

*Short note/Kurze Mitteilung*

## Fishes of a stranded *Sargassum* meadow at Punta Cana, Dominican Republic

Die Fischarten einer gestrandeten *Sargassum*-Matte bei Punta Cana, Dominikanische Republik

TIMO MORITZ

Deutsches Meeresmuseum, Katharinenberg 14-20, 18437 Stralsund, & Zoologisches Institut mit Phyletischem Museum, Universität Jena, Erbertstr. 1, 07743 Jena

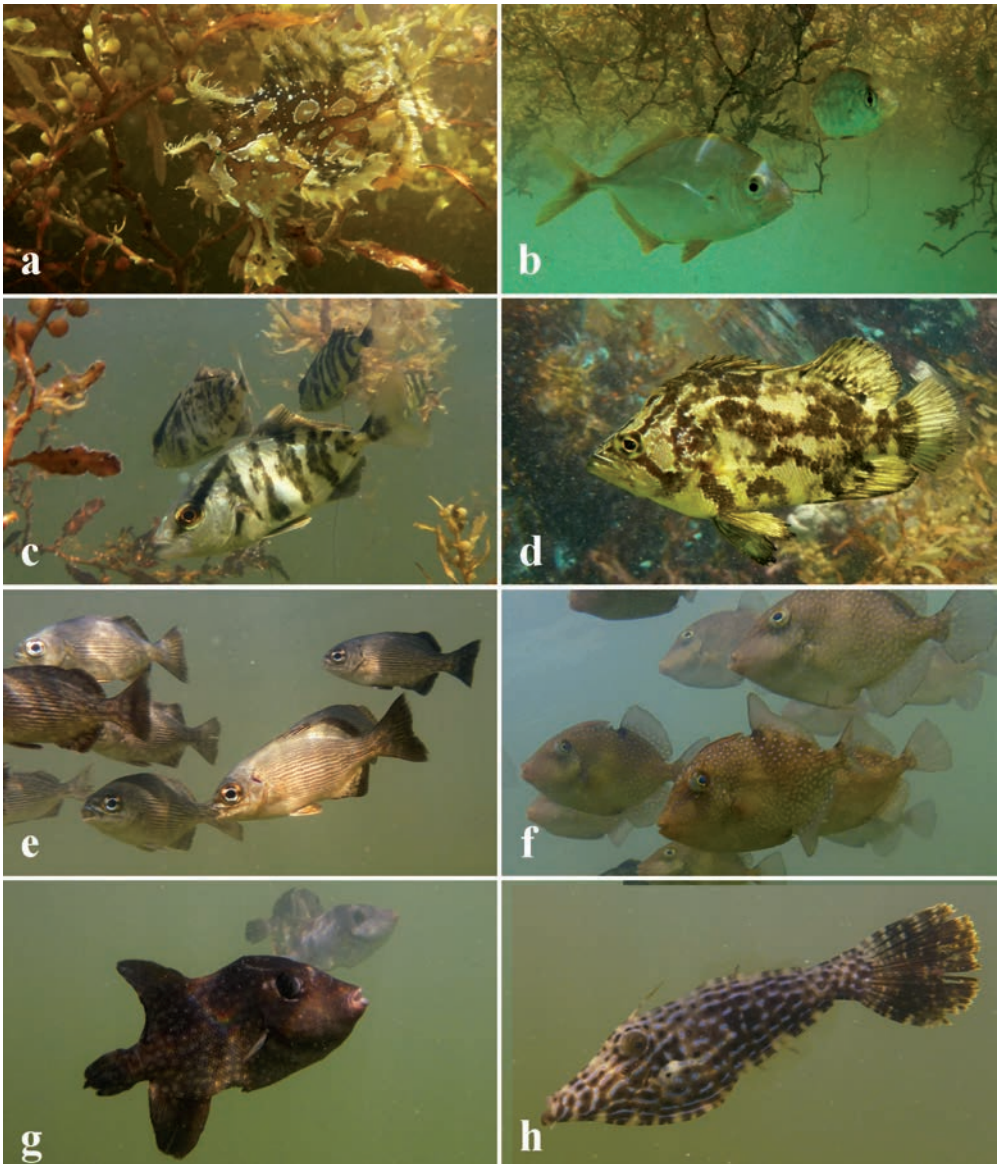
**Zusammenfassung:** Das Stranden einer größeren *Sargassum*-Matte an der Küste von Punta Cana, Dominikanische Republik, ermöglichte einen Blick auf die damit assoziierte Fischgemeinschaft. Auch wenn typisch *Sargassum*-assoziierte Arten, wie *Histrio histrio*, gefunden wurden, weicht doch die Zusammensetzung der Fischgemeinschaft deutlich von anderen Untersuchungen im Atlantik, inklusive dem Karibischen Meer, ab. *Lobotes surinamensis* und *Kyphosus sexatrigis*, die sonst untergeordnete Bedeutung haben, waren in sehr großen Anzahlen vorhanden, *Stephanolepis hispidus* konnte nicht nachgewiesen werden, obwohl diese Art meist den Großteil der Individuen in *Sargassum*-Matten stellt. Möglicherweise weist die ungewöhnliche Zusammensetzung auf einen längeren Transport des Algentepichs hin.

