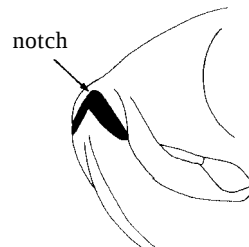


2.2.4 SUBFAMILY ALOSINAE

FAO Names : En - Shads.

Diagnostic Features : Moderate to large or (for clupeoids) very large herring-like fishes (to 60 cm standard length, usually about 20 to 30 cm; fully scuted along belly, scutes also present along back before dorsal fin in some (*Ethmidium*). Upper jaw not evenly rounded in front, but with a distinct notch into which the symphysis of the lower jaw fits; jaw teeth reduced or absent. Dorsal fin at about midpoint of body, pelvic fins below, anal fin short and well behind dorsal fin base; pelvic finrays i 6 to 8. Scales usually well attached. Stomach muscular in some. Often a dark spot posterior to gill opening and in some species a series of similar spots along flank (or even a second row below this).



Biology, Habitat and Distribution : The Alosinae are marine, pelagic, estuarine or freshwater fishes, with some species (or subspecies or races) anadromous, semi-anadromous or totally freshwater (rivers and lakes). All are schooling fishes, and most or all are migratory (except where landlocked). Food includes fishes and various invertebrates, but a few are filter-feeders on phytoplankton (e.g. *Ethmalosa*). A number of shads contribute significantly to fisheries, especially species of *Brevoortia*, *Alosa* and *Tenualosa*.

Remarks : Regan (1917) and some later authors have strongly deplored separation of the shads from the gizzard shads (subfamily Dorosomatinae) and there is some evidence that neither subfamily is in itself homogenous (i.e. that all species have a common ancestor). For the present, however, it is convenient to retain the traditional classification.

There are 7 genera (2 Europe and western Atlantic, 1 West Africa, 3 Indo-Pacific and 1 eastern Pacific) and 31 species, the largest concentration of species (also subspecies) being the European and western Atlantic *Alosa* (15 species or nearly half of all the shads);

Key to the Genera :

- 1a. Upper gillrakers of first gill arch (when numerous) overlapping the lower gillrakers at angle of arch (Fig. 1); pelvic finrays i 6 or i 8; Europe, western Atlantic, eastern Pacific
- 2a. No pre-dorsal scutes; gillrakers present on posterior face of third epibranchial (Fig. 2)
- 3a. Pelvic finrays i 8; normal scales along back before dorsal fin; body scales normal, not deeply overlapping; Europe, western and eastern Atlantic *Alosa*
- 3b. Pelvic finrays i 6; paired scales along back before dorsal fin enlarged, fringed (Fig. 3); body scales deeply overlapping; western Atlantic only..... *Brevoortia*

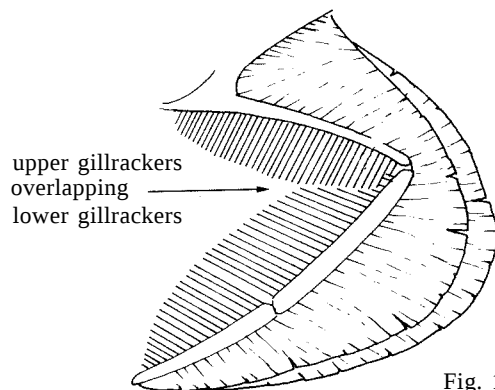


Fig. 1

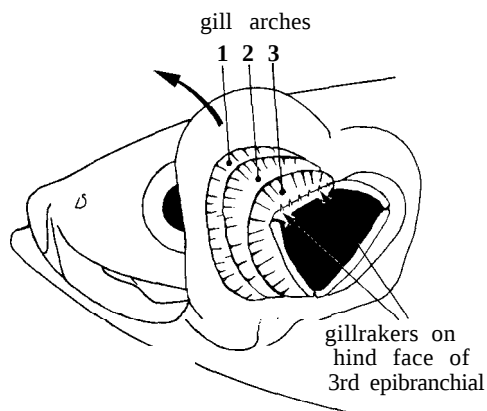


Fig. 2

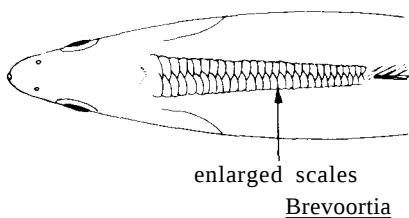


Fig. 3

- 2b. Pie-dorsal scutes present (Fig. 4); no gillrakers on posterior face of third epibranchial; pelvic finrays i 6; eastern Pacific only Ethmidium

