

**Incentivizing Lionfish Removals through Development of Markets for Jewelry:  
Preliminary Experiences from Belize, the Bahamas and St. Vincent and the Grenadines**

**Incentivando la Supresión del Pez León a través del Desarrollo de los Mercados para la Joyería:  
Experiencias Preliminares de Belice, las Islas Bahamas y San Vicente y las Granadinas.**

**Inciter Suppression de Poisson Lions à travers le Développement de Marchés pour les Bijoux:  
Les Expériences Préliminaires de Belize, aux Bahamas et Saint Vincent et les Grenadines**

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**EXTENDED ABSTRACT**

The Indo-Pacific lionfish (*Pterois volitans/miles*) invasion poses a unique threat to Caribbean marine ecosystems and as such requires innovative approaches for control. While localized removals can mitigate and/or reverse the negative impact of uncontrolled lionfish populations on native fish communities (De León et al. 2011, Frazer et al. 2012, Ali 2013, Green et al. 2014), such removals must be carried out regularly to confer long-term benefits to coral reefs and their associated fisheries (Morris et al. 2010, Barbour et al. 2011). For this reason, the creation of commercial incentives for lionfish removals is considered the most feasible option for achieving effective lionfish population control across broad geographic scope on a financially sustainable basis (Bogdanoff et al. 2014).

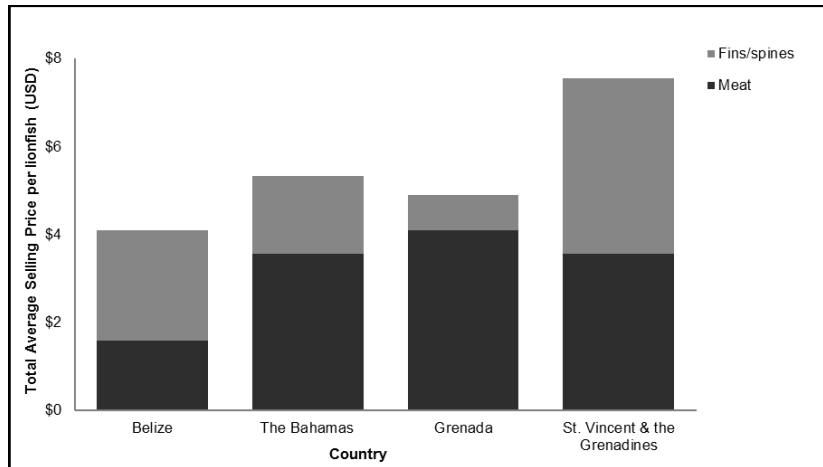
The most widely used market-based approach for lionfish control is the development of localized commercial lionfish fisheries (Smith 2011, Chapman 2013, Parmeggiani and Chapman 2014, Bogdanoff et al. 2014, Pasko and Goldberg 2014). However, efforts to develop lionfish fisheries face a common barrier; the high opportunity cost faced by fishers targeting lionfish in place of traditionally-caught species (Parmeggiani and Chapman 2014). Value addition along the market chain can help overcome this barrier, and one promising approach is the development of markets for jewelry made from parts of the fish that are otherwise discarded. In Belize, sale of lionfish fins was reported to increase the value of landed lionfish catch by 13-40% to local small-scale fishers (Parmeggiani and Chapman 2014).

While there are individual artists producing lionfish jewelry in various locations around the Caribbean, markets are most developed in Belize, Grenada, The Bahamas and Saint Vincent and the Grenadines, with small clusters of lionfish jewelry artists active in each country (P. Karp, personal observation). For these locations, typical 2015 market prices for lionfish (whole and fillet) combined with prices paid by jewelry artists for fins and spines were used to calculate the total potential value addition to landed lionfish catch. To better understand socioeconomic impact and market dynamics, twenty-six lionfish jewelry artists from the four countries were surveyed using a standardized questionnaire. Data was also garnered from informal interviews jewelry artists, marine conservation practitioners and sponsors of lionfish market initiatives in each country.

In all four countries, active intervention by a non-governmental organization (NGO) has been instrumental in jump-starting development of lionfish jewelry markets. In each case, the intervening NGO was already involved in lionfish management efforts and was motivated to introduce the jewelry initiative as part of an integrated approach. The package of interventions was similar in each case and included introducing the idea of lionfish jewelry to local community members and artists, provision of training through workshops, provision of at least an initial supply of fins and/or spines and other jewelry materials, and assistance with sales and/or in connecting jewelry producers with market outlets.

Artists use lionfish fins, spines, and even opercula to make jewelry and other decorative items. In part through innovation and in part due to concerns about sustainability of the initiatives, producers and NGOs involved in supporting lionfish market development have identified substitutes for imported jewelry materials, incorporating local materials and designs into the products. Examples include use of stainless steel fishing wire to make earring hooks, cut-outs from aluminum beverage cans to replace commercial crimps, nail-polish remover as a deodorizing agent, food dye to color fins and spines, boat varnish as a sealant, and incorporation of coconut shell, calabash gourd, and dried seeds into designs.

