



SEAFDEC/UNEP/GEF Project on Establishment and Operation of a Regional System of Fisheries *Refugia* in the South China Sea and Gulf of Thailand

Auxis thazard

Frigate Tuna



Scientific classification

Kingdom: [Animalia](#)
 Phylum: [Chordata](#)
 Class: [Actinopterygii](#)
 Order: [Scombriformes](#)
 Family: [Scombridae](#)
 Genus: [Auxis](#)
 Species: ***A. thazard***

Binomial name

Auxis thazard
 ([Lacepède](#), 1800)

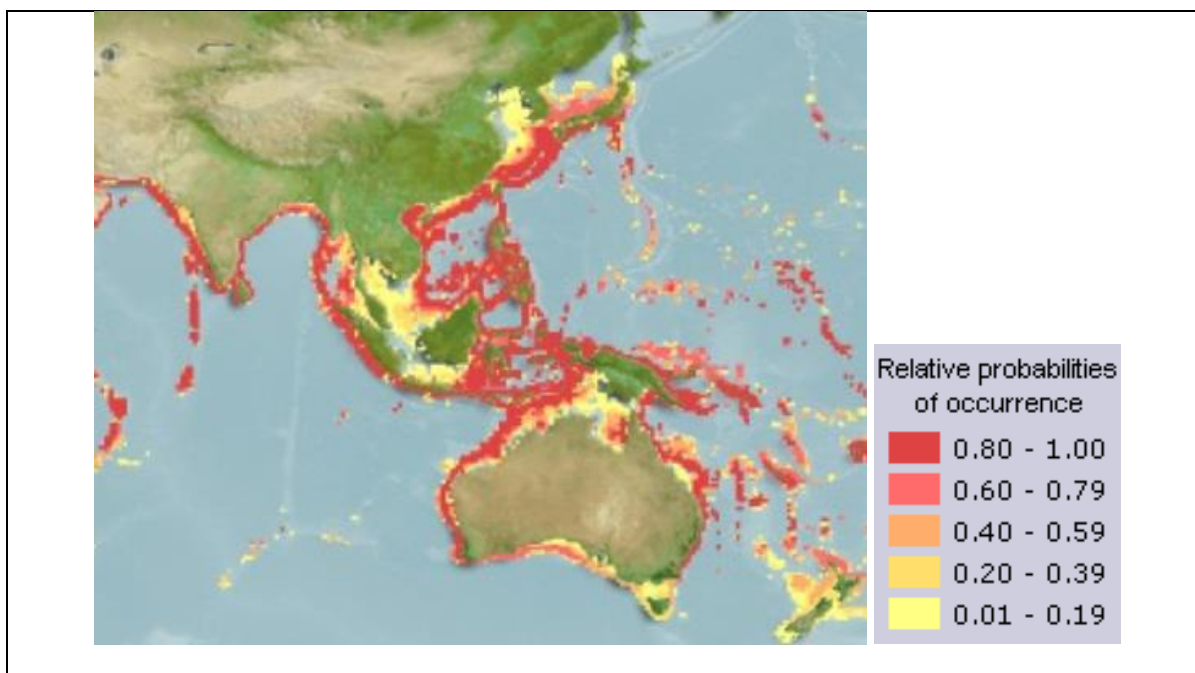
Synonyms^[2]

- *Scomber thazard* [Lacepède](#), 1800
- *Scomber taso* [Cuvier](#), 1832
- *Auxis tapeinosoma* [Bleeker](#), 1854
- *Auxis hira* [Kishinouye](#), 1915

A. Environment/Ecology:

Marine; pelagic-neritic; oceanodromous (Ref. [51243](#)); depth range 50 - ? m (Ref. [9340](#)). Tropical; 27°C - 28°C; 61°N - 51°S, 180°W - 180°E

B. Distribution:



Atlantic, Indian and Pacific (Western Central). Eastern Pacific population recognized as subspecies *Auxis thazard brachydorax* (Ref. [32349](#)). Many authors have used the name *Auxis thazard* as including *Auxis rochei* in the belief that there was only a single worldwide species of *Auxis*. Highly migratory species, Annex I of the 1982 Convention on the Law of the Sea (Ref. [26139](#)).

