)
 - b. Other adult(s)
 - c. Children and adults
 - d. I collected data by myself.
 - e. I did not collect data.

- 7) **Please rate your future involvement? (please select all that apply)**
 - a. I do not plan on returning.
 - b. I will participate in the *Firefly Watch* next year.
 - c. I will participate in other projects led by the Museum of Science.
 - d. I will get involved in other citizen science projects.

8) Please indicate your level of agreement with the following statements:

Before Participation

After Participation

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree		Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
					I am interested in fireflies.					
					I am interested in the environment.					
					I can collect data that is valuable to scientists.					
					I am familiar with how scientists study insects and the environment.					
					I am aware that my actions can impact the environment and other animals I see in nature.					
					I feel informed about fireflies.					
					I feel informed about insects in general.					

9) Please indicate your level of agreement with the following statements:

Since my participation in <i>Firefly Watch</i>	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
I have discussed the project with others.					
I have seen or done things that have reminded me of my involvement in the project.					
I have paid more attention to environmental references in print, on the internet or on TV.					
I have paid more attention to how I might impact the environment.					
I have made changes in my daily life based on what I've learned from the project.					
I have searched for more information about fireflies.					
I have searched for more information about insects in general.					
I have searched for more information regarding how insects interact with their environments.					

10) How have you taken actions to involve children in the *Firefly Watch* project? (please select all that apply)

- a. I have discussed the project topic with a child.
- b. I have engaged a child in collection activities.
- c. I have encouraged a child to learn more about topics, such as fireflies, insects or the environment.
- d. I have helped a child develop a stronger interest in fireflies, insects or the environment.
- e. I have helped a child with homework assignments related to fireflies, insects or the environment.
- f. Other
- g. None of the above
- h. Not applicable- there were no children involved.

11) Describe to me what you remember most about your participation in the *Firefly Watch* project.

12) What changes could we make to improve the *Firefly Watch* project?