CLUPEIDAE

Herrings (shads, menhadens)

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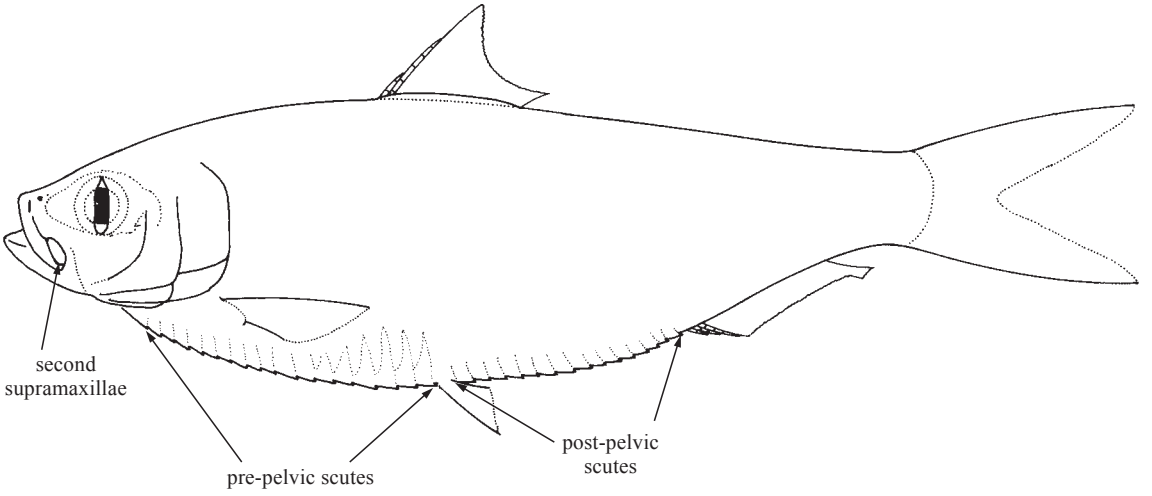
Diagnostic characters: Small, **mostly silvery fishes**, usually with fusiform, subcylindrical bodies but sometimes quite strongly compressed; **with a complete series of scutes present along abdomen** (absent in *Etrumeus* and *Jenkinsia*), **pelvic scute always present. Terminal mouth**; lower jaw short but deep, **giving typical clupeid mouth shape** (except gizzard shads with inferior mouth and *Etrumeus* with pointed mouth); **usually 2 supramaxillae; and small or minute jaw teeth**. Eyelids with vertical opening in middle (completely covering eyes only in *Etrumeus*). **Fins lacking spiny rays; a single dorsal fin**, usually short and at midpoint of body; pectoral fins set low on body; pelvic fins about equidistant between pectoral-fin base and anal-fin origin; anal fin often short (usually less than 30 rays); **caudal fin always deeply forked. Scales cycloid** (smooth to touch), but often shed easily; **no lateral line. Scales without posterior striations**. Great variation occurs in body shape and depth (round bodied to strongly compressed and deep), scutes (some or all absent along abdomen, but a few or a complete series of prepelvic scutes occasionally present), mouth shape (lower jaw prominent to mouth fully inferior in the gizzard shads), supramaxillae (1 or both absent), teeth (absent in some, canines in others), scales (deciduous in some, minute in others). **Colour:** typically dark blue or blue-green on dorsum and silvery on sides; with variable darker markings including spot on side of body posterior to gill opening (*Brevoortia*), spots along sides (in single or multiple series), spot at dorsal-fin origin, and dark pigmentation on margins of dorsal, anal, and pectoral fins and on caudal-fin tips.

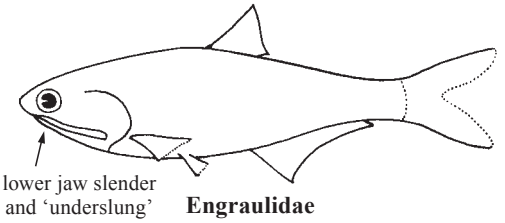


Habitat, biology, and fisheries: Clupeids are typically marine, coastal, and schooling fishes found in all seas from 70°N to about 60°S. Some species tolerate low salinities, sometimes entering fresh water to feed, and the shads (Alosinae) are anadromous, undergoing regular migrations up rivers to spawn, and some species may live permanently in fresh water. Many species feed on small planktonic animals (mainly crustaceans). Clupeids typically form large schools and generally scatter pelagic eggs that hatch planktonic larvae. However, there is wide variation in biology and ecology of clupeids. Some species are partial or full-time filter-feeders, some are predators on fishes (and probably form only loose and small schools as adults), and some produce only 200 eggs or less (pygmy species) or attach their eggs to the substrate. Although usually small fishes (mostly 15 to 25 cm), many species shoal in such numbers that they form the basis of sizeable fisheries. It is mainly the cool water genera that dominate clupeid catches, but multispecies clupeid fisheries in tropical and warm-temperate regions may account for as much as 1/3 of the total fish catch in these areas. Some species are valued as foodfishes, while others are used as bait or as fish meal. The reported catch of clupeid species in the area in 1995 was 663 779 t (chiefly from the USA and Venezuela). The major clupeid fisheries were for *Brevoortia patronus* (about 70% of total clupeid catch), *B. tyrannus* (4%), *Sardinella aurita* (23%) and *Opisthonema oglinum* (1.2%). The clupeid catch was 35% of the total catch of all marine resources in the area.

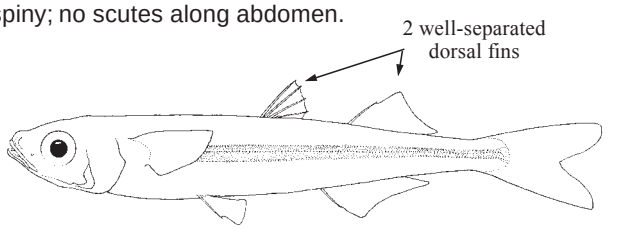
Similar families occurring in the area

Engraulidae: lower jaw slender and 'underslung', snout pig-like, usually pointed.

Atherinidae: 2 well-separated dorsal fins, the first spiny; no scutes along abdomen.

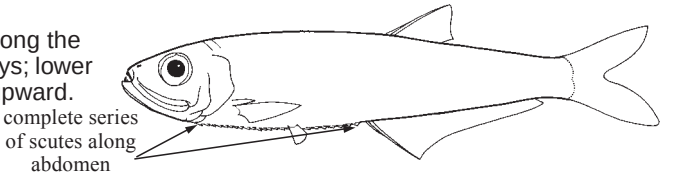


Engraulidae



Atherinidae

Pristigasteridae: complete series of scutes along the abdomen; anal fin long, with at least 30 fin rays; lower jaw projecting, mouth directed more or less upward.



Pristigasteridae

Key to the species of Clupeidae occurring in the area

1a. W-shaped pelvic scute present (Fig. 1); other abdominal scutes absent . . . . . → *2*

1b. W-shaped pelvic scute absent; pelvic scute (and most others) with lateral arms; series of abdominal scutes present, often keeled . . . . . → *6*

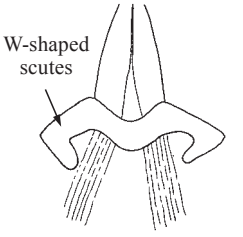


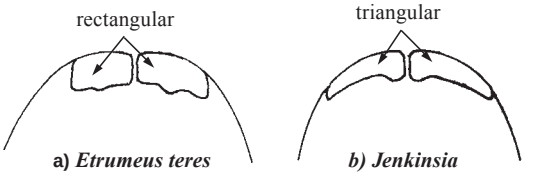
Fig. 1 cross section

2a. Branchiostegal rays 11 to 18; premaxillae rectangular (Fig. 2a) . *Etrumeus teres*

2b. Branchiostegal rays 6 or 7; premaxillae triangular (Fig. 2b) . . *(Jenkinsia)* → *3*

3a. Premaxilla without teeth . . . . *Jenkinsia majua*

3b. Teeth present on premaxilla . . . . . → *4*



a) ***Etrumeus teres*** **b)** ***Jenkinsia***

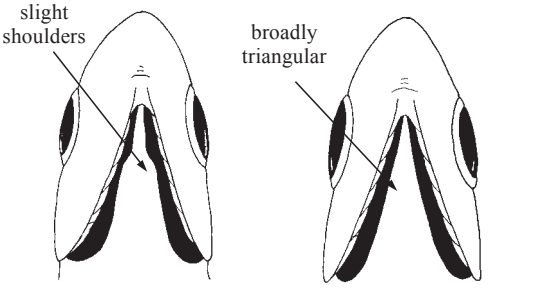
Fig. 2 premaxillae (dorsal view)

4a. Isthmus with slight shoulders anteriorly (Fig. 3a) . . . . . *Jenkinsia lamprotaenia*

4b. Isthmus broadly triangular, pointed anteriorly (Fig. 3b) . . . . . → *5*

5a. Silver lateral band narrowing and fading anteriorly . . . . . *Jenkinsia parvula*

5b. Silver lateral band not narrowing or fading anteriorly . . . . . *Jenkinsia stolifera*



a) ***Jenkinsia lamprotaenia*** **b)** ***Jenkinsia parvula*** **and** ***Jenkinsia stolifera***