C. Length at first maturity / Size / Weight / Age:

Maturity: L_m [29.5](#), range 29 - ? cm Max length : 65.0 cm FL male/unsexed; (Ref. [29114](#)); common length : 60.0 cm TL male/unsexed; (Ref. [47377](#)); max. published weight: 1.7 kg (Ref. [40637](#)); max. reported age: 5 years (Ref. [29114](#))

D. Short description

[Dorsal spines](#) (total): 10 - 12; [Dorsal soft rays](#) (total): 10-13; [Anal spines](#): 0; [Anal soft rays](#): 10 - 14. This species is distinguished by the following characters: a robust body, elongated and rounded; teeth small and conical, in a single series; total gill rakers on first gill arch 36-42; dorsal fins 2, D1 X-XII, separated from the second by a large interspace (at least equal to length of first dorsal-fin base), second dorsal fin followed by 8 finlets; anal fin followed by 7 finlets; pectoral fins short, but reaching past vertical line from anterior margin of scaleless area above corselet; a large single-pointed flap (interpelvic process) between pelvic fins; body naked except for the corselet, which is well developed and narrow in its posterior part (no more than 5 scales wide under second dorsal-fin

origin); a strong central keel on each side of caudal-fin base between 2 smaller keels. Colour of back bluish, turning to deep purple or almost black on the head; a pattern of 15 or more narrow, oblique to nearly horizontal, dark wavy lines in scaleless area above lateral line; belly white; pectoral and pelvic fins purple, inner sides black (Ref 9684).

E. Biology

Adults are epipelagic in neritic and oceanic waters (Ref. [9340](#)). They feed on small fish, squids, planktonic crustaceans (megalops), and stomatopod larvae (Ref. [5213](#)). Because of their abundance, they are considered an important element of the food web, particularly as forage for other species of commercial interest. They are preyed upon by larger fishes, including other tunas (Ref. [9987](#)). Marketed fresh and frozen (Ref. [9340](#)) and also utilized dried or salted, smoked and canned (Ref. [9987](#)).

F. Life cycle and mating behavior

In correlation with temperature and other environmental changes, the spawning season varies with areas, but in some place it may even extend throughout the year.

G. Fisheries

Catches of *Auxis* are usually not identified to species because of current problems in identification. It may, however, be assumed that the Pacific and Indian Ocean catches reported by Japan, the Philippines and the Maldives are predominantly *A. thazard*. In the period from 1977 to 1980 these catches almost doubled to 122 995 metric tons, particularly due to increased landings by the Philippines, but decreased to about 98 000 metric tons 1981 (FAO, 1983). The total catch in 1996 (*Auxis rochei* and *A. thazard*) was 172 693 t. Mainly Philippines 88 969 t. No catch in 1999

H. IUCN Red List Status

GEOGRAPHIC RANGE

- **Taxonomy**

Kingdom:	Animalia
Phylum:	Chordata
Class:	Actinopterygii
Order:	Perciformes
Family:	Scombridae
Genus:	Auxis

- **Geographic Range**

NUMBER OF LOCATIONS

UPPER DEPTH LIMIT : 0 metres

LOWER DEPTH LIMIT : 200 metres

RANGE DESCRIPTION

This species is present in the Atlantic, Indian, and Pacific oceans. It is considered vagrant in the Mediterranean Sea. However, there are only a few records of this species in the Atlantic as most of the *Auxis* in the Atlantic are *Auxis rochei*.

The Eastern Pacific population is recognized as a subspecies, *Auxis thazard brachydorax* (Collette and Aadland 1996), which occurs from California to the mouth of the Gulf of California to Peru, and all the oceanic islands except Clipperton (Robertson and Allen 2006).

- **Population**

CURRENT POPULATION TREND : Stable

POPULATION SEVERELY FRAGMENTED : No

- **Habitat and Ecology**

System : Marine

Habitat type : Marine Oceanic

Movement patterns : Full Migrant

- **Biological resource use :**

Fishing & harvesting aquatic resource

- **Threats**

This is a species with high commercial value. It is caught with beach seines, shore seines, drift nets, purse seines, hook-and-line, gill nets and by trolling.

