Lionfish Control in U.S. National Parks

Control de Lionfish en Parques Nacionales de los Estados Unidos

Le Contrôle de Lionfish dans les Parcs Nacionaux des Etats Unis

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EXTENDED ABSTRACT

Strategies adopted by U.S. National Park Service to monitor and control lionfish and mitigate impacts on protected resources are reviewed. This paper reviews and compares approaches taken in two parks located in South Florida: Biscayne National Park and Dry Tortugas National Park. In 2012, NPS adopted a Lionfish Response Plan with input from park managers and biologists, NOAA, REEF and university scientists (Mcreedy et al. 2012). First documented in Biscayne National Park in 2009, lionfish have since been detected in six other National Parks in Florida, Mississippi and the U.S. Virgin Islands. The affected parks are responding and removing lionfish according to local resource conditions and available funding.

Biscayne NP adopted a stratified, random sampling design to monitor lionfish abundance and size across park waters and habitats, including seagrass, coral reefs and artificial structures (Figure 1). Utilizing monitoring data, Biscayne NP obtained information on habitat preference of lionfish across coral reef habitat types (Figures 2, 3). The park also examined influences on lionfish abundance from depth, rugosity, temperature and year of invasion in spur and groove reef formations (Figures 4, 5). A research project also measured recolonization rates on artificial structures to determine how often the park needs to revisit sites for control (Figure 6). Dry Tortugas NP conducted a synoptic survey in 2013 of lionfish population levels using timed surveys by divers and snorkelers in coral habitats. 118 lionfish were observed at 46 sites within the park and 78 removed, a relatively low population level compared to the rest of the Florida Keys reef tract (Figure 7).

Findings from these studies elicit research questions and recommendations for managers. For example, larger, more abundant predators at Dry Tortugas may be keeping lionfish population levels low. Marine protected area managers may wish to target removal at preferred habitat types or deeper waters where larger lionfish congregate. They also may measure recolonzation rates to determine the most efficient schedule to repeat removals and maintain low population levels over time.

LITERATURE CITED

McCreedy, C., C.A. Toline, and V. McDonough. 2012. Lionfish response plan: A systematic approach to managing impacts from the lionfish, an invasive species, in units of the National Park System. Natural Resource Report NPS/NRSS/WRD/NRR—2012/497. National Park Service, Fort Collins, Colorado USA.

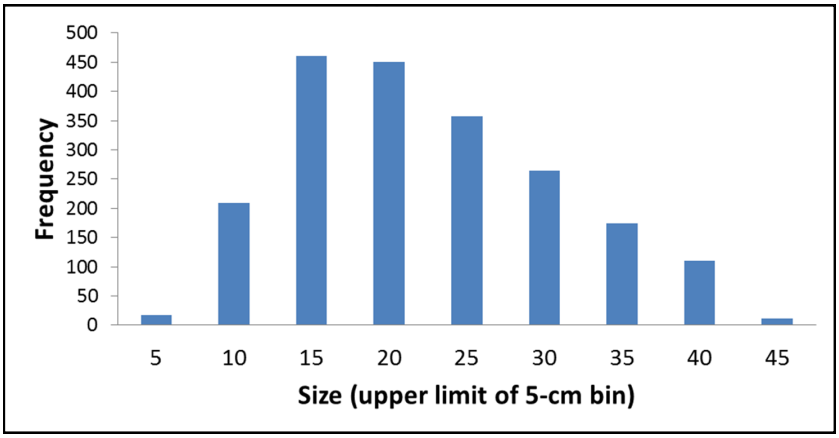

Figure 1. Size-frequency distribution of lionfish collected from Biscayne National Park.