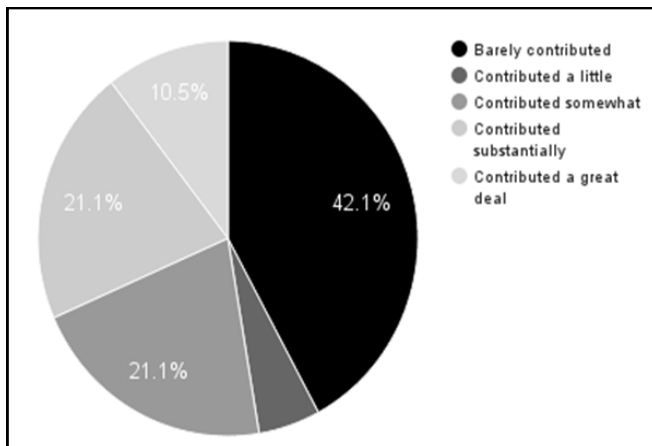
Assuming that all fins (one caudal, one anal, two pelvic, two pectoral, and 10 spines) were in suitable condition for sale to jewelry artists and that all meat was sold, the potential increase in value to fishers per landed lionfish ranged from 16% in Grenada to 61% in Belize (Figure 1).



**Figure 1.** Average market value (USD) per lionfish for meat and fins/spines across four countries: Belize, The Bahamas, Grenada, and St. Vincent & the Grenadines.

All twenty-six of the artists surveyed for this study were women. Sixteen had prior experience in jewelry-making; the remainder were introduced to jewelry production through lionfish jewelry workshops. When asked to rate the contribution of lionfish jewelry sales to their household income on a five-point scale (with five being the highest), 53% rated the contribution at three or higher. (Figure 2) Contribution to household income was rated highest in Belize, where lionfish jewelry workshop participants were selected through an application process that considered social and economic need (such as applicants from households with only one or no regular source of income and/or multiple dependents). In addition to income contribution, artists expressed increased self-esteem and that they felt more empowered both as individuals and as community members.

In all four countries, jewelry artists and key informants identified accessibility of fins and spines as the most critical factor to sustained engagement in lionfish jewelry production. This is particularly the case for jewelry artists



**Figure 2.** Reported contribution of lionfish jewelry sales to household income.

who do not live in or have easy access to fisher communities. Whereas artists have been able to find substitutes for jewelry wire, findings and other materials, those who are unable to get access to fins and spines have been forced to either stop production completely, or are producing only sporadically. The critical requirement of access to fins and spines is creating opportunities for income generation along the supply chain. As many of the Belizean jewelry artists come from fishing communities, they source their fins directly from their husbands or other family members. Even though these artists do not pay for the fins, the associated harvesting feeds an informal supply chain delivering lionfish products from fishers to jewelry artists across the country. One woman from a fisher community not only produced lionfish jewelry, but for a time procured fins and spines, dried and cured them, and then sold them to other artists who did not have direct access.

Prior experience with jewelry production has not proved to be a necessary pre-requisite for success. Indeed, many of the jewelry artists, particularly in Belize, had no prior jewelry-making experience at all. With a few days of training and follow-up peer support, and with assurance of access to materials, these individuals began to produce jewelry regularly. However, prior experience does represent a clear benefit; one artist in Belize has successfully established an independent lionfish jewelry line, building on her already established jewelry business, independent gift shop, and online sales presence.

Lionfish jewelry market proponents in all four countries reported high demand for the products. Indeed, none of the producers or proponents expressed any concern whatsoever about demand. Rather, their concern was over the ability to get sufficient supply of materials to be able to scale up production sufficiently to meet rising demand, both in local markets and abroad.

It is too early to say whether development of jewelry markets is incentivizing increased removals of lionfish, but findings from this study do show that the opportunity for sale of fins and spines increases the potential value of landed lionfish catch to fishers. To realize increased return

to fishers and consequently create incentives for a sustained supply of fins and spines, it is important that a value is recognized for these materials, and to ensure that this is reflected at key points in the value chain. Whether through direct transactions between fishers and artists, or through an intermediate link in the supply chain, it is critical that fishers receive payment for fins and spines or otherwise receive value, such as through revenue generated by family members who use the items to produce and sell jewelry.

Beyond the potential to increase incentives for lionfish removals, lionfish jewelry markets generate a number of ancillary benefits. The most important of these is increased livelihood, empowerment, and income opportunities for women. Furthermore, lionfish jewelry markets offer an additional platform for education and awareness about the threat posed by this invasive species.

Benefits of lionfish jewelry market initiatives can be maximized by situating them within integrated approaches to lionfish management, given the potential for synergies with other market-based approaches such as promotion of lionfish fisheries and seafood markets, as well as between public and private sector actions. Experiences thus far demonstrate the importance of ongoing knowledge exchange to share production techniques and designs. As lionfish jewelry is a new product, innovation is happening rapidly, much of it through trial and error. Local and regional knowledge sharing can help to accelerate the process and to spread the benefits to other communities and countries impacted by the invasion.

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