Overall trends in the small tuna catch may mask declining trends for individual species because annual landings are often dominated by the landings of a single species. These fluctuations seem to be partly related to unreported catches, as these species generally comprise part of the bycatch and are often discarded, and therefore do not reflect the real catch. It is commonly believed that catches of small tunas are strongly affected by unreported or underreported data in all areas. Small tunas are exploited mainly by coastal fisheries and often by artisanal fisheries, although substantial catches are also made, either as target species or as bycatch, by purse seiners, mid-water trawlers, handlines, troll lines, driftnets, surface drifting long-lines and small scale gillnets. Several recreational fisheries also target small tunas. Since 1991, the use of fish aggregating devices (FADs) by tropical purse seiners may have led to an increase in fishing mortality of small tropical tuna species (STECF 2009). There is a general lack of information on the mortality of these species as bycatch, exacerbated by the confusion regarding species identification (ICCAT 2009).



- **Use and Trade**

This species is fished throughout its range.

- **Conservation Action**

There are no known conservation measures for this species. It is a highly migratory species, Annex I of the 1982 Convention on the Law of the Sea (FAO Fisheries Department, 1994). No fishery management plan is currently in place except a prohibition on drift nets in EU countries.

Data on the catch composition, biology and trends are now available from the Mediterranean and the Black Sea, thanks to the ICCAT/GFCM joint expert group in 2008. More information, particularly on specific fishing effort, is needed from all areas. The small tuna fishery seems to be quite important for the coastal communities, both economically and as a source of proteins. The ICCAT Standing Committee on Research and Statistics (SCRS) suggests that countries be requested to submit all available data to ICCAT as soon as possible, in order to be used in future meetings. No management recommendations have been presented by ICCAT due to the lack of proper data, historical series and analyses. ICCAT/SCRS, in 2008, reiterated its recommendation to carry out studies to determine the state of these stocks and the adoption of management solutions. ICCAT-SCRS in 2009 noted that there is an improvement in the availability of catch and biological data for small tuna species particularly in the Mediterranean and the Black Sea. However, biological information, catch and effort statistics for small tunas remain incomplete for many of the coastal and industrial fishing countries. Given that, many of these species are of high importance to coastal fishermen, especially in some developing countries, both economically and often as a primary source of proteins, therefore the SCRS recommends that further studies be conducted on small tuna species due to the limits of information available (STECF 2009).

I. More Information:

1) Stocks

(NA)

2) Ecology

Ecology of *Auxis thazard*

Main Ref. [Collette, B.B. and C.E. Nauen, 1983](#)

Remarks Epipelagic in neritic and oceanic waters (Ref. 9340). Feeds on small fish, squids, planktonic crustaceans (megalops), and stomatopod larvae (Ref. 5213). Because of their abundance, they are considered an important element of the food web, particularly as forage for other species of commercial interest. Preyed upon by larger fishes, including other tunas (Ref. 9987). Confined to oceanic salinities with strong schooling behavior. Though larvae have a high temperature tolerance (at least between 21.6 and 30.5°C), the widest among tuna species studied, their optimum temperature is between 27 and 27.9°C.

Feeding						
Feeding type	mainly animals (troph. 2.8 and up)					
Feeding type ref	Uchida, R.N., 1981					
Feeding habit	hunting macrofauna (predator)					
Feeding habit ref	Collette, B.B. and C.E. Nauen, 1983					
Trophic level(s)		Original sample		Unfished population		Remark
	Estimation method	Troph	s.e.	Troph	s.e.	
	From diet composition	4.37	0.38	4.19	0.60	Troph of juv./adults from 2 studies.
	Ref.	Blaber, S.J.M., D.A. Milton, N.J.F. Rawlinson, G. Tiroba and P.V. Nichols, 1990				
	From individual food items	4.36	0.73			Trophic level estimated from a number of food items using a randomized resampling routine.

3) Diet

Food and Feeding Habits: Diet Composition <i>Auxis thazard</i> n = 3						
Main Food	Percent	Trophic Level (y)	Predator Life Stage	Country	Locality	Ref.
nekton	87	4.2	juv./adults	Colombia	Magdalena and La Guajira	56479
nekton	47	4.3	juv./adults	Solomon Is.		30531
nekton	60	4.5	juv./adults	Malaysia	Terengganu waters, east coast of Peninsular Malaysia, January 1993-June 1994	53850

4) Reproduction

Reproduction of <i>Auxis thazard</i>	
Main Ref.	Collette, B.B. and C.E. Nauen, 1983