Fig. 3 underside of head

6a. Upper jaw with deep median notch (Fig. 4a) . . . . . → *7*

6b. Upper jaw without median notch (Fig. 4b) . . . . . → *18*

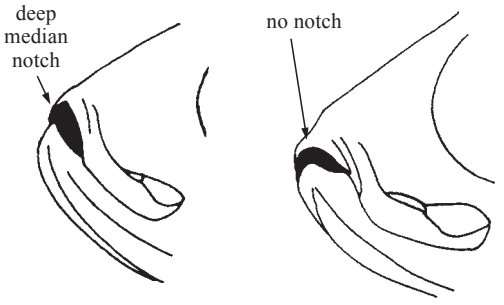


Fig. 4 anteriormost part of head (lateral view)

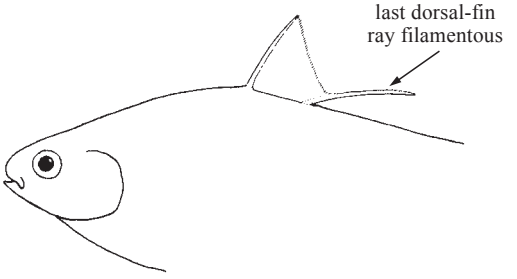


Fig. 5 ***Dorosoma***

7a. Last dorsal-fin ray filamentous (Fig. 5) . . . . . ***(Dorosoma)*** → *8*

7b. Last dorsal-fin ray not filamentous . . . . . → *9*

8a. Mouth subterminal (snout bulbous and fleshy, projecting past upper jaw); anal-fin rays 25 or more; more than 50 (52 to 70) scales in lateral series . . . . . ***Dorosoma cepedianum***

8b. Mouth terminal (snout more pointed and not extending anterior to upper jaw); anal-fin rays 25 or fewer; fewer than 50 (41 to 48) scales in lateral series . . . . . ***Dorosoma petenense***

9a. Modified predorsal scales present on either side of dorsal midline (Fig. 6); other scales deeply overlapping and irregular with posterior margin serrate or pectinate; 6 branched pelvic-fin rays . . . . . ***(Brevoortia)*** → *10*

9b. Predorsal scales along dorsal midline normal, not enlarged and fringed; other scales with smooth posterior margins; 8 branched pelvic-fin rays . . . . . ***(Alosa)*** → *13*

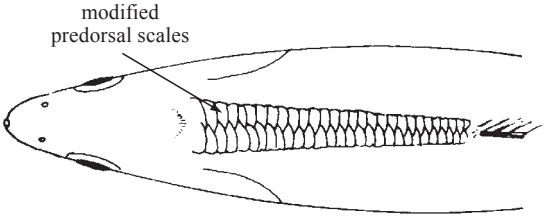


Fig. 6 dorsal view of body

10a. Pelvic fin with oblique and almost straight posterior margin, inner rays markedly shorter than outer rays when fin folded back (Fig. 7a) . . . . . → *11*

10b. Pelvic fin with rounded posterior margin, inner rays equal or nearly equal with outer rays when fin folded back (Fig. 7b) . . . . . → *12*

11a. Scutes 27 to 30 along abdomen; tip of pectoral fin extending to within 1 or 2 scales of pelvic-fin base . . . ***Brevoortia gunteri***

11b. Scutes 30 to 32 along abdomen; tip of pectoral fin extends to within 3 to 5 scales of pelvic-fin base . . . . ***Brevoortia smithi***

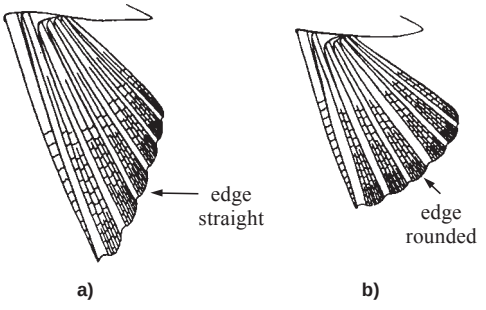


Fig. 7 pelvic fin

12a. Black spot posterior to opercular flap followed by series of spots along flank; Gulf of Mexico . . . . . ***Brevoortia patronus***

12b. Black spot posterior to opercular flap followed by variable number of smaller spots forming up to 6 approximate lines; Atlantic coast of United States . ***Brevoortia tyrannus***

13a. Lower jaw rising steeply within mouth (Fig. 8a) . . . . . → ***14***

13b. Lower jaw not rising steeply within mouth (Fig. 8b). . . . . → ***15***

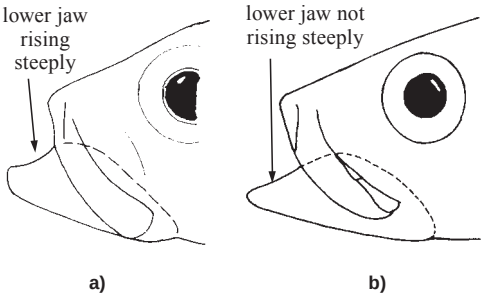


Fig. 8

14a. Peritoneum silvery to pale grey; dorsum greyish green; eye diameter greater than snout length . . . . . ***Alosa pseudoharengus***

14b. Peritoneum sooty or black; dorsum distinctly blue; eye diameter less than snout length . . . . . ***Alosa aestivalis***

15a. Jaw teeth present; gill rakers on lower limb of anterior arch less than 25; lower jaw projecting beyond upper when mouth closed . . . . . → ***16***

15b. Jaw teeth minute or absent in adults; gill rakers on lower limb of anterior arch more than 30; lower jaw not projecting beyond upper when mouth closed . . . . . → ***17***

16a. Dark shoulder spot present; body depth greater than head length . . . . . ***Alosa mediocris***

16b. No dark shoulder spot; body depth less than head length . . . . . ***Alosa chrysochloris***

17a. Gill rakers on lower limb of anterior arch 59 to 73 (Atlantic coast drainages) . . . . ***Alosa sapidissima***

17b. Gill rakers on lower limb of anterior arch 41 to 48 (Gulf of Mexico drainages). . . . . ***Alosa alabamae***

18a. Posterior border of gill opening with 2 fleshy lobes (Fig. 9) . . . . . → ***19***

18b. Posterior border of gill opening evenly rounded . . . . . → ***24***

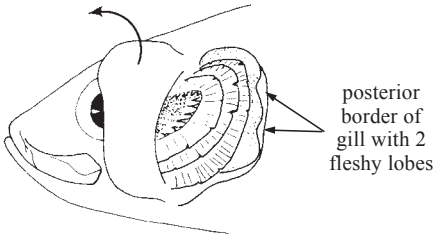


Fig. 9

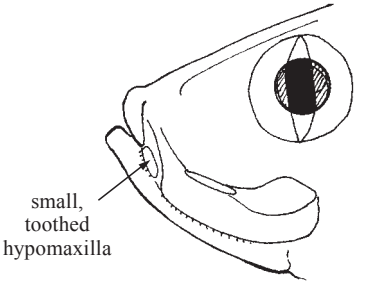


Fig. 10 ***Harengula***

19a. Small, toothed hypomaxilla present between posterior tip of premaxilla and expanded blade of maxilla (Fig. 10). . . . . ***(Harengula)*** → ***20***

19b. No small, toothed hypomaxilla between posterior tip of premaxilla and expanded blade of maxilla . . . . . → ***22***

20a. Black pigment at tip of dorsal fin; tooth plate on tongue (basihyal tooth plate) and tooth plate posterior to it (basibranchial tooth plate) narrow, width 10% of their combined length . . . . . ***Harengula humeralis***

20b. No black pigment at tip of dorsal fin; tooth plate on tongue (basihyal tooth plate) and tooth plate posterior to it (basibranchial tooth plate) broad, width 20 to 33% of their combined length . . . . . → ***21***

21a. Gill rakers 28 to 34 (usually 30 to 32) on lower limb of first arch; pectoral fin 19 to 22% of standard length; pelvic fin inserts closer to insertion of pectoral fin than to origin of anal fin . . . . . ***Harengula clupeola***

21b. Gill rakers 30 to 40 (usually 32 to 39) on lower limb of first arch; pectoral fin 22 to 25% of standard length; pelvic fin inserts about midway between insertion of pectoral fin and anal-fin origin . . . . . ***Harengula jaguana***

22a. Last dorsal-fin ray filamentous; 7 branched pelvic-fin rays . . . . . ***Opisthonema oglinum***

22b. Last dorsal-fin ray normal; 8 branched pelvic-fin rays . . . . . ***(Sardinella)*** → ***23***

23a. Anterior gill rakers on lower limbs of second and third gill arches lying more or less flat (Fig. 11a) . . . . . ***Sardinella aurita***

23b. Anterior gill rakers on lower limbs of second and third gill arches strongly curled (Fig. 11b) . . . . . ***Sardinella brasiliensis***

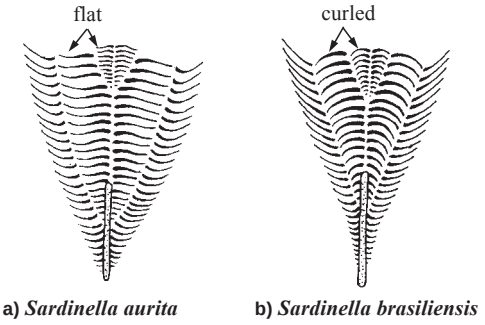


Fig. 11 lower limbs of gill arches

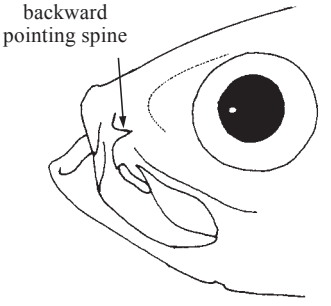


Fig. 12

24a. Upper part of maxilla at about level of eye with sharp, backward pointing spine (Fig. 12) . . . . . ***(Rhinosardinia)*** → ***25***

24b. No sharp, backward pointing spine on upper part of maxilla . . . . . → ***26***

25a. Scales in lateral series 39 to 41; vertebrae 38 to 39 . . . . . ***Rhinosardinia amazonica***

25b. Scales in lateral series 45; vertebrae 43 . . . . . ***Rhinosardinia bahiensis***

26a. Abdomen strongly keeled; bright silver stripe on sides; 7 branched pelvic-fin rays . . . ***Lile piquitinga***

26b. Abdomen moderately rounded, scutes without prominent keel; no silver stripe on sides; 8 (rarely 7 or 9) branched pelvic-fin rays (southwestern Greenland, Labrador, southward to South Carolina) . . . . . ***Clupea harengus***

List of species occurring in the area

The symbol is given when species accounts are included.