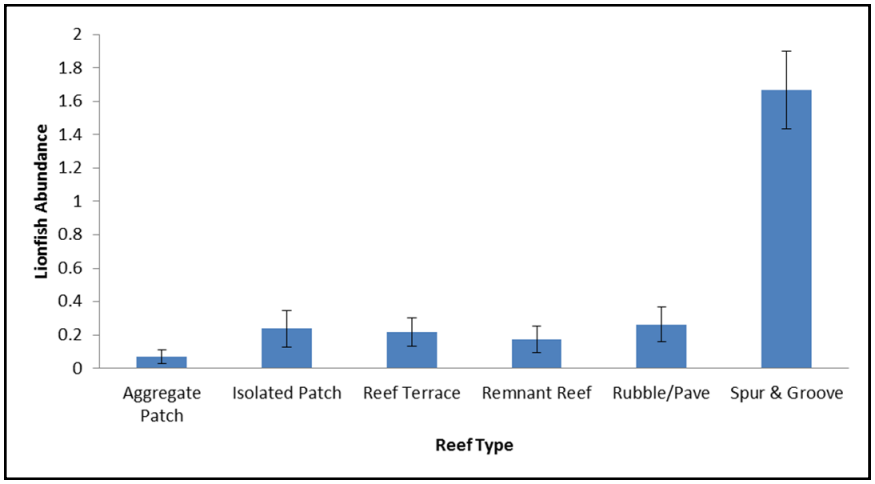

Figure 2. Reef–specific habitat associations. Mean lionfish abundance by habitat. Error bars = Standard Error.

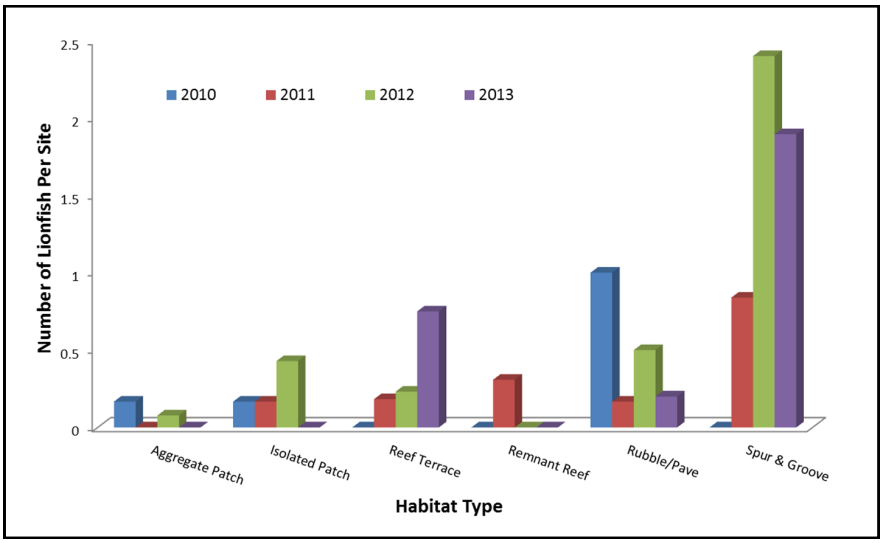

Figure 3. Lionfish abundances by habitat and time (2010 – 2013).

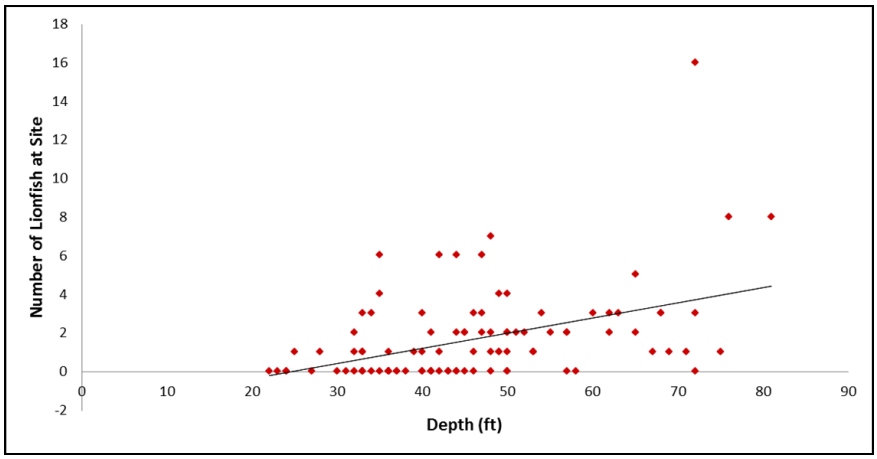

Figure 4. Lionfish abundances by depth in spur & groove habitat. Examining the influences of depth, rugosity, temperature, and year indicated depth as the only significant factor influencing lionfish abundance.