Mode	dioecism
Fertilization	external
Mating type	
Spawning frequency	Variable throughout range
Spawning aggregation	Ref.
Batch spawner	Ref.
Reproductive guild	nonguarders open water/substratum egg scatterers
Parental Care	none
Description of life cycle and mating behavior	In correlation with temperature and other environmental changes, the spawning season varies with areas, but in some places it may even extend throughout the year.
Search for more references on reproduction	Scirus

5) Maturity

Maturity studies for *Auxis thazard*
n = 7
[Lm vs Linf graph](#)

		Sort by <input checked="" type="radio"/> Lm <input type="radio"/> Country <input type="radio"/> Locality <input type="radio"/> tm						
Lm (cm)	Length (cm)	Age range (y)	tm (y)	Sex of fish	Country	Locality		
	35.0	-	-		unsexed	Hawaii	Hawaii	
	29.0	-	-		unsexed	Japan	Japan	
27.5 NG		-	-		unsexed	India	Kerala (2011-2012, 2014-2015)	
29.7 NG		-	-	2.50	unsexed	India	Karnataka (2016)	
29.7 NG		-	-		unsexed	India	Kerala (2012-2013)	
30.0 FL		-	-		unsexed	Russia	Eastern atlantic	
30.5 NG		-	-		unsexed	India	Karnataka (2011-2012)	

6) Spawning

Spawning for *Auxis thazard*
n = 5

J	F	M	A	M	J	J	A	S	O	N	D	Country	Locality
111	111	111	111	111	111	111	111	111	111	111	111		Eastern Pacific
						111						Japan	Japan
111	111	111	111										North of the equator
111	111	111	111	111	111	111	111	111	111	111	111	Costa Rica	Off Costa Rica
111	111	111	111				111	111	111	111	111		Southern Indian Ocean

7) Spawning aggregation

(NA)

8) Fecundity

Fecundity for *Auxis thazard*
Sort by Country Locality
[n = 3]

Country	Locality	Absolute Fecundity		Relative Fecundity		
		min	max	Min	Mean	Max
	Southern Indian Ocean	200,000	1,060,000			
	to be filled	0	1,370,000			
India	Kerala (2014-2015)	0	0	103		127

9) Eggs

(NA)

10) Egg development

(NA)

11) Age/Size

[List of Population Characteristics records for *Auxis thazard*](#)

n = 7

Sex	Wmax	Lmax (cm)	Tmax (y)	Country	Locality
unsexed		48		India	Karnataka, 2016
unsexed		49		India	Annankovil Parangipettai
unsexed		50		India	Kerala (2011-2012)
unsexed		50		South Africa	South Africa
unsexed		51			Indian Ocean
unsexed		58		Iran	Sistan and Baluchestan waters to Jask
unsexed		58		Sri Lanka	Sri Lanka

12) Growth

Growth parameters for *Auxis thazard*

Maximum Length 65cm FL

n = 14

Note that studies where Loo is very different (+/- 1/3) from Lmax are doubtful.

Lm vs Linf graph	[n = 5]
M vs K graph	[n = 1]
M vs Linf graph	[n = 1]
Longevity vs 3/K graph	[n = 4]

$\phi = 3.36$ $L_{inf} = 49.0$ cm NG K = 1.0 Median record no. 8 116140Ref. [116140](#)

Loo (cm)	Length Type	K (1/y)	to (years)	Sex	M (1/y)	Temp° C	Lm	Ø'	Country	Locality	Questionable	Captive
36.6	FL	1.200				28.0		3.21	Philippines	Camotes Sea	No	No
40.5		0.850					11.8	3.14	Philippines	Davao Gulf	No	No
47.0	FL	0.730			0.87	28.5		3.21	Philippines	Bohol Sea	No	No
47.5	FL	0.700				27.0		3.20	Indonesia	Pelabuhan Ratu, West Java	No	No
48.2	TL	0.520						3.08	Taiwan	Taiwan Strait and adjacent waters	No	No

48.2	FL	0.523	-0.33			23.5	27.1	3.08	Taiwan	Taiwan Strait	No	No
48.4	FL	0.511				23.5	27.6	3.08	Taiwan	Taiwan Strait	No	No
49.0	NG	0.960						3.36	India	Goa (2014-2015)	No	No
49.0	NG	0.960	-0.09				30.5	3.36	India	Karnataka (2011-2012)	No	No
51.5		0.320	-0.83					2.93			No	No
51.5	FL	1.000				27.0		3.42	Indonesia	Pelabuhan Ratu, West Java	No	No
58.7	NG	1.200	-0.01				29.7	3.62	India	Karnataka, 2016	No	No
61.6	FL	0.830				12.5		3.50	Sri Lanka	Southwest	No	No
63.5	FL	0.720				28.5		3.46	Philippines	Moro Gulf	No	No