On the Bavaro Coast, Punta Cana, Dominican Republic, a minor amount of *Sargassum* algae was washed ashore on a daily basis. The algae likely originate from the Sargasso Sea. During the night from 25<sup>th</sup> to 26<sup>th</sup> November 2014 a huge amount of *Sargassum* weed reached this coast (at about 18°39'N 68°21'W), which had roughly the dimensions of 150,000 m<sup>2</sup>. Even using large building machines it took about five days to clear the beach.

This stranding of an extraordinary large *Sargassum* meadow made it possible to have a closer look to the associated fish species. The fish community was investigated by snorkelling on the 28<sup>th</sup> and 29<sup>th</sup> November 2014. Snorkelling was performed mainly along the outer margin of the meadow with additional shorter dives into and under the meadow. For documentation and species determination pictures were made using a Panasonic TZ22 with underwater housing. Species occurrence was recorded semi-quantitatively by using four relative categories: very common (more than 100 specimens), common (10-100 specimens), rare (2-10 specimens per survey) and single specimen.

Due to the dimension of the stranded *Sargassum* meadow the algae were not washed ashore within a short time but a meadow of shrinking size was established for three to four days in front of the beach. The conditions for the *Sargassum* and its associated fauna were the worse the closer the beach was. Directly along the shore algae started to decay and water became murky and brownish. The increased water turbidity was to a major part also a result of the activities of large machines applied for beach cleaning. An overview of the recorded fish species is given in figure 1 and table 1.

*Histrio histrio* (Antennariidae). Two specimens of the *Sargassum* fish have been found by snorkelling through the meadow and sorting the algae piece by piece (fig. 1a). Both specimens were rather small with about 5 and 7 cm total length. The absolute amount of specimens was for sure much higher, but it was quite time consuming even to find these two specimens within the dense meadow. This typical *Sargassum* associated fish was present in virtually all studies of the ichthyofauna of pelagic *Sargassum* and was recorded sometimes in very high numbers, e.g.



**Fig. 1:** Live images of fishes associated with the Sargassum meadow. **a** *Histrio histrio*, **b** juvenile *Caranx* cf. *latus*, **c** juvenile *Seriola dumerili*, **d** *Lobotes surinamensis*, **e** *Kyphosus sextatrix*, **f** *Balistes capriscus*, **g** *Canthidermis maculata*, **h** *Aluterus scriptus*.

**Abb. 1:** Lebendaufnahmen der Fische, die mit der Sargassum-Matte assoziiert waren. **a** *Histrio histrio*, **b** juvenile *Carangidae* species. Several schools of differently sized carangids were observed directly at the edge of the *Sargassum* meadow. *Carangoides*

from March to June in the Florida Current (e.g. DOOLEY 1972).

*Carangidae* species. Several schools of differently sized carangids were observed directly at the edge of the *Sargassum* meadow. *Carangoides*

*ruber* seemed to occur in about the same numbers as usual for this coastal part. Therefore specimens of this species probably only accidentally passed by, although some individuals were found to be associated with pelagic

**Tab. 1:** Fishes observed in or very close to the stranded *Sargassum* meadow. ●●● very common; ●● common, ● rare; ○ single specimen.