- 1b. Upper gillrakers of first gill arch not overlapping the lower gillrakers at angle of arch; pelvic finrays i 7; West Africa and Indo-Pacific

- 4a. West Africa only; gillrakers very numerous, upper gillrakers strongly bent, V-shaped Ethmalosa

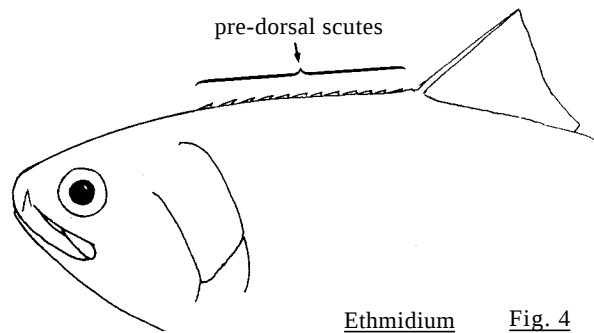
- 4b. Indo-Pacific only; upper gillrakers normal or curled outward

- 5a. Scales large, evenly arranged, 37 to 47 in lateral series; marine or anadromous

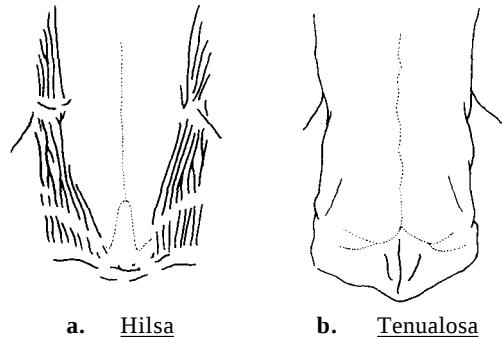
- 6a. Fronto-parietal striae (on top of head) many, 8 to 14 (Fig. 5a); gillrakers on inner arches distinctly curled outward; scales perforated Hilsa

- 6b. Fronto-parietal striae weakly developed, usually hidden by skin (Fig. 5b); gillrakers on inner arches straight; scales not perforated Tenulosa

- 5b. Scales small, series irregular except on upper flank, 77 to 91 in lateral series; freshwater only Gudusia



Ethmidium Fig. 4



fronto-parietal striae Fig. 5

Alosa Linck, 1790

CLUP Alos

Alosa Linck, 1790, Neuestes Mag.Phys.Naturgesch., 6(3):35 (type: no species included, but Clupea alosa Linnaeus, 1758 by tautonymy). Pomolobus Rafinesque, 1820 (April) Western Review Misc.Mag., 2(3):170 and 1820 (December), Ichthyol.Ohiensis:38 (type: Pomolobus chrysochloris Rafinesque, 1820, but see comment by Hildebrand, 1964:315, footnote). Alausa Valenciennes, 1847, Hist.nat.poiss., 20:389 (type: Alausa vulgaris Valenciennes, 1847 = Clupea alosa Linnaeus, 1758) (apparently a variant spelling of Alosa). Alausella Gill, 1861, Proc.Acad.nat.Sci.Philad., Suppl.:54 and Ibid.:36 (type: Clupea parvula Mitchill, 1814 = probably Clupea pseudoharengus Wilson, 1811, juvenile). Caspialosa Berg, 1915, Mater.pozn.russ.rybol., 4(6):4 (type: Clupea caspia Eichwald, 1838). Paralosa Roule, 1925, Poiss.Eaux douce France:73 (type: Clupea fallax Lacepède, 1803) (preoccupied by Paralosa Bleeker, 1868 = Sardinella; also by Paralosa Regan, 1916 = Hilsa).