13) Length-weight

Length-Weight Parameters for *Auxis thazard*

[Length-weight \(log a vs b\) graph](#) [n=10] [Hide graph](#)

Sort by a b Country Locality

Score	a	b	Sex	Length (cm)	Length type	r ²	n	Country	Locality
0.50	0.07700	2.509	unsexed					Japan	Shionomisaki
0.50	0.05470	2.700	unsexed		FL			South Africa	
0.50	0.00997	3.130	mixed		TL			Brazil	Southwestern EEZ
0.93	0.00890	3.170	Unsexed	24.6 - 31.7	FL	0.926	33	Brazil	Central coast, 1993-2000
0.95	0.00600	3.194	Unsexed	26.9 - 34.8	TL	0.951	34	Brazil	Central coast, 1993-2000
0.92	0.00800	3.228	unsexed	22.3 - 45.0	TL	0.920	261	India	Southern coast of Karnataka / 1999-2001

0.94	0.00800	3.273 Unsexed	23.0 - 29.3	SL	0.944	34	Brazil	Central coast, 1993-2000
0.50	0.00605	3.300 unsexed					Japan	Mikomoto
0.60	0.00180	3.334 unsexed				160	Sri Lanka	
0.91	0.00280	3.468 mixed	18.0 - 49.0	TL	0.907	618	India	Annangkovil Parangipettai

14) Length-length

Length-length Parameters for *Auxis thazard*
[n=5]

Unknown length	a	b	Known length	r	Length range (cm)	Sex of fish
SL	0.000	0.912	FL		-	unsexed
TL	0.000	1.034	FL		-	unsexed
TL	0.000	1.097	FL		-	unsexed
TL	0.000	1.113	SL		-	unsexed
TL	0.000	1.190	SL		-	unsexed

15) Length-frequencies

List of frequency studies for *Auxis thazard*

Locality	Year from - to	Sex	Gear	Frequency type
Bohol Sea, Philippines	1980-1980	unsexed/mixed	trawls	absolute number measured
Camotes Sea, Philippines	1983 - 1987	unsexed/mixed	various gears	absolute number measured
Indian Ocean (Pelabuhan Ratu, West Java), Indonesia	1980 - 1980	unsexed/mixed	trawls	absolute number measured
Indian Ocean (Pelabuhan Ratu, West Java), Indonesia	1981 - 1981	unsexed/mixed	trawls	absolute number measured
Moro Gulf, Philippines	1976 - 1977	unsexed/mixed	trawls	absolute number measured

16) Morphometrics

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Morphometric Data for *Auxis thazard*

n = 3

Picture Name	Length		Lifestage	Aspect ratio
Autha_u1.jpg	42	FL	unsexed	6.86
Autha_u5.jpg	33.3	FL	unsexed	5.11
Autha_u6.jpg		none	unsexed	5.43

Picture Used	Autha_u1.jpg
Size (cm)	42 FL, 43.5
Sex	unsexed
Total length (TL)	611 pixels
Standard length	92.6 % TL
Fork length	95.3 % TL
Pre-anal length	63.5 % TL
Pre-dorsal length	28.3 % TL
Pre-pelvic length	26.8 % TL
Pre-pectoral length	24.7 % TL
Body depth	23.2 % TL
Head length (HL)	23.6 % TL
Eye diameter	20.1 % HL
Pre-orbital length	16.7 % HL
Aspect ratio of caudal fin	6.85739
Remarks	1

Picture Used	Autha_u5.jpg
Size (cm)	33.3 FL
Sex	unsexed
Total length (TL)	600 pixels
Standard length	89.8 % TL
Fork length	96.7 % TL
Pre-anal length	66.2 % TL
Pre-dorsal length	29.5 % TL
Pre-pelvic length	26.2 % TL
Pre-pectoral length	24.8 % TL
Body depth	25.0 % TL
Head length (HL)	23.0 % TL
Eye diameter	15.9 % HL