**Tab. 1:** Überblick über die Fischarten, die in oder nahe bei der *Sargassum*-Matte beobachtet wurden. ●●● sehr häufig; ●● häufig, ● selten; ○ einzelnes Individuum.

Species	likely associated with <i>Sargassum</i> meadow	likely attracted by <i>Sargassum</i> meadow	relation to <i>Sargassum</i> meadow not clear
<b>Antennariidae</b>			
<i>Histrio histrio</i>	●		
<b>Carangidae</b>			
<i>Carangoides ruber</i>		●●●	
<i>Caranx latus</i>			●●
<i>Caranx</i> cf. <i>latus</i> juvenil	●		
<i>Seriola dumerili</i> (less than 20 cm)	●●●		
<i>Seriola dumerili</i> (about 20-30 cm)			●●●
<b>Lobotidae</b>			
<i>Lobotes surinamensis</i>	●●●		
<b>Kyphosidae</b>			
<i>Kyphosus sextatrix</i>	●●●		
<b>Balistidae</b>			
<i>Balistes capriscus</i>	●●●		
<i>Canthidermis maculata</i>	●●		
<b>Monacanthidae</b>			
<i>Aluterus scriptus</i>	●●		
<b>Diodontidae</b>			
<i>Diodon holacanthus</i>			○

*Sargassum* in other studies (e.g. DOOLEY 1972). For *Caranx latus* the situation is less clear, as there were juvenile specimens (< 5 cm), which likely belonged to this species (fig. 1b). They seemed to be tightly associated with the *Sargassum* algae. In other studies *Caranx crysos* was the most common species of this genus associated with floating *Sargassum* algae in the Gulf of Mexico (WELLS & ROOKER 2003) and in the Gulf Stream off North Carolina (CASAZZA & ROSS 2008). Also small juveniles (< 5 cm) of *Seriola* sp. occurred inside the layer of algae, larger juveniles (about 5 to 20 cm) swam directly below the meadow (fig. 1c) and schools of larger specimens patrolled along the margin

of the meadow. Although *Seriola* species are often difficult to distinguish, the colouration of the juveniles clearly identified this species as *Seriola dumerili* (SMITH-VANIZ 2002). This species is the most common of the genus in the studies on *Sargassum meadows* from the Gulf of Mexico of BORTONE et al. (1977) and WELLS & ROOKER (2003). Another study, however, found *Seriola rivoliana* and *Seriola fasciata* to be much more common at *Sargassum meadows* of the Gulf Stream off North Carolina (CASAZZA & ROSS 2008).

*Lobotes surinamensis* (Lobotidae). Very small specimens (40-60 mm long) stayed within the *Sargassum* meadow close to the surface. Such

specimens were occasionally floating on their sides at the surface. Slightly larger individuals stayed directly below floating *Sargassum* at a distance from the algae cover of only a few times their own body length (fig. 1d). If threatened they fled into the meadow. Laying laterally on the surface was also observed in this size class as reaction to threat. As a last resort out of threats from below, they jumped short distances out of the water. At the beginning of the survey they did not school, but stayed rather equally distributed within the meadow. With reduced size of the meadow after three days, however, specimens formed more and more schools. Many specimens have been observed suffering from wounds on their flanks, likely originating from ground contact at the shore. When most *Sargassum* weed was removed from the water after four days several schools of smaller *L. surinamensis* could even be observed along the surf wave zone very close to the beach. Schools of larger specimens had already disappeared from the area at this point of time. This species was very common in different sizes. In other studies investigating the ichthyofauna of pelagic *Sargassum* this species was reported to be rather rare in the Gulf of Mexico (BORTONE et al. 1977) or at least was not considered a common species in the Gulf Stream off North Carolina (CASAZZA & ROSS 2008). DOOLEY (1972) recorded more specimens of *L. surinamensis* from July to October in the Florida Current than during the rest of the year.