Diagnostic Feature : Moderate or large herring-like fishes (to 60 cm standard length), somewhat compressed, with a fairly prominent keel of scutes along the belly. Upper jaw with a distinct median notch. Upper gillrakers, when numerous, folding down over lower gillrakers at angle of first arch; total gillrakers (upper plus lower) from 30 to as many as 130. Pelvic finrays i 8. Scales normal, hind borders smooth, no enlarged and fringed scales along back before dorsal fin (cf. Brevoortia). The notched upper jaw and long upper gillrakers separates Alosa from similar sympatric genera (Clupea, Sardina, Sardinella, etc.).

Biology, Habitat and Distribution : Marine, pelagic, mostly anadromous or semi-anadromous, but some purely freshwater species (subspecies or races); schooling, migratory (except where landlocked). Feed on small fishes and invertebrates, also phytoplankton in species with numerous gillrakers. Mediterranean, Black Sea, Sea of Azov, Caspian, and eastern and western North Atlantic (introduced into North Pacific).

Interest to Fisheries : Species of Alosa contributed 25 663 tons in 1983, mainly from American Atlantic waters (82%).

Species : Earlier authors considered Alosa, Caspialosa and Pomolobus as distinct genera; Svetovidov (1964) united them, but kept Pomolobus as a subgenus of Alosa (sympatric in western North Atlantic). Species of 'Caspialosa' are Ponto-Caspian in distribution and only meet 'true' Alosa in the associated rivers and lakes of the northern part of the Aegian Sea. To help identification, the 15 species of Alosa are listed geographically:

Eastern Atlantic, Mediterranean

- A. alosa (Linnaeus, 1758), eastern Atlantic, Mediterranean
- A. fallax (Lacepède, 1803), eastern Atlantic Mediterranean

Ponto-Caspian

- A. pontica (Eichwald, 1838), Black Sea, Sea of Azov
- A. maotica (Grimm, 1901), Black Sea, Sea of Azov
- A. caspia (Eichwald, 1838), Caspian, also Black Sea, Sea of Azov
- A. brashnikovi (Borodin, 1904), Caspian
- A. saposhnikovi (Grimm, 1887), Caspian
- A. sphaerocephala (Berg, 1913), Caspian
- A. kessleri (Grimm, 1887), Caspian (anadromous)

Western Atlantic

- A. aestivalis (Mitchill, 1814), western North and central Atlantic
- A. alabamae Jordan & Evermann, 1896, western central Atlantic
- A. chrisochloris (Rafinesque, 1820), western central Atlantic
- A. mediocris Mitchill, 1814), western North and central Atlantic
- A. pseudoharengus (Wilson, 1811), western North and central Atlantic
- A. sapidissima (Wilson, 1811), western North and central Atlantic

Remarks : The taxonomy of the European shads, and especially the Ponto-Caspian species, still requires much work. In the absence of fully diagnostic morphometric or meristic characters, biochemical analysis may be the best solution, especially in resolving questions of subspecies.

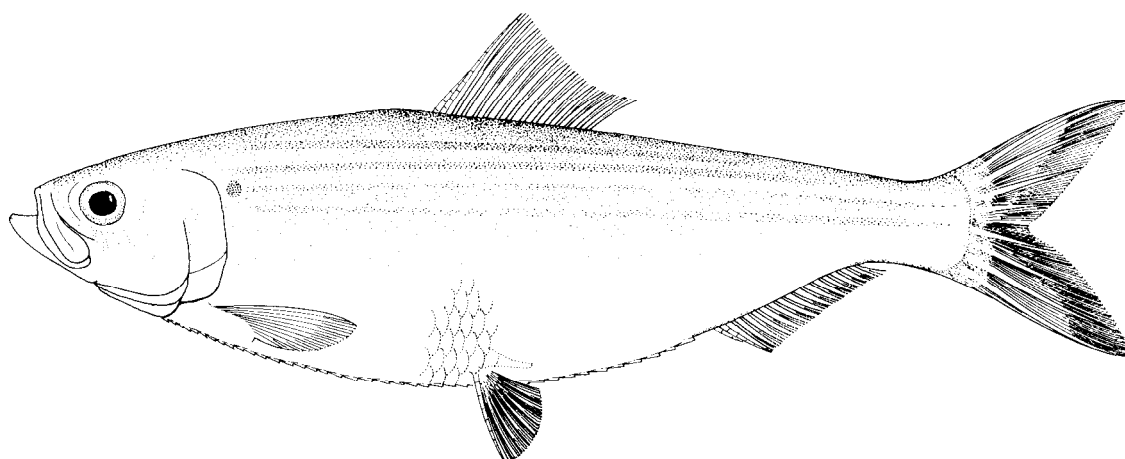
Alosa aestivalis (Mitchill, 1814)

