

The invasive red lionfish, *Pterois volitans* (Linnaeus 1758), in the southwestern Caribbean Sea

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Abstract

Here, we record the presence of the invasive Indo-Pacific lionfish (*Pterois volitans*) in Colombia based on six individuals collected in the Parque Nacional Natural Tayrona, Santa Marta (southern Caribbean), as well as two individuals observed in San Andres Island (western Caribbean) during May-July 2009. This is the first report of lionfish from South America.

Key words: *Pterois volitans*, *P. miles*, lionfish, invasion, Western Atlantic, Caribbean, Colombia

Alien species are recognized as major threat to ecosystem health, causing dramatic effects on biodiversity and habitat composition (Mack et al. 2000). One of the most notorious cases of alien marine fishes in recent years is the Indo-Pacific lionfish, which was introduced in the Western Atlantic. Lionfish comprises a species complex whose native range encompasses the Red Sea, the Indian Ocean, and the western Pacific (Schultz 1986). While traditional taxonomy indicates that *Pterois volitans* (Linnaeus 1758) (or red lionfish) and *P. miles* (Bennett 1828) (or devil firefish) comprise two different valid species (Schultz 1986), recent molecular studies suggest that there is uncertainty in determining whether the two entities represent species or populations (Kochzius et al. 2003; Whitfield et al. 2007). Lionfish introduction was likely the result of aquarium releases and it was first sighted off south Florida from mid 1980's to early 1990's (Courtenay 1995; USGS-NAS 2009). By 2000's it had dispersed along the East coast of the US and Bermuda (Whitfield et al. 2002) and is now well established in the US (Ruiz-Carus et al. 2006). The species was also

recently reported from the Bahamas, the northern and central Caribbean Sea through the Greater Antilles, southern Mexico, Belize, Honduras, San Andrés and Old Providence Islands off Nicaragua (Colombian territory), Costa Rica, and Panama (Snyder and Burgess 2007; Chevalier et al. 2008; Guerrero and Franco 2008; Schofield et al. 2009; Schofield 2009). Molecular analyses have shown that the two lionfish taxa are present in the Western Atlantic, with *P. volitans* being more than one order of magnitude more common than *P. miles* (Hamner et al. 2007).

Between May and July 2009, six individuals of lionfish were observed, photographed (whenever possible; Figure 1), and collected (using spear gun or fish pot) at Parque Nacional Natural Tayrona (PNNT) and adjacent waters, Santa Marta, Colombia (Southern Caribbean; 11°15'–11°20'N, 74°03'–74°13'W). The specimens measured 96–157 mm total length (TL) and were found at 12–20 m depth over coral patches near sandy bottoms. The material is deposited at the Museo de Historia Natural Marina de Colombia, Santa Marta, Colombia (INVEMAR-PEC; Annex 1).

