

## Rapid Communication

## First record of the painted spiny lobster *Panulirus versicolor* (Latrielle, 1804) in coastal Georgia, USA

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### Abstract

In August 2012, a single painted spiny lobster (*Panulirus versicolor*) was captured in the coastal waters of Georgia, USA. The specimen was captured by a recreational fisherman in the South Brunswick River in water <1 meter deep. This is the first record of this non-native species in Georgia waters, and is believed to be the first record of *P. versicolor* in both the coastal waters of the continental USA and in the Atlantic Ocean.

**Key words:** *Panulirus versicolor*; lobster; Georgia; USA, non-native species

### Introduction

The native range of the painted spiny lobster *Panulirus versicolor* (Latrielle, 1804) includes the Indo-West Pacific region, extending from the Red Sea and east coast of Africa south to Natal and eastward to southern Japan, Micronesia, Melanesia, northern Australia, and Polynesia (Holthius 1991). The species is considered native in Australia (Northern Territory, Queensland, Western Australia); Djibouti; Egypt; Eritrea; Israel; Japan; Jordan; Kenya; Madagascar; Micronesia; Mozambique; Saudi Arabia; Somalia; South Africa; Sudan; Tanzania; and Yemen (Cockcroft et al. 2011). This manuscript reports a specimen that was captured in the coastal waters of Georgia. This is the first record of *P. versicolor* in the coastal waters of Georgia, United States (USA) and is believed to be the first record of *P. versicolor* in both the coastal waters of the continental USA (A. Benson, USGS, pers. communication) and in the Atlantic Ocean.

### Materials and methods

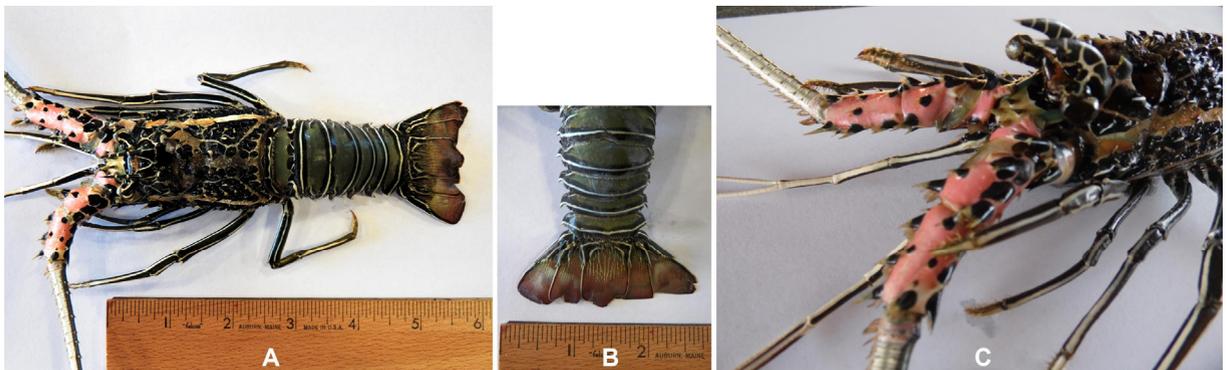
In August 2012, a single specimen was captured by a local fisherman along the edge of the South Brunswick River in water <1 m deep (Figure 1). The collection site (31°08'07"N, 81°31'50"W) is approximately 15 kilometers from the Atlantic Ocean (Figure 1). The specimen was brought to the Georgia Department of Natural Resources (GADNR) in Brunswick, Georgia, where it was measured and taxonomically identified. Identification of the specimen was confirmed by Dr. Ashley Frisch (James Cook University, Townsville, Australia). The specimen was retained at the GADNR; however, it may be deposited at another site in the future.

### Results

#### Identification

The collected specimen was unequivocally identified as *Panulirus versicolor* based on the following distinguishing characteristics (Figure 2):

**Figure 1.** Geographic location of where the lobster specimen was captured (denoted by green dot) in the South Brunswick River, GA.



**Figure 2.** Painted spiny lobster specimen captured in the South Brunswick River, GA in August 2012. (A) top view of specimen, (B) tail view of specimen, (C) head view of specimen. Unit of measure shown in photo is in inches. Photographs by James Page.

smooth abdominal somites without a transverse groove; a third maxilliped without an exopod; antennular plate with 4 strong spines arranged in a quadrangle; deep blue/green body color with narrow transverse white bands on the abdomen; pink antennal peduncles; and white flagella (Carpenter and Niem 1998). The native Caribbean spiny lobster *Panulirus argus* (Latrielle, 1804) is characterized as having abdominal somites with a distinct transverse groove; a third maxilliped with an exopod; antennular plate with 4 large spines arranged in a square; large eyespots of whitish or yellowish color on the anterior end of the abdominal somite; and a tail fan having a

broad transverse reddish band near the posterior margin (Holthius 1991).