DUSSUMIERIINAE

Etrumeus teres (Dekay, 1842).

SPRATELLOIDINAE

Jenkinsia lamprotaenia (Gosse, 1851).
Jenkinsia majua Whitehead, 1963.
Jenkinsia parvula Cervigón and Velasquez, 1978.
Jenkinsia stolifera (Jordan and Gilbert, 1884).

CLUPEINAE

Clupea harengus Linnaeus, 1758.

Harengula clupeola (Cuvier, 1829).
Harengula humeralis (Cuvier, 1829).
Harengula jaguana Poey, 1865.

Lile piquitinga (Schreiner and Miranda-Ribeiro, 1903).

Opisthonema oglinum (Lesueur, 1818).

Rhinosardinia amazonica (Steindachner, 1879).
Rhinosardinia bahiensis (Steindachner, 1879).

Sardinella aurita Valenciennes, 1847.
Sardinella brasiliensis (Steindachner, 1879) (= *Sardinella janeiro*).

ALOSINAE

Alosa aestivalis (Mitchill, 1814).
Alosa alabamae Jordan and Evermann, 1896.
Alosa chrysochloris (Rafinesque, 1820).
Alosa mediocris (Mitchill, 1814).
Alosa pseudoharengus (Wilson, 1811).
Alosa sapidissima (Wilson, 1811).

Brevoortia gunteri Hildebrand, 1948.
Brevoortia patronus Goode, 1878.
Brevoortia smithi Hildebrand, 1941.
Brevoortia tyrannus (Latrobe, 1802).

DOROSOMATINAE

Dorosoma cepedianum (Lesueur, 1818).
Dorosoma petenense (Günther, 1867).

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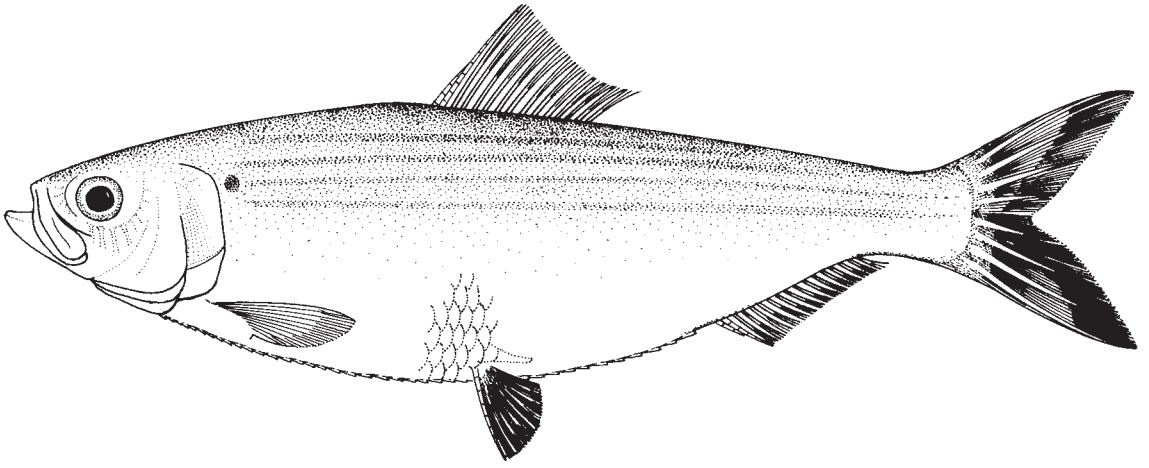
Alosa aestivalis (Mitchill, 1814) BBH

Frequent synonyms / misidentifications: *Pomolobus aestivalis* (Mitchill, 1814). / *Alosa pseudoharengus* (Wilson, 1811).

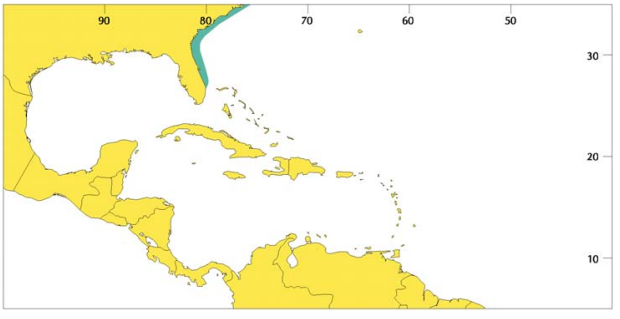
FAO names: En - Blueback shad (AFS: Blueback herring); **Fr** - Alose d'été du Canada; **Sp** - Sábalo del Canadá.



Diagnostic characters: Body fusiform, moderately compressed; abdomen with scutes forming distinct keel. **Upper jaw with distinct median notch; lower jaw rising steeply within mouth; minute teeth present at front of jaws** (but disappearing with age); no teeth on vomer. **Eye diameter less than snout length. Gill rakers slender, 41 to 51 on lower limb of anterior gill arch** (fewer in fishes less than 10 cm standard length). Dorsal fin slightly anterior to centre point of body; anal fin short and situated well posterior to vertical through posterior base of dorsal fin; 8 branched pelvic-fin rays, pelvic-fin origin about at vertical through centre point of dorsal-fin base. **Colour: dorsum blue**, sometimes with more or less definite dusky lines in adults, shading to silver on sides; dark spot on shoulder (often absent in fishes less than 10 cm standard length); **peritoneum dark**; fins slightly yellow to green in life.

Size: Maximum about 38 cm standard length, commonly to 30 cm standard length.

Habitat, biology, and fisheries: Coastal, pelagic, euryhaline. Anadromous, adults migrate inshore and ascend rivers to spawn in fresh water or in slightly brackish pools with an outlet to the sea. Possibly overwintering near bottom and out from coast, approaching shore in late spring. Spawns in brackish or fresh waters of rivers, having arrived in coastal waters a month or so later than *A. pseudoharengus* (Chesapeake Bay in April), later farther north, apparently when water temperatures are above 22°C; young probably returning to salt water at the end of their first summer. Minimum age at maturity 3 years Estimated fecundity 30 000 to 400 000 eggs/female. Eggs pelagic, semi-demersal, yellowish, semi-transparent, 0.87 to 1.11 mm. Often forms large schools. Vertical migrator; feeds on planktonic animals (i.e., copepods), small fishes, and shrimps. Probably not distinguished from *A. pseudoharengus* in northern part of the range, but catches in southern parts of its range are negligible. Caught with pound nets, weirs, seines, gill nets, fyke nets, and occasionally with otter trawls. Marketed mostly fresh and salted, and used as a baitfish in crustacean fisheries.

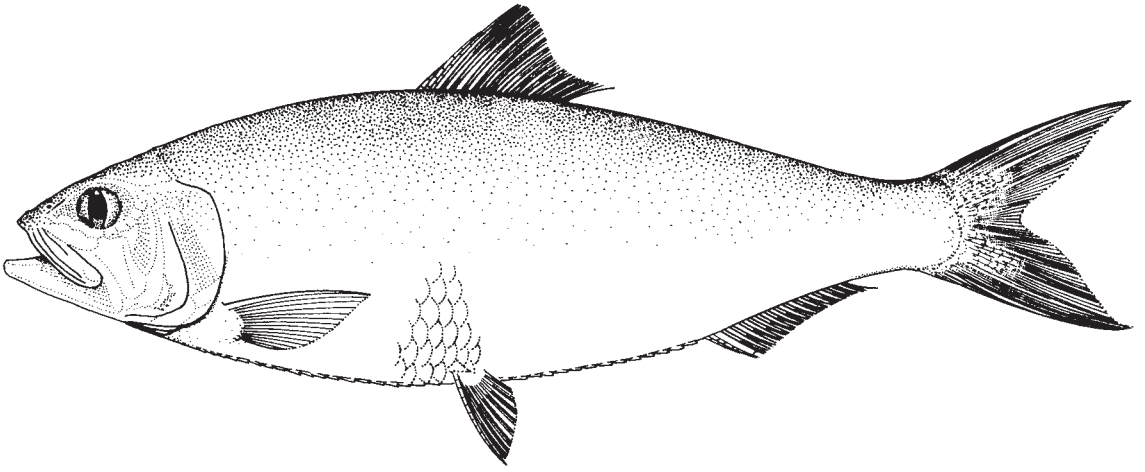


Distribution: Western north Atlantic (east coast of Florida from St. Johns River northward to Cape Breton, Nova Scotia). Uncertain if landlocked in Great Lakes.