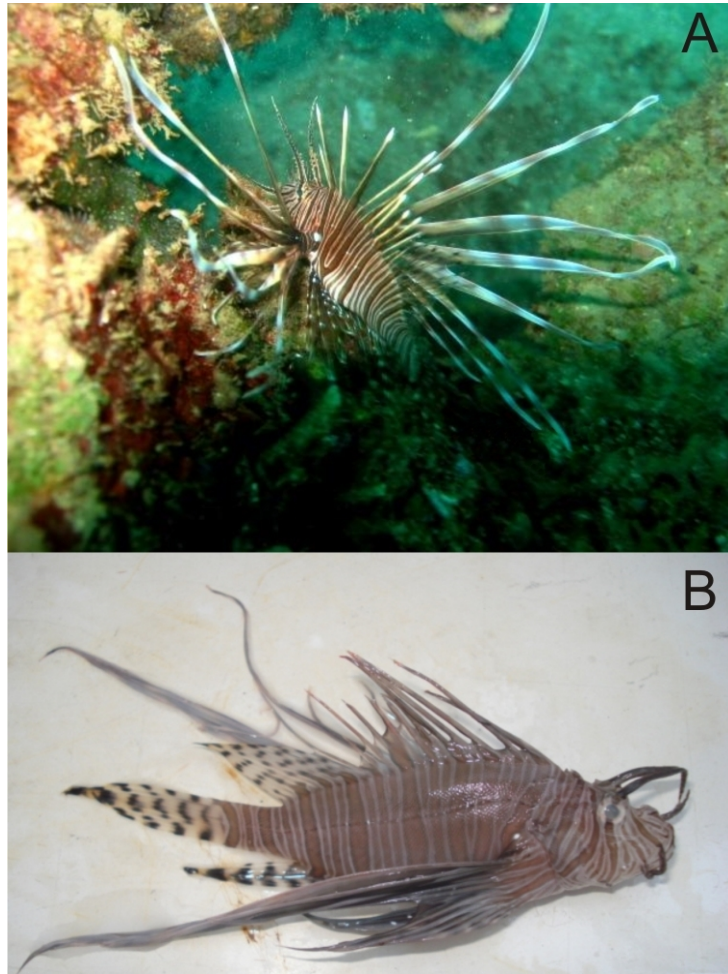


Figure 1. Lionfish from Parque Nacional Natural Tayrona, Santa Marta, Colombia (Southern Caribbean). (A) specimen (156 mm total length) photographed (13 May 2009) and collected (7 July 2009) at 16 m depth, Punta Granate, Bahía de Granate (INVEMAR-PEC 7903); (B) specimen (115 mm total length) collected at 13 m depth, El Cantil, Bahía de Granate (23 May 2009; INVEMAR-PEC 7866)



Figure 2. Lionfish observed at 6 m depth, Ratón Place, San Andrés Island, Colombia (July 2009; Western Caribbean). Photograph by A. Merchán-Cepeda (~150 mm TL)

Further examination of material, following the diagnostic characteristics defined by Schultz (1986), led us to conclude that all specimens are likely *Pterois volitans* (Table 1). This is the first report of lionfish from South America. In addition to the records off the mainland of Colombia, two specimens (~150 mm TL) were observed and photographed (Figure 2) by A. Merchán-Cepeda and colleagues (6 m depth) on July 2009 at Ratón Place (12°32'46.8"N, 81°43'52.2"W), San Andrés Island, Colombia (Western Caribbean). These specimens confirm previous reports from the Archipelago (Schofield et al. 2009, Schofield 2009).

Table 1. Meristic data for lionfish from Santa Marta, Colombia (six specimens; see Annex 1) and diagnostic characteristics for *Pterois miles* and *P. volitans* (based on Schultz 1986). Numbers in parentheses indicate number of individuals with each count

	<i>P. miles</i>	<i>P. volitans</i>	Material examined
Total length (mm)	85–245	85–235	96–157
Dorsal-fin rays	9(4), 10(99), 11(6)	10(9), 11(98), 12(5)	11(5), 12(1)
Anal-fin rays	5(1), 6(107)	5(1), 6(6), 7(102), 8(5)	7(5), 8(1)

Despite the devastating consequences that may result from lionfish introduction, it provides a natural experiment for studying dispersal patterns of tropical marine fishes. Based on biophysical connectivity models for reef species within the Caribbean (Cowen et al. 2006), Freshwater et al. (2009) suggested that lionfish is likely to disperse throughout the Caribbean, Gulf of Mexico, and the Florida keys. Interestingly, Freshwater et al. (2009) predicted that the Panama-Colombia gyre (which encompasses Santa Marta) was the last location for dispersal of lionfish, as it is the most isolated region within the Caribbean. Lionfish provides an excellent system for studying marine connectivity and dispersal patterns of non-indigenous species.

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Annex 1

Material examined of *Pterois volitans* (all from Santa Marta, Colombia). PNNT, Parque Nacional Natural Tayrona

Location	Depth (m)	Date	Total length (mm)	Collection #	Collectors
Punta Granate, Bahía de Granate (PNNT) (11°17'27"N, 74°11'43"W)	16	7 July 2009 (photo 13 May 2009)	156	INVEMAR-PEC 7903	J. González, A. Acero P. and R. Betancur-R.
El Cantil, Granate (PNNT) (11°18'10"N, 74°11'40"W)	13	23-May-09	115	INVEMAR-PEC 7866	J. Peláez et al.
Calichán, Isla Aguja (PNNT) (11°18'42"N, 74°11'40"W)	15	26-Jun-09	157	Not vouchered	J. Peláez et al.
Bahía de Cinto, east side (PNNT) (11°20'27"N, 74°03'12"W)	15	1-Jul-09	142	INVEMAR-PEC 7901	A. Acero P. and R. Betancur-R.
Punta Betín (11°15'00"N, 74°13'14"W)	12	2-Jul-09	108	INVEMAR-PEC 7902	A. Acero P. and R. Betancur-R.
La Piedra del Medio, Bahía de Granate (PNNT) (11°17'52"N, 74°11'35"W)	20	9-Jul-09	96	INVEMAR-PEC 8140	A. Acero P. and R. Betancur-R.