Of the lobsters in the family Palinuridae, *P. versicolor* most closely resembles *Panulirus gracilis* (Streets, 1871). However, *P. gracilis*, a native of the Eastern Pacific, is distinguishable by its nearly uniformly brownish or blue/green colored carapace and blue/green flagella (Holthius 1991). Furthermore, *P. gracilis* has a large yellowish spot on the side of each segment and spots on the middle member of the tail fan, none of which occur in *P. versicolor* (Williams 1986). Regardless of which Palinuridae it is compared to, the highly ornate colors of *P. versicolor*, including

distinctive transverse bands of white bordered by 2 black lines across each abdominal segment, longitudinally striped legs and antennules, and bright pink antennal peduncle, simplify positive identification of the species.

## Discussion

### Ecology

In their native range, these brightly colored crustaceans inhabit shallow waters, from the sublittoral zone to depths of 15 meters (Holthius 1991). They frequently inhabit coral reefs, rocks, and other structure where they will hide in crevices and cavities during daytime (Cockcroft et al. 2011). Studies using tagged specimens have shown the species to have high site fidelity, with individuals frequently returning to areas near their original den (Frisch 2007b). Though natural predation of the species does occur, Frisch and Hobbs (2012) suggests that this high site fidelity, coupled with an abundance of high quality coral dens, may reduce predation on the species by large predators such as sharks and teleosts. A nocturnal species, painted spiny lobsters are not gregarious, preferring to remain solitary or aggregate in very small numbers (Frisch 2007a). These lobsters are opportunistic foragers, known to eat detritus and benthos (Frisch 2007b). Monthly growth increments for the species have been estimated by Kuthalingham et al. (1980) to be 2–3 mm carapace length (CL). MacDonald (1982) observed sexual maturity for females at 8.2 cm CL. Frisch (2007a) indicates it takes 3 years for the species to attain sexual maturity and 10–12 years to reach maximize size. Maximum size of the species is 40 cm total length, though the average adult measures less than 30 cm total length (Holthius 1991). Spawning of the species occurs year-round in Palau (MacDonald 1982).

Painted spiny lobsters are harvested throughout their native range, mostly for local use (Holthius 1991). Throughout much of their range, they are taken by recreational, commercial, and artisanal fishermen (Frisch and Hobbs 2011). Like all spiny lobsters they are considered to be an excellent food. The species is typically harvested abroad by divers, either by hand or with spears (Frisch and Hobbs 2012). In Thailand, the species can be bought in fish markets and restaurants (Holthius 1991). As compared to other fisheries in the world, the total catch of *P. versicolor* is relatively small, averaging only 6000–8000 kg

per year on the Great Barrier Reef of Australia (Frisch and Hobbs 2012). In addition to being harvested for food purposes, the species is also commonly captured and sold for display in home aquaria around the world. Holthius (1991) also reports that mounted specimens of the species are commonly sold as curios to tourists.

The capture of the specimen in coastal Georgia waters raises questions as to how the species was introduced and what its current status is in these waters. Though no definitive proof exists as to how the species was introduced in the South Brunswick River, several possibilities exist. One possibility is that it was released as part of a religious observance or by an animal rights group (e.g., Stebbing et al. 2012). Because the species is commonly sold via the internet and other avenues for use in home aquariums, it is possible that the specimen was released by an aquarium owner who no longer desired to keep the specimen. The red lionfish (*Pterois volitans*), a non-native species found in the offshore waters of Georgia that is commonly sold for use in aquariums, is believed to have been introduced from aquariums in Florida, and thus such an introductory method does exist. Another potential scenario is that the species was unintentionally introduced from cargo ships docked near the site from where the specimen was captured. Foreign cargo ships dock approximately 500 meters from where the specimen was captured. This relatively short proximity certainly raises questions about the possibility of ballast water serving as the introductory mechanism. Carpenter and Niem (1998) report that members of the Palinuridae family are characterized as having very long planktonic larval stages, and thus transport in ballast water is certainly feasible. Other non-native species, including the green mussel (*Perna viridis*), a native species to the Indo-Pacific region of Asia, has also been found in recent years in coastal Georgia waters, and scientists believe ballast water from cargo ships is the likely vector (Power et al. 2007).

### Possible effects

As with the introduction of any exotic species, concerns certainly exist regarding the potential impacts of *P. versicolor* populations if they become established in coastal Georgia waters. Of greatest concern is the potential effect they may have on resident species. This type of release, even if rare, poses an initial concern of new pathogens being introduced into coastal waters.

Such concerns have arisen in other instances, including the introduction of American lobsters *Homarus americanus* (Milne Edwards, 1837) into European waters. American lobsters are known carriers of the lethal bacterial disease Gaffkaemia, and Stebbing et al. (2012) suggests their introduction into European waters may potentially threaten native European lobster *Homarus gammarus* (Linnaeus, 1758) stocks. Though we cannot conclusively say that *P. versicolor* has an established population in coastal Georgia waters as a result of a single specimen capture, we also cannot definitively say that additional specimens do not still remain at –large. Establishment of the species in coastal Georgia would largely depend on how adaptable the species is, as the estuarine environ in Georgia differs significantly from those regions where *P. versicolor* is native. Nonetheless, continued efforts to locate other specimens and monitor their potential impact are warranted.

## Acknowledgements

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