*Kyphosus sextatrix* (Kyphosidae). This species was very common usually along the margin of the *Sargassum* meadow, where individuals of approximately the same size, usually around 80-100 mm, formed medium to large shoals (fig. 1e). Amazingly, some intense studies investigating the ichthyofauna of pelagic *Sargassum* recorded rather few in the Gulf Stream off North Carolina (CASAZZA & ROSS 2008) or even not a single specimen of *K. sextatrix* in the Gulf of Mexico (BORTONE et al. 1977).

Balistidae species. Two species of the Balistidae have been observed of which *Balistes caprisicus* was the more common one. Only juveniles of

this species were observed (fig. 1f). They usually stayed close to or even within the *Sargassum* meadow. When the *Sargassum* algae were taken out of the water three and four days after their stranding groups of similar sized *B. caprisicus* juveniles gathered together at floating objects, like buoys or floating ropes. This species is known to be quite common in pelagic *Sargassum* meadows of the Gulf of Mexico (BORTONE et al. 1977; WELLS & ROOKER 2003) and Gulf Stream off North Carolina (CASAZZA & ROSS 2008), whereas DOOLEY (1972) found this species to be only common in *Sargassum* during a certain time of the year, i.e. from July to October in the Florida Current.

The second balistid species, *Canthidermis maculata*, was less common (fig. 1g). In other studies dealing with this topic the latter species was recorded only rarely in the Gulf Stream off North Carolina (CASAZZA & ROSS 2008) and even classified as 'coincidental and moderately associated' *Sargassum* fish for the Florida Current (DOOLEY 1972, p. 9: table 1)

*Aluterus scriptus* (Monacanthidae). Of this species only medium sized juveniles (approx.. 100-140 mm long) were recorded (fig. 1h). They usually formed groups of about four to ten individuals of almost identical size swimming head down shortly below the *Sargassum* meadow. They oriented their dorsum in the direction of a potential predator minimizing their visible body area.

Also WELLS & ROOKER (2003) found *A. scriptus* not to be rare in *Sargassum* meadows in the Gulf of Mexico. All four *Aluterus* species, i.e. *A. heudelotii*, *A. monoceros*, *A. schoepfii* and *A. scriptus*, have already been recorded from pelagic *Sargassum* in the Gulf Stream off North Carolina (CASAZZA & ROSS 2008) and these otherwise rather coastal species seem to manage quite well to live in this pelagic habitat.

*Diodon histrix* (Diodontidae). A single dead specimen was found floating on the surface of the *Sargassum* meadow. It is not clear, if the specimen was accidentally found here or if it was associated with the *Sargassum* meadow. The related species *Diodon holacanthus* was rarely and in low numbers recorded from pelagic *Sargassum* fish communities from the Gulf of Mexico

(BORTONE et al. 1977) and the Gulf Stream off North Carolina (CASAZZA & ROSS 2008).

Other species. Several coastal fish species passed by and probably profited from food particles falling down from the floating algae. Such species were e.g. *Gerres cinereus* (Gerreidae), *Mulloidichthys martinicus* (Mullidae) and *Haliocboeres* species (Labridae).

Strandings of *Sargassum* meadows are always strandings of complete biotopes. Several *Sargassum* associated species are trapped on the coast with varying chances to survive. Best chances to survive in the here reported situation had for sure carangid species, followed by balistids and kyphosids, as open water inhabitants with temporal profit of a *Sargassum* meadow. Worse was the situation for *Lobotes surinamensis*. It seems that larger individuals had the possibility to escape forming schools. Little chances of surviving had the smaller *L. surinamensis* specimens, as they seemed to be confined to the meadow. Worst chances to survive had *Histrio histrio*, a species highly adapted to live in floating weed (ADAMS 1960). The amount of profiting fish-eating birds seemed astonishing little: Royal tern regularly passed by, but never more than ten individuals at a time; sea gulls and brown pelican were only rarely seen.