CLUP Alos 1

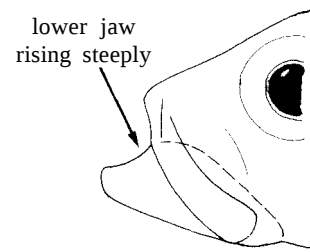
Clupea aestivalis Mitchill, 1814, Fishes New York:21 (New York).

Synonyms : ? Clupea fasciata LeSueur, 1818:233 (Sandwich, Massachusetts); ? Pomolobus cyanonoton Storer, 1848:242 (presumed Massachusetts); Pomolobus aestivalis:FWNA, 1964:324, fig. 80, also fig. 81 (growth stages) (full synon., descr., biol.); Alosa aestivalis - Liem & Scott, 1966:87, fig. (poor) (synopsis).

FAO Names : En - Blueback shad.



Diagnostic Features : Body fusiform, moderately compressed, belly with distinct keel of scutes. Lower jaw rising steeply within mouth; minute teeth present at front of jaws (disappearing with age), no teeth on vomer. Lower gillrakers 41 to 52 (fewer in fishes under 10 cm standard length), slender. Back dark blue, sometimes bluish-grey; a dark spot on shoulder. Resembles *A. pseudoharengus* in number of gillrakers and steeply rising lower jaw, but that species has the eye usually larger than snout length, the peritoneum silvery (cf. dark) and the back greyish-green. Other shads have a gently rising lower jaw and more (59 to 73) or fewer (18 to 24) lower gillrakers or occur only in the Gulf of Mexico (*A. alabamae*). See CLUP Alos 1, Fishing Area 31.



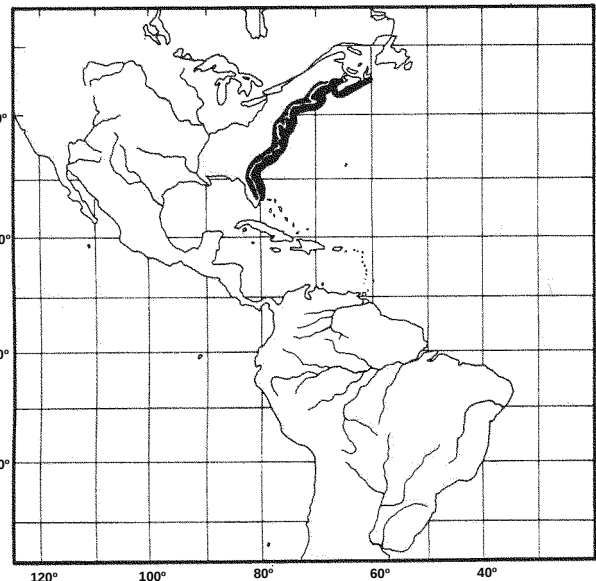
Geographical Distribution : North America (Atlantic coasts from Cape Breton, Nova Scotia south to the St. John's River, Florida, also in lower parts of rivers).

Habitat and Biology : Euryhaline, anadromous possibly wintering near the bottom and out from the coast, approaching the shore in late spring. Feeds on small fishes, copepods, small shrimps. Spawns in brackish- or freshwaters of rivers, having arrived in coastal waters a month or so later than *A. pseudoharengus* (Chesapeake Bay in April, apparently when the water is above 70°C; later further north); the young descend in autumn (Chesapeake Bay in October/November).

Size : To about 38 cm standard length, usually about 25 to 30 cm.

Interest to Fisheries : Probably not distinguished from *A. pseudoharengus* in northern part of range, but catches in south negligible (128 tons in 1974; not recorded in 1983).