Pre-orbital length	19.6 % HL
Aspect ratio of caudal fin	5.10505
Picture Used	Autha_u6.jpg
Sex	unsexed
Total length (TL)	575 pixels
Standard length	84.0 % TL
Fork length	91.1 % TL
Pre-anal length	57.4 % TL
Pre-dorsal length	28.3 % TL
Pre-pelvic length	27.8 % TL
Pre-pectoral length	25.0 % TL
Body depth	20.0 % TL
Head length (HL)	23.7 % TL
Eye diameter	18.4 % HL
Pre-orbital length	33.1 % HL
Aspect ratio of caudal fin	5.43496

17) Morphology

Morphology Data of <i>Auxis thazard</i>	
Identification keys	
Abnormalities	
Main Ref.	Collette, B.B., 2001
Sex attributes	
Specialized organs	no special organs
Different appearance	males alike females
Different colors	males alike females
Descriptive characteristics of juvenile and adult	
Striking features	none
Body shape lateral	fusiform / normal
Cross section	oval
Dorsal head profile	more or less straight
Type of eyes	more or less normal

Type of mouth/snout	more or less normal
Position of mouth	terminal
Diagnosis	This species is distinguished by the following characters: a robust body, elongated and rounded; teeth small and conical, in a single series; total gill rakers on first gill arch 36-42; dorsal fins 2, D1 X-XII, separated from the second by a large interspace (at least equal to length of first dorsal-fin base), second dorsal fin followed by 8 finlets; anal fin followed by 7 finlets; pectoral fins short, but reaching past vertical line from anterior margin of scaleless area above corselet; a large single-pointed flap (interpelvic process) between pelvic fins; body naked except for the corselet, which is well developed and narrow in its posterior part (no more than 5 scales wide under second dorsal-fin origin); a strong central keel on each side of caudal-fin base between 2 smaller keels. Colour of back bluish, turning to deep purple or almost black on the head; a pattern of 15 or more narrow, oblique to nearly horizontal, dark wavy lines in scaleless area above lateral line; belly white; pectoral and pelvic fins purple, inner sides black (Ref 9684).

Meristic characteristics of *Auxis thazard*

Lateral Lines	1 Interrupted: No
Barbels	0
Gill clefts (sharks/rays only)	absent
total	36 - 42

Fins

Dorsal fin(s)

Attributes	no striking attributes
Fins number	2
Finlets No.	Dorsal 8 - 8 Ventral 7 - 7
Spines total	10 - 12
Soft-rays total	10 - 13
Adipose fin	absent

Caudal fin

Attributes	forked; more or less normal
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Anal fin(s)

Fins number	1
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Spines total	0 - 0
Soft-rays total	10 - 14
Paired fins	
Pectoral	Attributes more or less normal
	Spines 0
	Soft-rays 23 - 24
Pelvics	Attributes more or less normal
	Position thoracic before origin of D1
	Spines
	Soft-rays

18) Larvae

Larvae Information Summary for *Auxis thazard*

(not available)

Main Ref:	Collette, B.B. and C.E. Nauen 1983
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Yolk-sac larvae

	max	min	mod	Ref.
Length at birth (mm)	3.6	3.26		
Preanal L. % TL				
Place of development	planktonic			
Larval area	to be filled			
Yolk-sac	spherical			
Other melanophores on tail				
Thirty-nine myomeres.				

Post larvae

Striking feature	teeth clearly visible			
Striking shape lateral		dorsal	normal (not striking)	
Striking feature	teeth clearly visible			
Shape of gut	triangular			
Gas bladder early		late		
Spinal armature early	opercular spines only	late	opercular spines only	
Pigmentation early				
Rows on tail	ventral row			
Other melanophores on tail	tail with single melanophore			

Melanophores on head + trunk	melanophores on head + trunk			
Pigmentation late				
Rows on tail	dorsal + ventral row			
Other melanophores on tail	tail with single melanophore			
Melanophores on head + trunk	melanophores on head + trunk			
Urostyle region early	unpigmented	late	unpigmented	
Peritoneum	covered with melanophores			
Pectorals	normal			
Pelvics	normal (i.e. small or absent)			
@A. thazard@ = @A. auxis@ for months of presence of larvae.				
Meristic characters				
	max	min	mod	Ref.
Total number of myomeres			39	65

19) Recruitment

(NA)

20) Abundance

See [SEAFDEC study](#)

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