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# Measuring the socio-economic characteristics of a lionfish derby event

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## Introduction

In the western North Atlantic Ocean, Caribbean Sea, and the Gulf of Mexico, invasive lionfish (*Pterois miles* and *P. volitans*) have demonstrated the ability to rapidly expand their range and establish populations throughout different habitats reaching higher densities than their native range.<sup>a</sup> There is great potential for this invasive species to continue impact local populations of native reef fishes. For example, within just two years following increases in lionfish abundances on Bahamian reefs, the biomass of their 42 native prey species declined dramatically.<sup>b</sup>

The image shows a survey form titled '2013 Lionfish Derby Participation Survey'. It includes logos for REEF, NSU, and OSU. The form asks for personal information, derby experience, and expenditure details. It also lists derby dates and locations: June 22 (Green Turtle Cay, Bahamas Green Turtle Club), July 27 (Fort Lauderdale, FL 10th Street Fisheries), August 17 (Palm Beach, FL Salfish Marina), and September 14 (Key Largo, FL Pennekamp State Park). Prizes are listed as \$3,500 in cash prizes for the top 10 smallest lionfish and 1st, 2nd, & 3rd place prizes for most, largest, & smallest lionfish.

Fig. 1. Image of 2013 Lionfish Participation Survey Form



Fig. 2. Image of Lionfish Derby Advertisement

Lionfish derbies are being used as a means to both control local populations and increase recreational diver awareness. Teams compete for boasting rights and prize money awarded for the most, biggest, and smallest lionfish collected while on SCUBA or free diving. Thousands of lionfish from small geographic regions have been removed during these single-day events, which have shown measurable success at reducing local lionfish populations.<sup>c</sup>

The Reef Environmental Education Foundation (REEF) has hosted a series of annual derbies in Key Largo since 2010. Aside from continuing to remove lionfish and collect specimens for research, this was the first attempt to examine the socio-economic component of the 2013 derby experience. This preliminary data was gathered to better understand the impact derbies have on the local economy and participation.

## Discussion

Results from this 2013 event suggest that participation is comprised of all age groups and an approximate even share of the local resident base as well as out-of-town visitors. Further, while all ranges of economic income were represented, a large proportion of participants earned a high income bracket. This may indicate that it is possible to pay for the costs of participation even at the relatively lower income levels; however, those individuals at higher income levels may be likely to participate most often, or again in a future derby.

The results of the lionfish catch reflect non-derby related removal activity and can infer the on-going effort that exists. As shown here, spearing (76%) as opposed to netting (16%) is the primary method divers remove lionfish for both derby and non-derby removal responses. 52% replied that removing lionfish while diving is a very important practice. Most teams collected lionfish while on SCUBA (90%), but most commonly dive only once per month (18%). Further, of the non-derby removals, 52% capture lionfish on "most" to "every" dive.

A combined total amount of \$24,561 was reported as spent by all the teams. The derby expenditures presented within this survey demonstrate the diversity of economic markets that may be influenced by these one-day events. Boat fuel and oil was the most common expense (16% of total), followed by dive boat fees (14% of total), and then accommodations, restaurant meals and automobile transport (12% total each). The increase in net expenditure may add a benefit to the recreational/ tourism industry of the Key Largo economy, especially since approximately half the participants travel from out of town and spend their money there.

Further versions of this survey will be improved upon by asking for more specific responses, rather than generalized qualitative and multiple response answers. For example, it would be of interest to include local businesses and inquire pre- and post-derby sales/output effects. Future plans for this survey during 2014 include surveys at the entire South Florida-based derby series to expand the geographic range and temporal fields for comparison.

<sup>a</sup>Green and Cote, 2009. Coral Reefs 28(107); <sup>b</sup>Green et al., 2012. PLoS ONE 7(3); <sup>c</sup>Green et al., in preparation

## Materials & Methods

A six-page socioeconomic survey was distributed at the 2013 Key Largo Lionfish Derby held at John Pennekamp Coral Reef State Park, Florida this September. A total of 22 teams with up to 4 members entered the derby, and 707 lionfish were captured with over \$3,675 awarded in prize money.

Surveys were physically handed out and collected at the weigh-in site, as opposed to mail or phone-based methods, to ensure both a high response rate as well as an immediate account of the overall experience for accurate replies. Respondents were asked 27 questions from four sections describing: (1) the lionfish derby experience; (2) non-derby related lionfish removal effort; (3) derby expenditures; and (4) personal characteristics. Results were analyzed with descriptive statistics in Microsoft Excel.



Fig. 3. Derby volunteers are present at the lionfish weigh-in station to hand out surveys to teams as they check-in, and encourage a high response rate.

## Results

A total of 50 from the 82 derby participants completed surveys, which generated results describing the overall experience for 61% of the teams.

### Demographics:

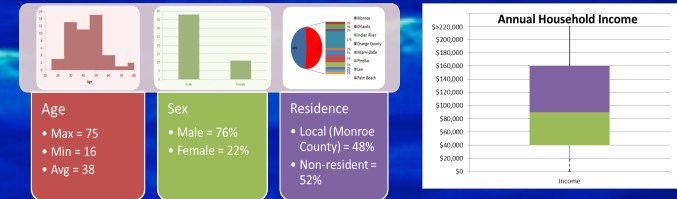


Fig. 4. From left to right: (a) A normal distribution represented here by all age groups. (b) Most participants were male. (c) The majority of derby participants reside outside of the host county. The side bar shows the percentage of the other Florida counties with participants.

### Catch Characteristics:

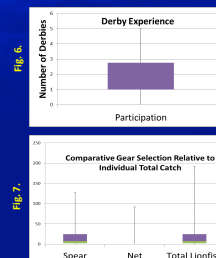


Fig. 6. The majority of participants (64%) had participated in this derby for the first time, although some had entered as many as 5 derbies (4%). Most (82%) responded that they had some previous lionfish catching experience

### Expenditure Categories:

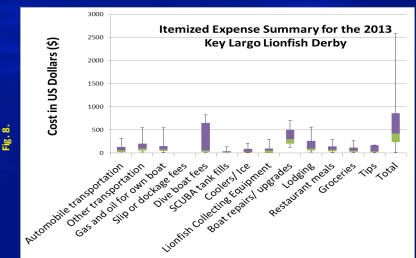


Fig. 5. The majority of participants (64%) had participated in this derby for the first time, although some had entered as many as 5 derbies (4%). Most (82%) responded that they had some previous lionfish catching experience. Fig. 7. Lionfish captured by spear was significantly greater than those netted, while 52% of the participants captured ten or fewer lionfish total by either net or spear. Only 2% reported to capture 130 lionfish (the most caught for a team was 192). Fig. 8. The range of costs itemized for derby participation expenses. Dive boat fees, boat gas and oil, and lodging were among the most costly expense categories.



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