Alosa alabamae Jordan and Evermann, 1896 CUA

Frequent synonyms / misidentifications: None / None.

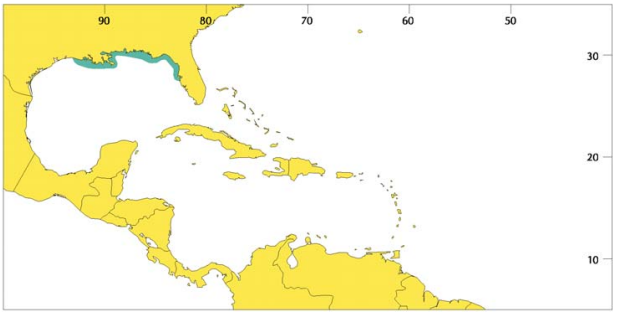
FAO names: En - Alabama shad; **Fr** - Alose de l'Alabama; **Sp** - Sábalo de Alabama.



Diagnostic characters: Body fusiform, moderately compressed, body depth increasing somewhat with size; abdomen with distinct keel. **Upper jaw with distinct median notch; lower jaw not rising steeply within mouth; no teeth in jaws**; no teeth on vomer. **Gill rakers slender, 41 to 48 on lower limb of anterior gill arch** (fewer in fishes less than 30 cm standard length). Dorsal fin placed slightly anterior to centre point of body; anal fin short and placed well posterior to vertical through posterior dorsal-fin base; 8 branched pelvic-fin rays, pelvic-fin origin at vertical through middle region of dorsal-fin base. **Colour:** dorsum bluish grey, with dark streaks along scale rows; shading to silver on sides, **vague dark shoulder spot behind upper operculum**; fins hyaline.

Size: Maximum 51 cm standard length, commonly to 45 cm standard length.

Habitat, biology, and fisheries: Euryhaline, anadromous, ascending rivers and streams to breed in winter and spring (January through April), young returning to salt water (at 50 to 100 mm) at end of their first summer. Actual spawning occurs at 18 to 22°C over coarse sand and gravel sediments swept by moderate currents. Adults apparently not feeding during spawning run. Annual fecundity ranging from 100 000 to 250 000 eggs/female. Spawning adults primarily age-2, some age-1 fish also capable of spawning. Longevity 3 to 6 years Adults probably feed mainly on small fish; juveniles feeding on smaller invertebrates. Principally caught in rivers during spawning migrations. Separate statistics not reported for this species. Caught with seines. Marketed mostly fresh, but populations declining throughout range.

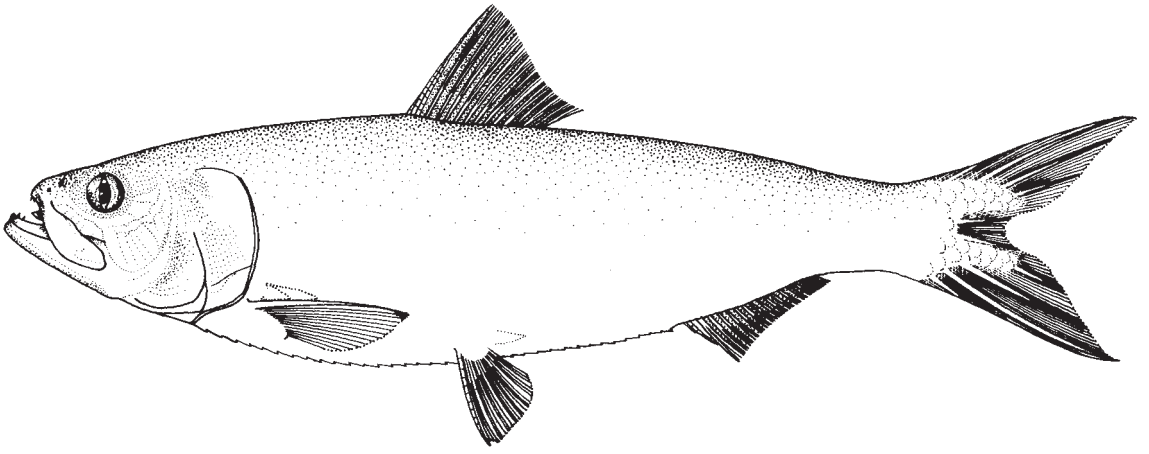


Distribution: Eastern Gulf of Mexico drainages, from Suwannee River, Florida, to Mississippi River; also in rivers from Iowa to Arkansas. Presently rare throughout much of former range in larger rivers tributary to Gulf of Mexico.

Alosa chrysochloris (Rafinesque, 1820)

Frequent synonyms / misidentifications: *Pomolobus chrysochloris* (Rafinesque, 1820) / None.

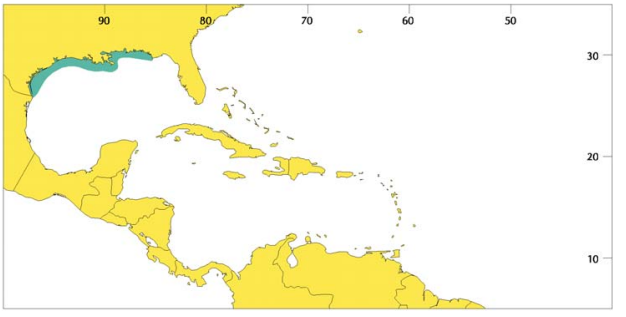
FAO names: En - Skipjack shad (AFS: Skipjack herring); **Fr** - Alose dorée; **Sp** - Sábalo del Golfo.



Diagnostic characters: Body fusiform, moderately compressed, body depth increasing somewhat with size; **body depth less than head length**; scutes on abdomen forming a distinct keel. **Upper jaw with distinct median notch; lower jaw not rising steeply within mouth; teeth present at front of jaws**; no teeth on vomer. **Gill rakers slender, 20 to 24 on lower limb of anterior gill arch**, not increasing in number in larger fishes. Dorsal fin placed just anterior to vertical through body midpoint; anal fin short and placed well posterior to vertical through posterior dorsal-fin base; 8 branched pelvic-fin rays, pelvic-fin origin inserted about at vertical through centre of dorsal-fin base. **Colour:** dorsum deep blue-green, changing abruptly to light green that shades to white on abdomen; **no dark spot on shoulder**; fins pale or yellow, caudal-fin tips dusky.

Size: Maximum 50 cm standard length; commonly to 45 cm standard length.

Habitat, biology, and fisheries: Coastal waters, entering brackish and fresh waters, but perhaps not strictly anadromous, although strongly migratory within rivers (both upstream and downstream), mostly in fast-flowing water where they are renowned for leaping (hence the common name). Large numbers of adults congregate in swift-flowing areas below dams in late March and early April, presumably to spawn. Adults feed mainly on small fishes, while juveniles prey on insects. Adults serve as hosts to glochidial larvae of the economically valuable pearly mussel (*Fusconaia ebena*) of the Mississippi River basin. Principally caught in rivers. Separate statistics not reported; present commercial importance negligible. Caught mainly with seines; also on hook-and-line as a sport fish. Not commonly found in markets; not highly valued as a foodfish, being bony and not especially well flavoured.

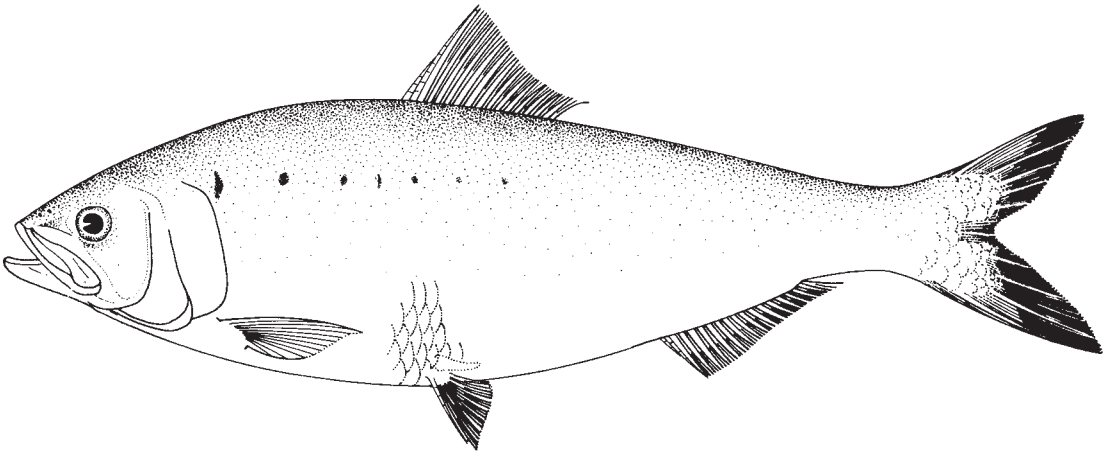


Distribution: Gulf of Mexico (Corpus Christi, Texas, eastward to Pensacola, Florida); also in rivers (e.g., Mississippi and Ohio Rivers to Minnesota, Wisconsin, and Pennsylvania).

Alosa sapidissima (Wilson, 1811) SHA

Frequent synonyms / misidentifications: None / None.