*Sargassum* meadows appear as a quite uniform environment and one could expect rather uniform species compositions at least within each ocean. DOOLEY (1972), however, described differences in numbers of species depending on study area. He came to the conclusion that there might be centres of highest diversity – each one in the Atlantic and in the Pacific – and that by increasing distance from these centres, the diversity of *Sargassum* communities decreases. If looking only at species numbers the herein presented result might still fit in this hypothesis, but looking more detailed at the ichthyofaunal composition, it does not. Also other studies showed that the composition of fish communities varies in time and space within the Atlantic (FINE 1970; WELLS & ROOKER 2003; CASAZZA & ROSS 2008). Seasons mainly seem to influence the amount of juveniles and larvae associated with *Sargassum* meadows. But the abundance of fish species strongly associated with *Sargassum* seems to differ locally.

Studies over several years in the eastern Gulf of Mexico revealed *Stephanolepis hispidus* to be by far the most common species representing 84.5% of the fish individuals directly associated with the *Sargassum* weed, followed by *Balistes capricus* (6.1%), *Histrio histrio* (1.8%) and *Caranx crysos* (1.4%) (BORTONE et al. 1977). Likewise, in another study from the Gulf of Mexico (WELLS & ROOKER 2003) and in studies from the Atlantic off the coast of Florida (DOOLEY 1972) and of the coast off North Carolina (CASAZZA & ROSS 2008), *Stephanolepis hispidus* represented the most common species almost all through the year. Remarkably in the present study not a single specimen of *Stephanolepis hispidus* was recorded. On the other hand, in all aforementioned studies *Lobotes surinamensis* and *Kyphosus sectatrix* were only rarely recorded, e.g. in the study of BORTONE et al. (1977) only five out of almost 3,000 fish specimen belonged to *Lobotes surinamensis* and not a single specimen of *Kyphosus sectatrix* was found. These two species, however, were very common in the present study.

Regularly patches of weed detach from a centre of pelagic *Sargassum* within the Sargasso Sea and go on a surface current driven journey within the Atlantic (DOOLEY 1972). One could assume that the fish community is beside seasonal variations more or less homogenous in the distribution centre and thus also in detaching patches. If so, the momentary fish community of a travelling patch should be dependent on travelling time and route, as well as on its original and actual size. A long journey could be an explanation for the observed differences between ichthyofaunal fish communities of the herein observed meadow and from other close-by areas of the Central Atlantic. A long journey might result in fewer strongly associated species, e.g., no pipefish typical for *Sargassum* could be recorded. At the same time the amount of unspecialized Atlantic pelagic fishes commonly associating with flotsam should increase, i.e. *Balistes capricus*, *Canthidermis maculata*, *Kyphosus sextatrix* and *Lobotes surinamensis*). This issue, however, remains quite complex and has to be investigated in future studies.

## Literature

- ADAMS, J.A. 1960. A contribution to the biology and postlarval development of the Sargassum fish, *Histrionicus* (Linnaeus), with a discussion of the *Sargassum* complex. Bulletin of Marine Science 10, 55-82.
- BORTONE, S.A., HASTINGS, P.A. & S.B. COLLARD. 1977. The pelagic *Sargassum* ichthyofauna of the eastern Gulf of Mexico. Northeast Gulf Science 1, 60-67.
- CASAZZA, T.L. & S.W. ROSS. 2008. Fishes associated with pelagic *Sargassum* and open water lacking *Sargassum* in the Gulf Stream off North Carolina. Fisheries Bulletin 106, 348-363.
- DOOLEY, J.K. 1972. Fishes associated with the pelagic *Sargassum* complex, with a discussion of the Sargassum community. Contributions to Marine Science 16, 1-32.
- FINE, M.L. 1970. Faunal variation on pelagic *Sargassum*. Marine Biology 7, 112-122.
- SMITH-VANIZ, W.F. 2002. Carangidae, pp.1426-1468. In: The living marine resources of the Western Central Atlantic. Volume 3 (CARPENTER, K.E., ed.). FAO species identification guide for fishery purposes. FAO, Rome.
- WELLS, F.J.D., & J.R. ROOKER. 2003. Distribution and abundance of fishes associated with *Sargassum* mats in the NW Gulf of Mexico. Gulf and Caribbean Fisheries Institute 54, 609-621.

Received: 22.0.2.2015

Accepted: 01.07.2015