Local Names : CANADA: Blueback herring; USA: Blueback herring (AFS list).



Literature : Hildebrand (i.e. FWNA, 1964 - USA, biol., etc.); Liem & Scott (1966 - Canada, synopsis).

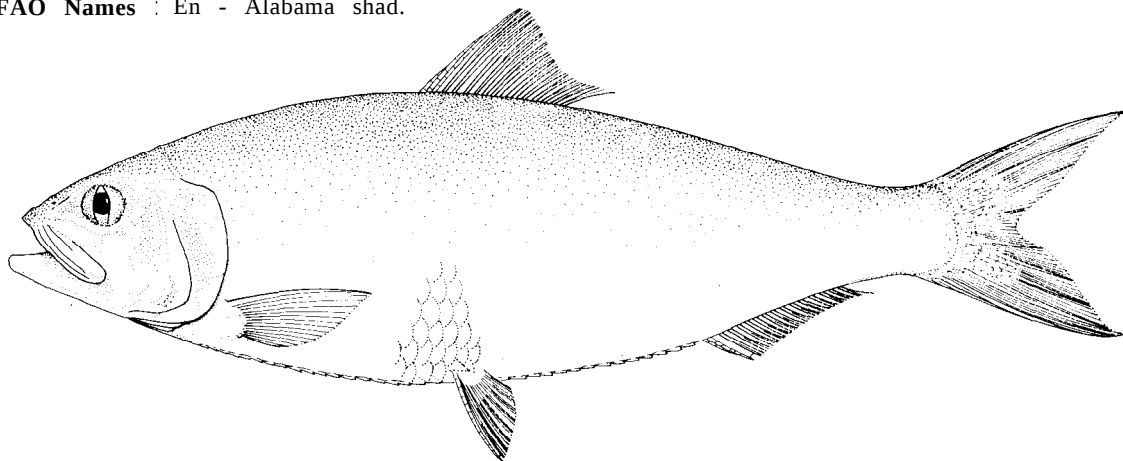
Alosa alabamae Jordan & Evermann, 1896

CLUP Alos 2

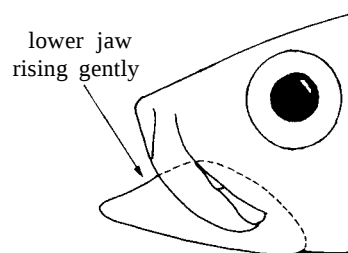
Alosa alabamae Jordan & Evermann, in Evermann, 1896, *Rep.U.S.Commnr Fish*, (21):203 (Black Warrior River, Tuscaloosa, Alabama).

Synonyms : *Meletta suoerii* Valenciennes, 1847:375 (Wabash River, Illinois; *nomen oblitum*); *Alosa ohienensis* Evermann, 1902:fig 1,2 (Ohio River, Louisville, Kentucky); *Alosa alabamae* - Regan, 1916:7 (key), (descr., subspecies *A. alabamae ohienensis*); FWNA, 1964:308, fig. 75 (full synonym, descr., biol.); Whitehead, 1967:84 (types of *Meletta suoerii*); Whitehead & Bauchot, in press (same; see Remarks).

FAO Names : En - Alabama shad.



Diagnostic Features : Body fusiform, moderately compressed, belly with distinct keel of scutes. Lower jaw not rising steeply within mouth; no teeth present at front of jaws, no teeth on vomer. Lower gillrakers 41 to 48 at 30 cm standard length or more. The only other shad of the Gulf of Mexico, A. chrysochloris, has only 20 to 24 gillrakers. Closely resembles A. aestivalis and A. pseudoharengus of Atlantic coasts, but in them the lower jaw rises very steeply in the mouth. See CLUP Alos 2, Fishing Area 31.



Geographical Distribution : Gulf of Mexico (northern part, from the Mississippi delta eastward to the Choctawhatchee River in Florida; also in rivers from Iowa to Arkansas and across to West Virginia).

Habitat and Biology : Euryhaline, anadromous. Food (no data given in FWNA, 1964). Spawns in freshwater in spring or early summer, ascending rivers and streams, the young presumably descending in autumn.