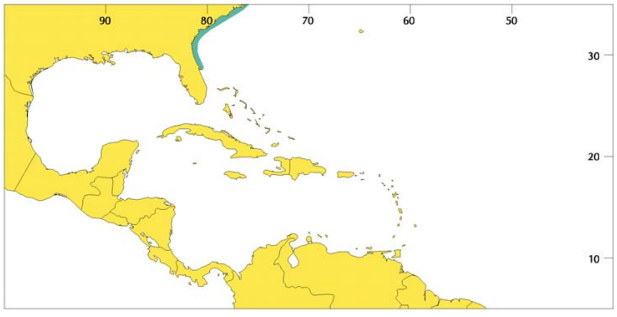
FAO names: En - American shad; **Fr** - Alose savoureuse; **Sp** - Sábalo americano.



Diagnostic characters: Body fusiform, moderately compressed, body depth moderately variable and increasing with size; scutes on abdomen forming distinct keel. **Upper jaw with distinct median notch; lower jaw not rising steeply within mouth; teeth absent in jaws** (minute in juveniles to 15 cm standard length); no teeth on vomer. **Gill rakers slender and numerous, 59 to 71 on lower limb of anterior gill arch** (fewer in young). Dorsal fin placed slightly anterior to centre point of body; anal fin short and placed well posterior to vertical through posterior dorsal-fin base; 8 branched pelvic-fin rays, pelvic-fin origin at vertical through about centre point of dorsal-fin base. **Colour:** dorsum bluish green with metallic luster, gradually shading to silver on sides; **dark spot on shoulder, sometimes followed by several more spots, or even a second row, along sides**; fins pale green, caudal tips sometimes dusky.

Size: Maximum 60 cm standard length, commonly to 50 cm standard length.

Habitat, biology, and fisheries: Coastal, pelagic, euryhaline, entering brackish and fresh waters; in the sea, to depths of about 100 m. Schooling; anadromous, strongly migratory; ascending rivers (up to 500 km upriver) to spawn; appears off Florida coast as early as November, off Carolina coast in February and March, and further north in April, May, or June, depending on water temperature (peak runs at about 18.5°C); spent fish die or return to the sea shortly after spawning; young fry descend in autumn. Spawns at 5 years, sometimes 4, apparently in their home rivers, on sandy or pebbly substrate in the evening. Semelparous (die after spawning) south of Cape Hatteras, North Carolina; increasingly iteroparous (individuals survive and return to sea) north of this region. Estimated fecundity 600 000 eggs/female. Eggs transparent, pink, or amber, semi-buoyant, 2.5 to 3.5 mm (fertilized). Vertical migrator; follows movement of prey; primarily plankton feeders; takes mainly copepods and mysids, also algae, fish eggs, and occasionally small fishes (e.g., smelt, sand lance); no feeding during migration up rivers; juveniles feed on copepods and insect larvae in rivers. Historically of moderate importance to fisheries, chiefly in rivers of North America. Principally caught in rivers, especially northward of the area. Caught mainly with pound nets, gill nets, and seines, but also with fyke nets, otter trawls, purse seines, traps, and dip nets; also caught in rivers as a sportfish with hook-and-line, using flies or small artificial lures. Marketed fresh, consumed fresh or smoked; the roe is particularly esteemed.

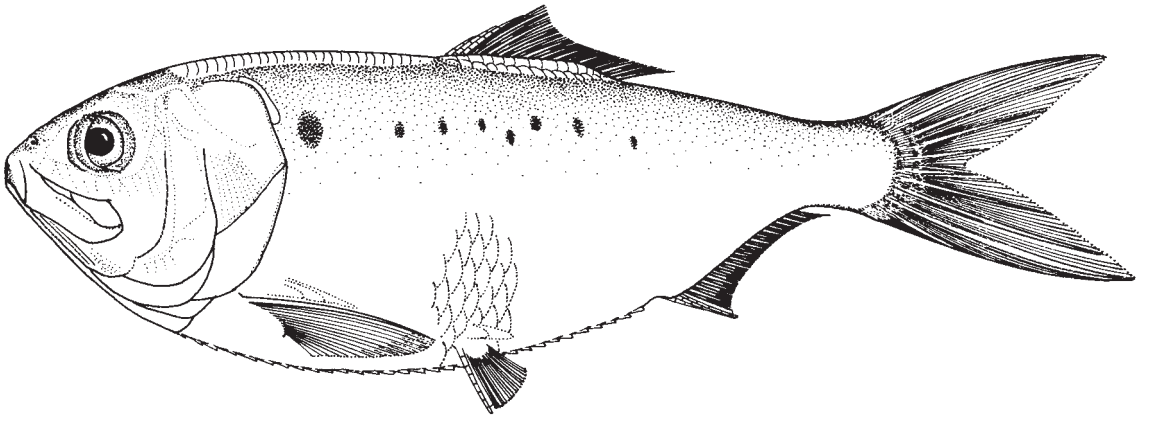


Distribution: Western North Atlantic (central Florida northward to Gulf of St. Lawrence and Nova Scotia); also in rivers and streams. Introductions in Gulf of Mexico appear to have failed, but attempts on the Pacific coasts of North America and Russia succeeded; Pacific distribution from Baja, California north to British Colombia, also Kamchatka.

Brevoortia patronus Goode, 1878 MHG

Frequent synonyms / misidentifications: None / None.

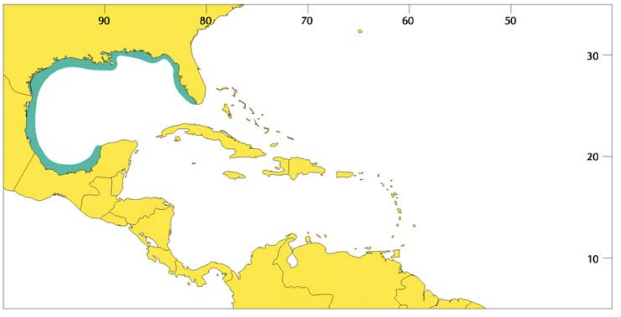
FAO names: En - Gulf menhaden; **Fr** - Menhaden écailleux; **Sp** - Lacha escamuda.



Diagnostic characters: Body compressed, fairly deep, head moderately large; abdomen with 29 to 31 scutes forming distinct keel; **double line of modified predorsal scales**; copious body mucus. **Upper jaw with distinct median notch**, no teeth. Gill rakers very fine and numerous. Dorsal-fin origin at about midpoint of body; anal fin fairly short, beginning slightly posterior to vertical through dorsal-fin base; **6 branched pelvic-fin rays, posterior margin of pelvic fin rounded, inner rays about as long as outer rays**; pelvic-fin base at vertical through anterior dorsal-fin base. **Scales in lateral series 42 to 48, large**, those on dorsum and above anal-fin base only slightly smaller and more irregular than rest; **exposed part narrow, their posterior edges pectinated with sharp points**. **Colour:** dorsum bluish grey, sides brassy green; **large dark spot on side posterior to gill cover, often followed by series (rarely 2) of smaller spots** (either round or vertically elongate); fins yellow-green, a dusky margin on caudal fin.

Size: Maximum 27 cm standard length, commonly to 20 cm standard length.

Habitat, biology, and fisheries: Marine, pelagic, usually in shallow waters, but caught down to at least 60 m; forms very large schools. In Mississippi delta region adults begin to migrate offshore in October and remain in deeper waters throughout winter. Spawns from October to March from near shore to about 97 km offshore, at depths of 2 to 111 m; multiple spawns per season; nursery areas in estuaries. Estimated batch fecundity 37 000 to 151 000 eggs/female. Eggs opaque, 1.04 to 1.30 mm. Mature at age 1 (greater than 14 cm fork length). Eggs hatch at sea; larvae are carried to estuaries by ocean currents where they develop into juveniles. Juveniles migrate offshore during winter and move back to coastal waters the following spring as age-1 adults. Filter-feeds on plankton at the surface, but probably also feeds at or near the bottom. Probably contributes the major part of the Gulf of Mexico menhaden catches. Commercial catches are mostly in salinities of 5 to 24‰, but also in fully salt water and up to 60‰ in the hypersaline Laguna Madre, Texas, and down to 0.1‰ in Grand Lake, Louisiana. Fished throughout its range, but especially off Louisiana (USA); fishing season mid-April to mid-October. The most important fishery resource in the area in terms of total landings with 492 and 649 thousand t landed annually between 1996 and 2000 which accounted for between 29 and 39% of total reported landings. Caught with purse seines, gill nets, also with trawls. Marketed fresh, salted, and canned, the flesh not being generally esteemed (very oily and bony); chiefly used as a source of fish oil, also as fish meal.