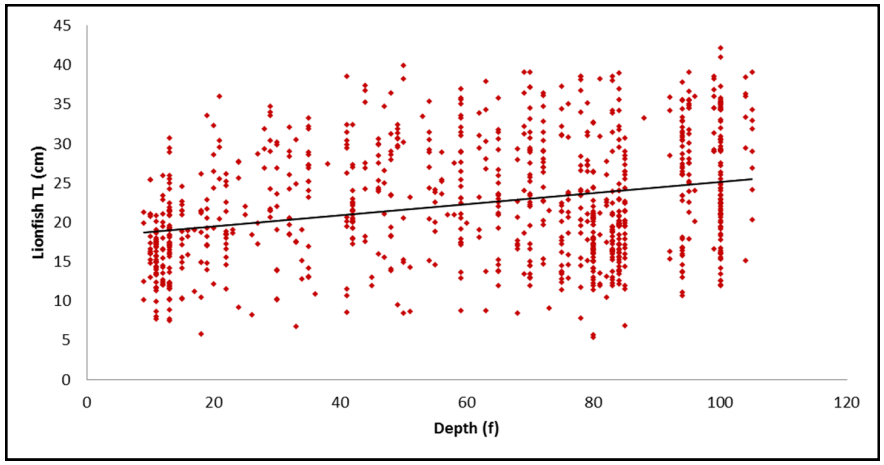

Figure 5. Lionfish size vs depth. ($p < 0.0001$)

SITE	Summer recolonization rate (# LF per week)	Winter recolonization rate (#LF per week)
Shrimpboat (wreck)	0.38	-0.04
Boca Chita South (wreck)	0.55	0.64
Boca Chita North (wreck)	1.64	0.89
Miami Springs Power Boat House (stilted house)	0.13	0.05
Ellenburg House (stilted house)	0.37	0.20

Figure 6. Lionfish recolonization rates at selected locations during summer and winter seasons

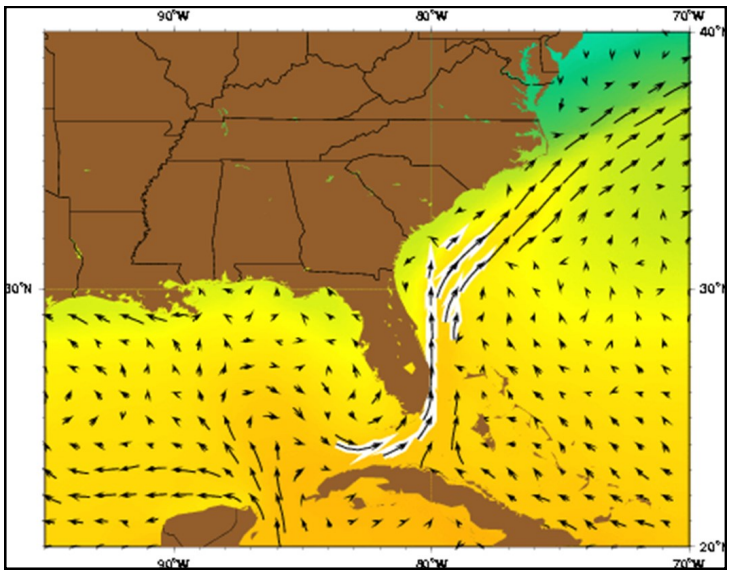

Figure 7. The Loop Current. The Dry Tortugas is the larval source.