

Invasion of Lion Fish in the Caribbean

a gift for photographers
but a poison for the biodiversity
by Jean Michel Machefert

Before 2010 all the pictures of Lion fishes were taken either in the Red Sea or in the Indian Ocean or Pacific Ocean. Now since few years as soon as you dive in the Caribbean Sea in shallow or deep water you will have the opportunity to see Lion fishes.

How can it be?

The Caribbean Sea is known to be a hotspot for biodiversity with more than 12 000 different species and with quite a lot of endemic species (For example, about 45% of the fish species here are considered Caribbean endemics). Since the closure of the Isthmus of Panama recently estimated 10 million years ago the marine organisms are isolated on each side of the land (this is called allopatric speciation by biologists) and then their evolution is different from one side to the other, explaining the specificity of the Caribbean region in comparison with the Pacific ocean region close by but on the other side of the land.

As a consequence if the Lion fish or his ancestor is younger than the closure of the isthmus or was living far from Panama, there is no chance to see any Lion fish in the Caribbean region and even in the tropical Atlantic. This is what happened for the last 10 millions of years without a single intrusion of Pterois in the Caribbean Sea.

But originally imported into the united states for the aquarium trade 2 different species of lion



Wreck of the Roraima, at 45m the lion fishes living on the former deck. Nikon D2x, housing Aquatica, Tokina 10 - 17mm at 10mm, 1/ 60, f 11 , ISO 400 , 2 strobes nikon Sb 910, Patima housings, ½ and full power

fish Pterois Volitans (originally living from Western Australia and Malaysia on the Eastern side, to the French Polynesia and the United Kingdom's Pitcairn Islands on the western side, and up to southern Japan and southern Korea in the north and off the east coast of Australia to the south) and Pterois miles (living in the Indian Ocean the Red sea and the gulf of Aden) should be released into the marine environment and so in 1985 a first

Lion fish was found off Fort Lauderdale in Florida by a fisherman. Then nothing until 1992 and the hurricane Andrew destroying some aquarium in Florida with the release of several fishes. (red dot on the map)

The invasion of lion fishes in the caribbean sea.

Pink: 2000; orange:2002; 2004-2006:green; 2007: blue; 2008: purple; 2009: grey; 2010: dark grey; 2011: red- brown; 2012 – today: yellow

It was the beginning of a continuous process as we can see on the map and with some more details here under:

2000: some Pterois are observed by divers in the Bermuda archipelago. Some other are seen in South and North Carolina (pink dots and line on the map)

2002: young lion fishes are observed in New Jersey and off New York city during the summer but they cannot survive at temperatures lower than 13°C, what is common in winter. (orange line on the map)

The invasion continues then to the south:

2004 to 2006 : Providence islands in the Bahamas and Turk and Caicos (green dots)

2007: Cuba (blue line)

2008: Haiti, Dominican republic, Puerto Rico, and also in Colombia (purple lines)

2009: Mexico, Panama, Costa Rica, Bonaire, Venezuela (grey lines)

2010: US virgin islands, Guadeloupe (dark greyline)



2011 : Dominica and Martinique (red - brown dots)

Since 2012 the invasion of Pterois continues to the south east coast of South America towards the Brazilian coast and it is expected that all the coast line of Brazil with temperatures over 13°C will be invaded in a short future. (yellow line on the map).

What is the reason for such rapid invasion?

Every 4 days a female lays 2 clusters of 30000 eggs held together by a jellylike material (the fertility of a single female is estimated at 2 millions of eggs each year). The male fertilizes the eggs and the masses float at the water's surface. After 2 days, the jelly breaks down and the eggs drift apart with the streams on



Lion fish in a barrel sponge during the day. Lava flow, Saint Pierre Martinique FWI at a depth of 20m. Nikon D2x, housing Aquatica, , Sigma 17-70mm at 17mm, 1/ 100, f 10 , ISO 200 , 2 strobes nikon Sb 910, Patima housings, ½ and full power

long distances for the next 25 days. The baby lionfish with a length of 10 to 12mm go near the reefs or on the sea grass where they grow at a rate of 0.5mm per day to reach around 200mm after 1 year. The young lion fishes eat small invertebrates (shrimps, crabs...) and as soon as they grow more and more fishes. When they become adults more than 80% of their preys are fishes. It is estimated that a single Pterois eats around 6 kg of fish each year and with the present density of lion fishes in the Bahamas more or less 800 kg of preys are eaten

by the population of Pterois for each hectare of the maritime area. In an area where Pterois is living all the fishes with a length smaller than 15 cm can be considered as potential food for lion fishes.