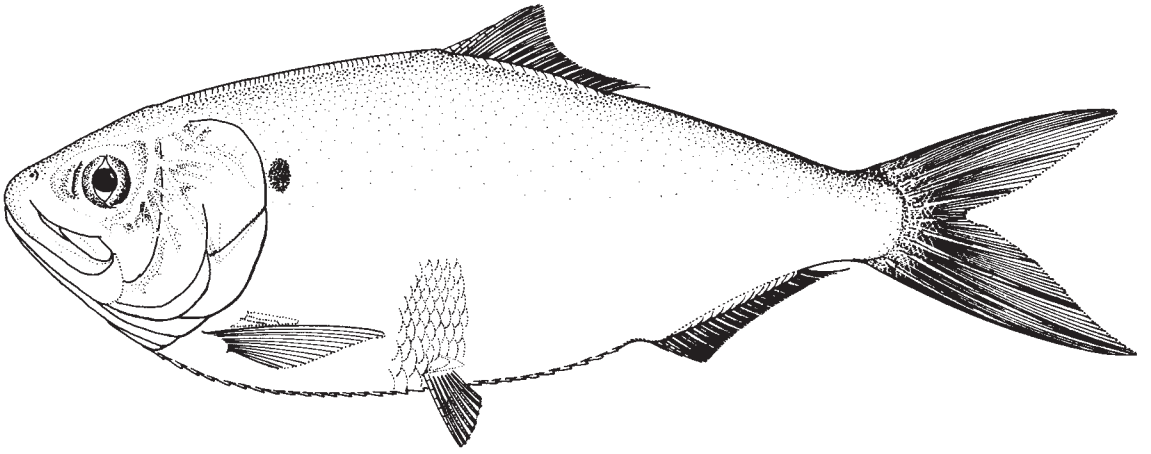


Distribution: Gulf of Mexico (Florida Bay to Gulf of Campeche, Mexico).

Brevoortia smithi Hildebrand, 1941 MHT

Frequent synonyms / misidentifications: None / None.

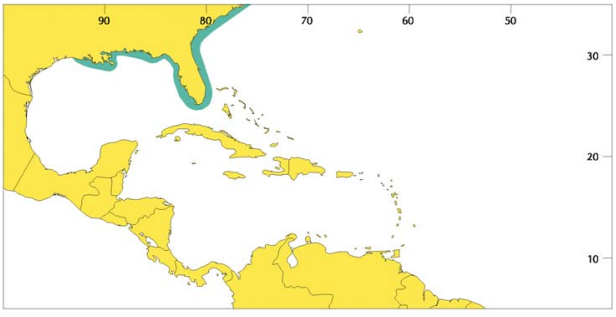
FAO names: En - Yellowfin menhaden; **Fr** - Menhaden jaune; **Sp** - Lacha amarilla.



Diagnostic characters: Body compressed, fairly deep, head quite large; **abdomen with 30 to 32 scutes** forming a distinct keel; **double line of modified predorsal scales**; little body mucus. **Upper jaw with distinct median notch**, no teeth. Gill rakers very fine and numerous. Dorsal fin at about midpoint of body; anal fin fairly short, anal-fin origin slightly posterior to vertical through posterior dorsal-fin base; **tip of pectoral fin extending to within 3 to 5 scales of pelvic-fin base; 6 branched pelvic-fin rays; posterior margin of pelvic fin oblique and almost straight, inner and middle rays markedly shorter than outer rays**; pelvic-fin base at or anterior to vertical through dorsal-fin origin. **Scales in lateral series 54 to 80 (usually about 60 to 70), small** and numerous, those on dorsum and above anal fin markedly smaller than rest; **exposed part narrow, their posterior edges pectinate with blunt points. Colour:** dorsum green-blue, sides silvery; **large dark spot on side posterior to gill cover, but not followed by series of smaller spots; fins golden yellow.**

Size: Maximum 33 cm standard length, commonly to 25 cm standard length.

Habitat, biology, and fisheries: Marine, pelagic, inshore, especially in bays and estuaries, also entering brackish and fresh waters; shoaling where common. Spawning and nursery areas not known in the Gulf; spawns in winter (eggs and larvae in plankton beginning in November), February and March in the Indian River (Atlantic coast of Florida). Eggs 1.21 to 1.48 mm in diameter. Filter-feeds on plankton at the surface. Not of much importance to fisheries; separate statistics not reported for this species; frequently caught with other *Brevoortia* species. Caught with drag nets and seines. Marketed mainly fresh, its flesh claimed to be more palatable and less oily than that of *B. tyrannus*.

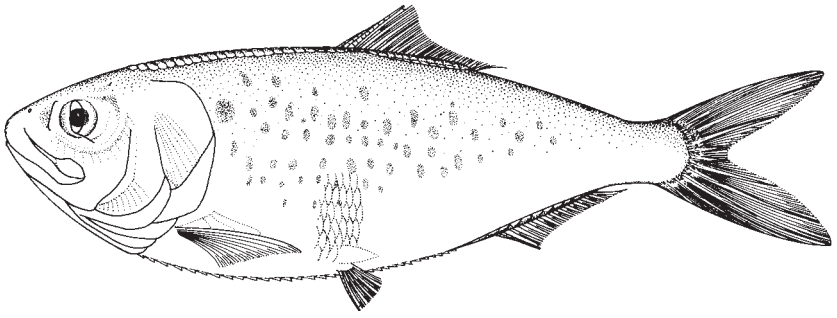


Distribution: Atlantic coast (Beaufort, North Carolina, to Indian River, Florida); Gulf of Mexico (Florida Bay to Louisiana, with a possible break between Biscayne Bay and Florida Bay).

Brevoortia tyrannus (Latrobe, 1802) MHA

Frequent synonyms / misidentifications: None / None.

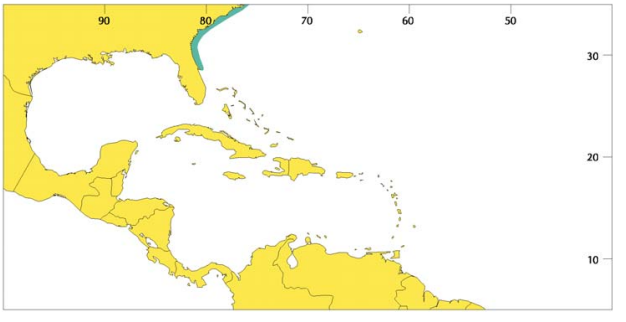
FAO names: En - Atlantic menhaden; **Fr** - Menhaden tyran; **Sp** - Lacha tirana.



Diagnostic characters: Body compressed, fairly deep, head rather large; abdominal scutes 30 to 35, forming distinct keel; **double line of modified predorsal scales**; copious body mucus. **Upper jaw with distinct median notch**, no teeth. Gill rakers very fine and numerous. Dorsal fin at about midpoint of body; anal fin fairly short, its origin located slightly posterior to vertical through posterior dorsal-fin base; **6 branched pelvic-fin rays; posterior margin of pelvic fin rounded, length of inner rays equal or nearly equal to outer rays**; pelvic-fin base at vertical through anterior portion of dorsal fin. Scales **in lateral series 40 to 58 (usually about 45 to 52), those on dorsum above anal-fin base and at base of caudal fin much smaller and irregularly placed**; exposed part narrow, **their posterior edges pectinate with sharp points. Colour:** dorsum dark green-blue, sides brassy green; **large dark spot on side posterior to gill cover, usually followed by variable number of smaller dark spots lying in one or more (up to 6) approximate horizontal lines**; fins yellow to brassy, sometimes with dusky spots.

Size: Maximum 50 cm standard length, commonly to 35 cm standard length (northern range), 20 cm standard length (southern range).

Habitat, biology, and fisheries: Marine, pelagic, usually in shallow waters, both adults and juveniles forming very large and compact schools at the surface; school sizes vary greatly from year to year; schools comprised of similar-sized individuals. Inshore in summer; adults migrate into deeper water in winter in the northern part of range, but less offshore migration occurs in the south. North/south migrations (spring and summer versus autumn) occur, as also short-term migrations in and out of bays and inlets depending on tides, season, and weather. Tolerates wide range of salinities, from almost fresh to full-strength sea water. Spawning season apparently limited by high temperatures (20.5°C maximum monthly mean); spring spawners (April, May) in Cape Cod and Long Island waters, autumn spawners (October, November) from Long Island to North Carolina (plus some spawning June to August), probably winter spawners off Florida (December to March). Determinate, multiple spawners; spawn over broad geographic and temporal ranges. Minimum size at maturity about 180 mm. Estimated fecundity 48 000 eggs (180 mm fork length) to over 500 000 eggs (360 mm fork length). Eggs buoyant, spherical, transparent, 1.3 to 1.9 mm; egg size positively correlated with female size. Recruitment success depends heavily on transport to nearshore areas by water currents. Nursery areas are in estuaries. Feeds by filtering phyto- and zooplankton (diatoms, copepods, euphausiids); as individuals increase in size trend in feeding regime changes from predominately herbivorous to more omnivorous diet. The most important of Atlantic coast menhadens to fisheries; majority of fishing landings occur outside the area. Reported catch within the area for 1995 was 27 314 t (USA only). Great fluctuations occur in abundance, however. Caught commercially with purse seines, although some are taken in long haul seines and in pound nets, and minor quantities with ordinary seines, drag nets and gill nets. Marketed fresh, salted, canned and smoked in limited amounts, the flesh not being generally esteemed (very oily and bony); chiefly used as a source of fish oil, also as fish meal and fertilizer and used as bait in some crustacean fisheries.