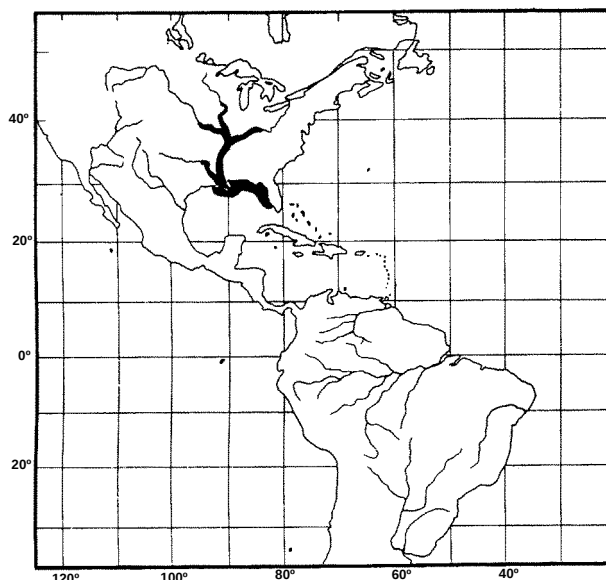
Size : To 51 cm standard length, usually about 40 to 45 cm.

Interest to Fisheries : Only small catches in the past.

Local Names : USA: Gulf shad, Ohio shad.

Literature : Hildebrand (i.e. FWNA, 1964 - biol., etc.).

Remarks : The lectotype of Meletta suoerii (a juvenile) has 33 lower gillrakers, thus cannot be A. chrysochloris as supposed by Hildebrand (1964, i.e. FWNA). However, the name has not been used for either species.



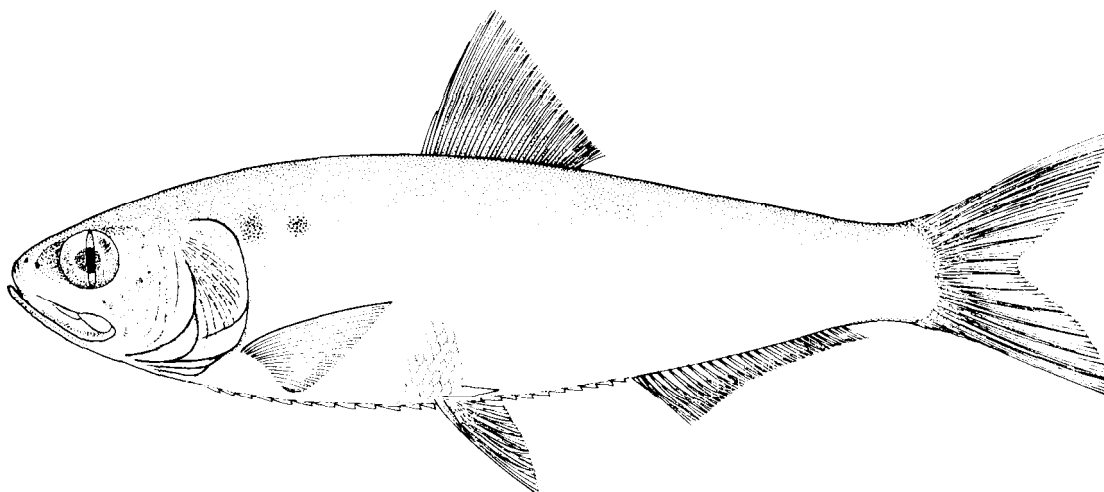
Alosa alosa (Linnaeus, 1758)

CLUP Alos 5

Clupea alosa Linnaeus, 1758 Syst.nat., 10th ed.:318 (in Oceano Europaeo').