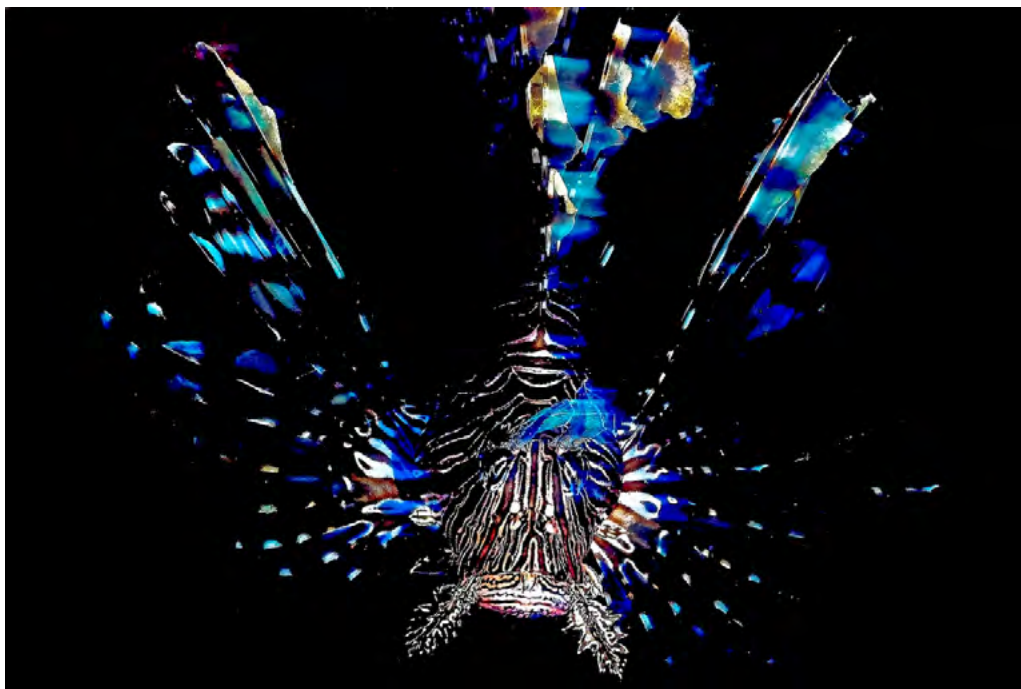
The other reason for such rapid invasion is that the lion fish seems to have almost no enemies. Some big groupers and some sharks are known to eat them but some experiences in aquarium show that even if they can eat Pterois they do not really like it too much and prefer eating something else as soon as they have the

possibility to choose. Of course in the Caribbean Sea there is a lot of choice and it is considered that the lion fishes have no predator.

During the day the lion fish stays quietly most of the time in a shadowy place (crevice in a reef, wrecks, barrel sponges...) with its head pointed down. Some times he shares protective places with bigger fishes as porcupine fishes without any risk for him and also no risk for the porcupine fish since it is too big for the Pterois. At this time the lion fish seems to be motionless but by looking carefully the fins and antennas are always in movement for stabilisation and may be also for prey attraction. For the photographer this is easy to see pictures taken at a low speed: the fish is sharp and the fins and antennas are blurred.

The Lion fish hunts in the late afternoon and the night. It can ambush its preys and as soon as it sees a small prey fish it spreads its pectoral fins to force the fish to move away. The Pterois follows it until it is cornered. Then in less than 1 second the lion fish swallows the prey whole. The lion fish has a stomach that can stretch up to 30 times its size and so it can eat a huge quantity of food in a short period. It also allows the lion fish to go as long as 3 months without a single meal.

Indeed for photographer the



Low speed portrait of a lion fish on the wreck of the Amelie (8m). Only the supra-ocular antennae are moving. Nikon D2x, housing Aquatica, Sigma 17-70mm at 60mm, 1/4, f11, ISO 200, 2 strobes nikon Sb 910, Patima housings, 1/2 and full power. Postprocessing for darkening the background and increase of the saturation by DxO software.