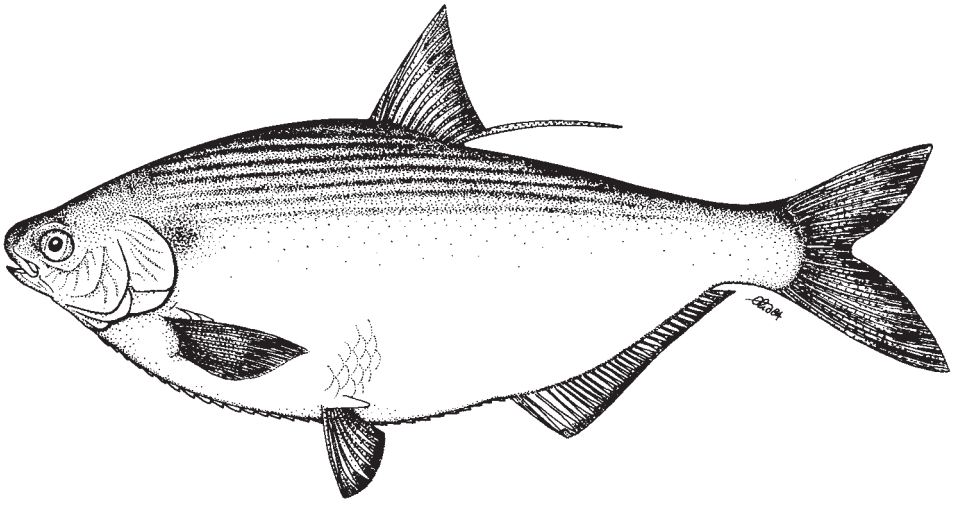


Distribution: Atlantic coast (Jupiter Inlet, Florida, northward to Nova Scotia).

Dorosoma cepedianum (Lesueur, 1818) SHG

Frequent synonyms / misidentifications: None / None.

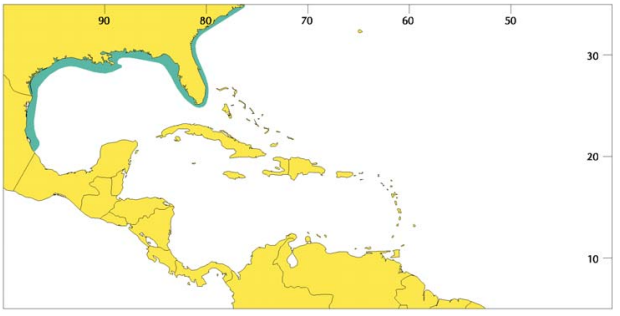
FAO names: En - American gizzard shad (AFS: Gizzard shad); **Fr** - Alose noyer; **Sp** - Sábalo molleja.



Diagnostic characters: Body moderately compressed and deep, body depth about 30 to 40% of standard length; abdomen with 17 to 20 prepelvic and 10 to 14 postpelvic scutes forming a distinct keel. **Mouth small, subterminal. Snout bulbous and fleshy, projecting past upper jaw.** Lower jaw short, about 9 to 12% of standard length. Gill rakers fine and very numerous, over 400 on complete anterior arch in large fishes. **Dorsal fin slightly anterior to midpoint of body, its last ray filamentous; anal fin fairly long (considerably longer than head), with 25 to 36 rays**; branched pelvic-fin rays 7 (rarely 6); pelvic-fin base anterior to vertical through dorsal-fin origin. **Scales small, somewhat irregular, 52 to 70 (usually 58 to 65) in lateral series**. **Colour:** dorsum dark blue, grading to silvery on sides and milky white on abdomen, often with brassy or golden reflections from scales; about 6 to 8 dark horizontal stripes along upper sides and large dark spot on side posterior to gill opening; fins dusky, especially at margins.

Size: Maximum 42 cm standard length; commonly to 30 cm standard length.

Habitat, biology, and fisheries: Inhabits mainly fresh waters, found in large rivers, reservoirs, lakes, swamps, temporary floodwater pools, and estuaries; larger fishes tolerating salinities up to 41.3‰. In brackish water populations, young remain in fresh water until reaching about 70 mm total length. Herbivorous, filter-feeding on microscopic plants (at least in fresh water); food is strained by the numerous fine gill rakers, then presumably transferred in a mucus stream in the pharyngeal pouches, concentrated in some way, then everted as a bolus into the pharynx. Spawns in fresh water from mid-March to August in ponds, lakes, and large rivers, usually near surface depths (0.3 to 1.6 m) but sometimes as deep as 15 m; daylight spawning typical, but nighttime spawning observed in Alabama; eggs adhesive and demersal; experience heavy post-spawning mortality. Fecundity 22 400 to 543 900 ova. Prone to large-scale, unexpected die-offs in late summer. Separate statistics not reported for this species. Frequently caught in brackish bays, estuaries, and rivers, mainly with seines. Valued as a forage for various game fishes, not esteemed as food, but sometimes used as fertilizer and harvested for its oil, utilized as a supplementary food for pigs or cattle.

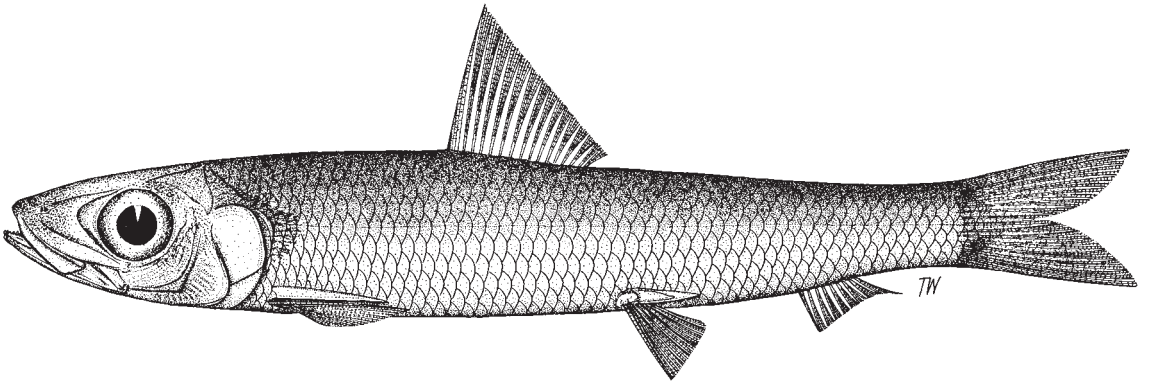


Distribution: Atlantic coast (New York to Florida) and Gulf of Mexico, southward to central Mexico; also Atlantic and Gulf of Mexico drainages of North and Central America, southward to the Mississippi river drainage and smaller rivers affluent to the Gulf of Mexico southward to the Río Pánuco, Mexico.

Etrumeus teres (Dekay, 1842) RRH

Frequent synonyms / misidentifications: *Etrumeus sardina* (Mitchill, 1814) / None.

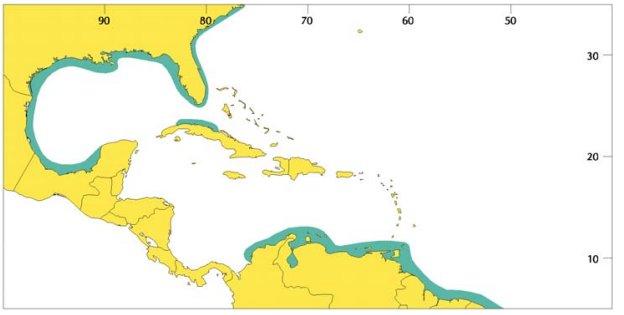
FAO names: En - Redeye round herring (AFS: Round herring); **Fr** - Shadine ronde; **Sp** - Sardineta canalera.



Diagnostic characters: Body elongate, cylindrical; abdomen rounded, without pre- and postpelvic scutes; presence of plate-like W-shaped pelvic scute. Premaxillae rectangular (not triangular) giving distinctive appearance to mouth; **branchiostegal rays numerous (14 to 15)**. Dorsal-fin origin just anterior to centre point of body; anal-fin base very short (10 to 13 rays), well posterior to vertical through posterior dorsal-fin base; pelvic-fin origin posterior to vertical through posterior dorsal-fin base. **Colour:** dorsum olive green, sides and abdomen silvery.

Size: Maximum 25 cm standard length; commonly to 18 cm standard length.

Habitat, biology, and fisheries: Marine, pelagic, rarely taken inshore, usually in deep waters along continental shelf and slope; in southern areas does not occur in nearshore or estuarine habitats; in southern Caribbean Sea, the majority of round herring landings come from depths greater than 60 m. Diurnal vertical migrators; surface waters at night, 9 to 37 m off the bottom during day. Seasonal shift in depth distribution may also occur with fish moving offshore (56 to 183 m) during summer and autumn and inshore during winter and spring. Schooling species, often in dense mixed schools. Spawning occurs at night along the inner continental shelf, December through May in Gulf of Mexico, peak activity January through February. Estimated fecundity 7 446 to 19 699 eggs (based on 8 females 130 to 165 mm standard length captured in eastern Gulf of Mexico), equivalent to 150 to 428 eggs/g. Fertilized eggs 1.17 to 1.37 mm in diameter. Feeds mainly on zooplankton. Sparse in catches in this area, but larger catches are made farther north. Separate statistics not reported for this species. Caught mainly with boat seines and purse seines; taken mainly as bycatch in the industrial trawl fishery for shrimps. Marketed fresh, probably also reduced to fish meal together with other clupeid fishes.