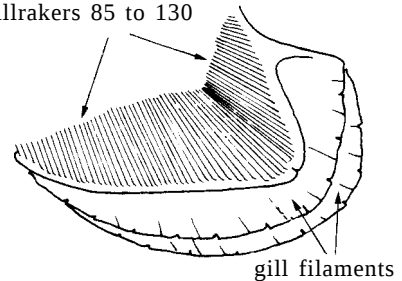
Synonyms : Alosa communis Yarrell, 1836:136 (Thames and Severn Rivers); Alausa vulgaris Valenciennes, 1847:391, pl. 604 (Europe, North Africa); Alosa cuvieri Maim, 1877:154 (Bordeaux); Alosa alosa - Svetovidov, 1952:312, pl. 25, fig. 1 (but not A. alosa bulgarica = A. caspia); Idem, 1963:351, pl. 25, fig. 1 (same); Wheeler, 1969:70, fig. (synopsis); CLOFNAM, 1973:105 (synonymy); Wheeler, 1978:70, fig. (synopsis); FNAM, 1984:269, fig. (synopsis); CLOFETA in press (synonymy).

FAO Names : En - Allis shad.



Diagnostic Features : Body somewhat compressed, fairly deep (depth at pectoral fin more than head length), scutes apparent along belly. Upper jaw notched, lower jaw fitting into it; no teeth on vomer. Gillrakers long, thin and numerous, total 85 to 130, longer than gill filaments. A dark spot posterior to gill opening (sometimes absent; occasionally 1 or 2 more spots). Resembles A. fallax, which has fewer and shorter gillrakers (total 30 to 80) and 7 or 8 black spots along flank. See CLUP Alos 5, Fishing Areas 34, 47 (in part).

gillrakers 85 to 130



gill filaments

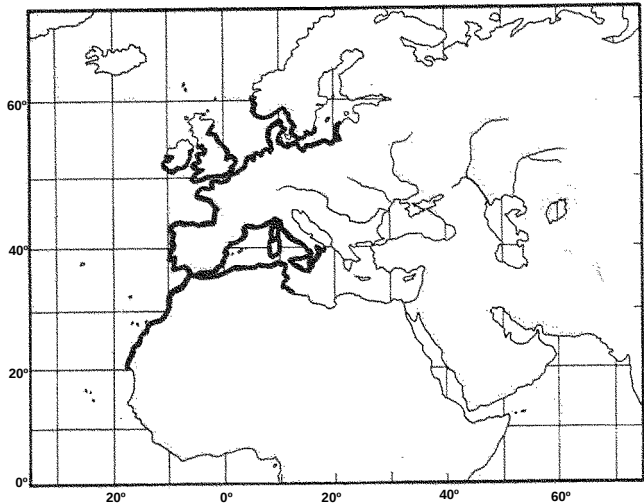
Geographical Distribution : Coasts of Europe, from about Bergen to northern Mauritania (but not in Baltic), also western part of Mediterranean.

Habitat and Biology : Marine, pelagic, schooling and strongly migratory, penetrating far up rivers (but not into small tributaries). Enters rivers in spring to spawn in May, usually at night and where the current is swift, the adults returning to the seas afterward; juveniles pass down to the sea in autumn. Feeds on a wide range of planktonic crustaceans; larger adults feed on small schooling fishes. Less common than A. fallax, but both have suffered from pollution and weirs or other obstructions.

Size : To 60 cm standard length and 2.7 kg.

Interest to Fisheries : Palatable, but bony. Not always separated from A. fallax in fishery records; the combined catch for both species in 1983 was only 971 tons (Morocco, France, Turkey).

Local Names : DENMARK: Majsild
GERMANY: Maifisch; NORWAY: Maifisk; THE NETHERLANDS: Groote meifisch; UK: Mayfish.



Literature : Wheeler (1969, 1978 - synopsis); FNAME (1984 - synopsis).

Remarks : Alosa africana Regan, 1916 from Algeria is not a distinct subspecies, but a hybrid between A. alosa and A. fallax (Furnestin & Vincent, 1958). Alosa macedonica Vinciguerra, 1921, is also not a subspecies of A. alosa (see under Alosa caspia).