Lion fish because of its almost static behaviour and its striped body with widely opened fins is very attractive and easy to shot with all the kind of lenses from macro to wide angle. A lot of creative effects are also easily possible playing with in camera or with easy post treatment.

From head to tail and even on the eye, the animal is covered in vertical red-brown stripes with a white background. All the fins and flexible rays are striped. The 13 dorsal fins

3 anal fins and the 2 pelvic spines are venomous and the pectoral fins are not. The venom of the lion fish is extremely toxic and it can kill fishes larger than the lion fish itself and being very painful for the diver.

There is no reason for the lion fish to attack divers but as all the animals if the Pterois feels threatened (for example if the photographer is going to close for a macro shot and corner it) it can jump very rapidly on its enemy and sting it with venomous



A typical residence for lion fishes during the day in shallow water at a depth of 3m. On the right side of the anchor a small lion fish stay vertically head down and almost impossible to be seen by the other fishes Nikon D2x, housing Aquatica, Tokina 10 - 17mm at 10mm, 1/100, f9, ISO 200, 2 strobes nikon Sb 910, Patima housings, 1/2 and full power

spines. The pain is immediate and violent and can sometimes leads to a nervous shock. The diver have to go out of the water as soon as possible, and the only way to destroy the venom is to heat the area near the bite



Al lion fish at the top of a barrel sponge near Saint Pierre Martinique FWI at a depth of 25m . Nikon D2x, Aquatica, Sigma 17-70mm at 60mm, 1/ 60, f 8 , ISO 200 , 2 strobes nikon Sb 910, Patima housings, ½ and full power.



Typical residence for lion fishes with food (small fishes on the left) and plenty of hidden places near the sponges Nikon D2x, Aquatica, Tokina 10 - 17mm at 15mm, 1/ 125, f 11 , ISO 200 , 2 strobes nikon Sb 910, Patima housings, ½ and full power

at the higher bearable temperature (usually 45°C in hot water) for at least 1 hour. Of course a medical consultation as soon as possible is highly recommended.

One more interesting detail. By looking carefully to the head of the Pterois on some specimens supra ocular tentacles. These tentacles are sometimes straight and sometimes

peacock feather like. When existing the tentacles are interesting for photographers since they are always in motion even when the fish has absolutely no movement and low speed pictures of such behaviour make still images a little bit more “living”. Until know the role of the tentacles is unknown, it could be an organ for prey attraction or for sexual selection.

A study from Morris and Freshwater published in 2007 demonstrates that these tentacles are closely linked to the age of the lion fish. The youngest fishes exhibit straight tentacles, the juvenile- young adults the peacock feather like tentacle and no tentacles for the oldest.

To conclude, the invasion of the lion fish in the Caribbean Sea

and along the entire western tropical Atlantic coast is a perfect example of a huge and probably irreversible trouble in the environment caused by human irresponsibility, and how few specimens of fishes can invade in almost 10 years a highly specific and protected area for the last 10 million of years.

Nobody knows the future but for sure the invasion of Lion fishes is going to an alarming reduction of local native reef fish populations and also as a consequence the modification of the complete eco system.

The invasion represents also a major socio-economic threat to the region on several topics. The lion fish is considered as a safety risk to divers and fishermen and this can adversely impact important commercial activities such as tourism. Tourism might also be affected by the reduction in the biodiversity and as a direct consequence, the natural attraction of some dive sites.

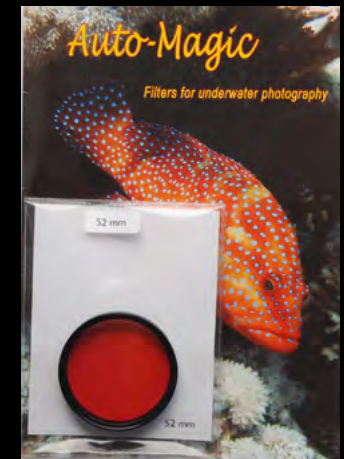
The invasion contributes also to the decline of commercially important species of fishes fished for local consumption which are an important source of food for the local communities.

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