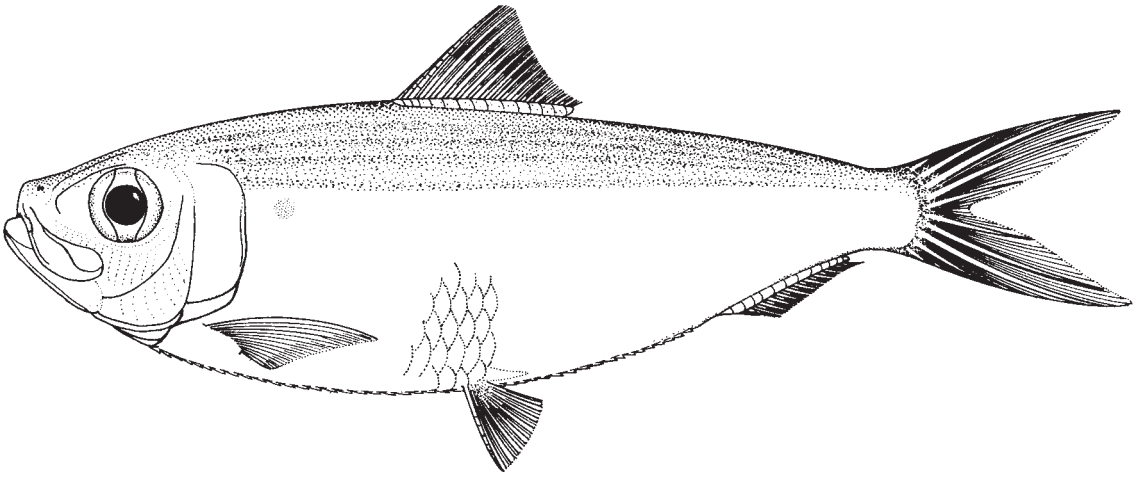


Distribution: Recorded from northern Florida, northern and eastern coasts of Gulf of Mexico, Cuba, Colombia, Venezuela, Trinidad, French Guiana, possibly more widely distributed; northward to Bay of Fundy. Elsewhere, recorded in the eastern Pacific and Indo-Pacific.

Harengula clupeola (Cuvier, 1829) HCC

Frequent synonyms / misidentifications: *Harengula macrophthalma* (Ranzani, 1842) / *Harengula jaguana* Poey, 1865.

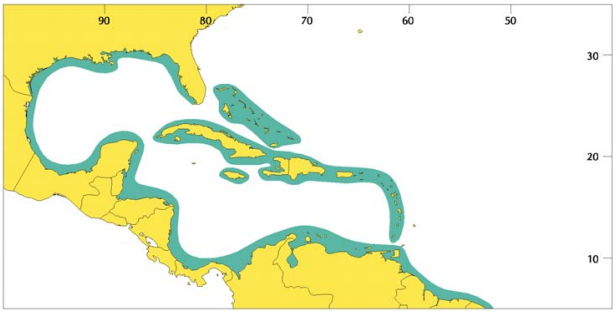
FAO names: En - False herring (AFS: False pilchard); **Fr** - Harengule écailleux; **Sp** - Sardineta escamuda.



Diagnostic characters: Body fusiform, moderately compressed, **body depth usually less than 32% standard length (in specimens 3.5 to 11.6 cm)**; abdomen with 29 to 32 scutes forming a distinct keel. **Toothed hypomaxilla present**; posterior border of gill opening with 2 fleshy outgrowths; gill rakers fine, usually 28 to 34 on lower limb of anterior gill arch; **fairly narrow tooth plates extending back from tongue**. Dorsal fin slightly anterior to centre point of body; **7 branched pelvic-fin rays**, pelvic-fin origin at about vertical through middle of dorsal fin; anal fin short and placed well behind vertical through posterior dorsal fin; **pectoral fin short (19 to 22% standard length); pelvic fin inserts nearer to insertion of pectoral fin than to origin of anal fin. Scales strongly attached, not easily lost. Colour:** dorsum and upper sides blue-green, with faint longitudinal streaks; lower sides and abdomen silvery; **faint dark spot on side posterior to opercular margin**; fins hyaline, but caudal tips and margin often dusky.

Size: Maximum 17 cm standard length; commonly to 9 cm standard length.

Habitat, biology, and fisheries: Pelagic, in coastal waters, estuaries, and lagoons; tolerates considerable changes in salinity. Occurs in turbid waters along the mainland coast as well as in clear waters of insular coral reef habitats. Schools of small individuals are often found along sandy beaches. Nocturnal predator; feeds on zooplankton, almost exclusively on copepods. Multiple spawnings per season; approximate diameters for oocytes entering vitellogenesis and pre-ovulatory hydration were 140 μm and 580 μm, respectively. Caught where it occurs, with no major fishing grounds. Separate statistics not reported for this species, but combined *Harengula* catches for 1995 were 1 117 t (Cuba: 1 045 t; Dominican Republic: 72 t). Caught mainly with purse seines and beach seines. Marketed mostly fresh, but flesh not of high quality (unpleasant odor); probably also reduced to fish meal together with other clupeid fishes.

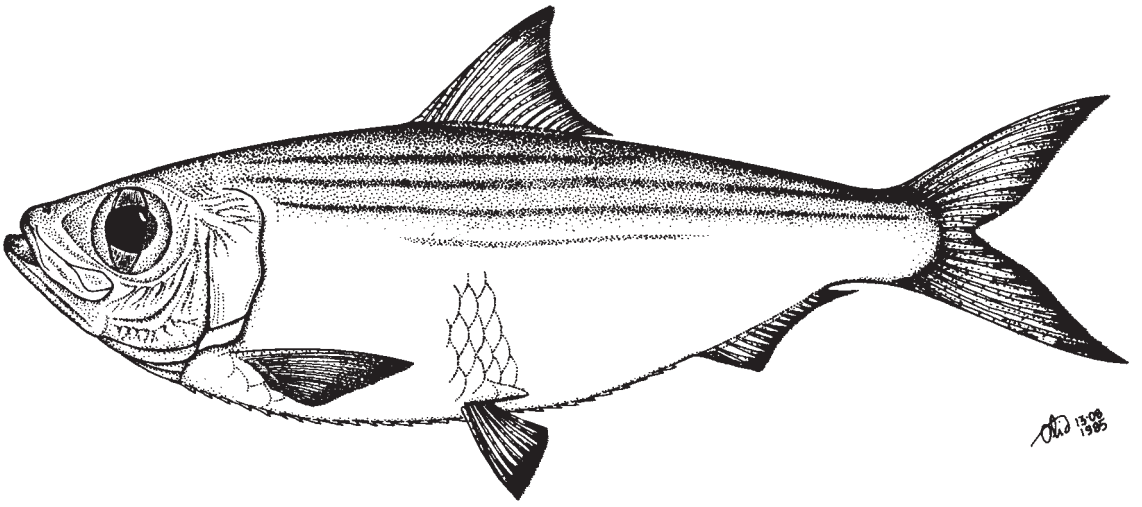


Distribution: Gulf of Mexico, southeastern Florida (not north Florida), Bahamas, entire Caribbean and West Indies, southward to Brazil.

Harengula humeralis (Cuvier, 1829) HCU

Frequent synonyms / misidentifications: *Harengula maculosa* Valenciennes, 1847; *Alosa apicalis* Müller and Troschel, 1847; *Harengula sardina* Poey, 1860 / None.

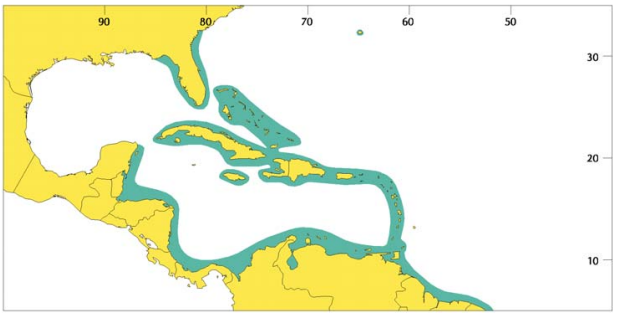
FAO names: En - Redear herring; **Fr** - Harengule camomille; **Sp** - Sardineta manzanillera.



Diagnostic characters: Body fusiform, moderately compressed; abdomen with 25 to 29 scutes forming a distinct keel. **Tooth plate on tongue and tooth plate behind it (basihyal and basibranchial tooth plates) very narrow, their width about 10 times in combined length, the basihyal tooth plate not bulging in front**. Lower gill rakers usually 27 to 31. Dorsal fin placed slightly anterior to body midpoint; anal fin placed well posterior to vertical through posterior dorsal-fin base; 7 branched pelvic-fin rays, pelvic-fin origin inserted about at vertical through middle of dorsal-fin base. **Scales thin, loosely attached, easily lost. Colour: an orange spot on opercular margin**; 3 to 4 narrow, yellowish orange, lateral stripes; **tips of anterior dorsal-fin rays dark.**

Size: Maximum 22 cm standard length, commonly to 12 cm standard length.

Habitat, biology, and fisheries: Marine, coastal, pelagic; in clear coastal waters of coral-reef habitats. It may occur in large, dense schools in the vicinity of sand beaches, mainly over seagrass beds of *Thalassia*. Nocturnal predator; feeds on copepods, larvae and juveniles of decapods, fishes, and stomatopods. Caught with beach nets. Separate statistics not reported for this species, but combined *Harengula* catches for 1995 were 1 117 t (Cuba: 1 045 t; Dominican Republic: 72 t). Usually not actively fished, since the flesh may occasionally be deadly poisonous, but utilized as bait or in the preparation of fish feeds in aquaculture.



Distribution: Bermuda, Florida, Bahamas; Cuba, Lesser Antilles, Trinidad; Yucatán to Colombia, Venezuela, French Guiana; no records from Brazil.