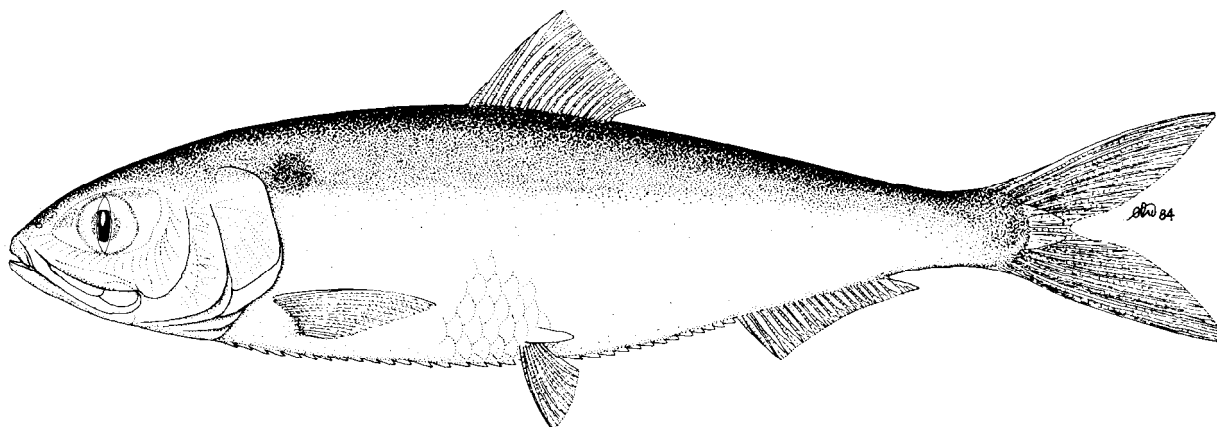
Alosa brashnikovi (Borodin, 1904)

CLUP Alos 8

Clupea caspio-pontica var. brashnikovi Borodin, 1904, Vestnik Rybopromyshlennosti, 19(3):176, 180, 182-183, 184-185, fig. 2 (in part: Aleksandrovsk Nos 1-15, Krasnovodsk Nos 25-26, 28-33; Fort Shevenko chosen).

Synonyms : Clupea caspio-pontica var. grimmii Borodin, 1904:180, 184 (Ashur-ade, near Astrabad Bay, Caspian); Clupea (Alosa) curensis Suvarov, 1907:165, 192-194, fig. 4 (opp. mouth of Kura River, and near Kziligach Bay, Caspian); Clupeonella leucocephala Berg, 1913:27, pl. 14, figs 1, 2 (Sumgait and Gyrgenchai at Belidzhi Station, Caspian); Caspialosa brashnikovi autumnalis Berg, 1915:5, 6, pl. 1, fig. 2, pl. 2, fig. 3 (Cheleken Island, Krasnovodsk, Lenkoran, Kizilgach Bay opposite Samur River mouth at Tyulenii Island, Caspian); Caspialosa caspia nigra Kisselevitch, 1923:115, 139-140 (Bay or Mertvi Kultuk, Caspian; also included specimens of A. saposhnikovii); Caspialosa kisselevitshi Bulgakov, 1926:27, pl. 2 (Gasan-uli, Caspian); Caspialosa nirchi Morosov, 1928:73 Krasnovodsk Bay, Caspian); Caspialosa brashnikovi kenderlensis Budamshin, 1938:36 Kendyrli Bay, Caspian); Caspialosa brashnikovi orientalis Mikhailovskaya, 1941:560 (eastern coast of southern Caspian north to Kendyrli Bay); Caspialosa brashnikovi agrachanica Mikhailovskaya, 1941:559 (southern part in winter, spawning in northern part at Tyulenii and Darga Islands in summer, Caspian; earlier descriptions on Mikhailovskaya's data by Meisner, 1932:52 and Dekhtyareva, 1940:47, but authorship given to Mikhailovskaya by Svetovidov, 1952, 1963); Caspialosa brashnikovi sarenensis Mikhailovskaya, 1941:560 (western coast of southern and central Caspian); Caspialosa brashnikovi derzhavini Tarasevich, 1946:48 (biometrics); Alosa brashnikovi Svetovidov, 1952:251 et seq., pls 15-20 (synopsis: subspecies brashnikovi, grimmii, nirchi, autumnalis, orientalis, sarenensis, agrachanica, kisselevitshi; also maeotica, considered a species here; also Alosa curensis, considered a subspecies of A. brashnikovi here; Idem, 1963:280 et seq., pls 15-20 (same).

FAO Names : En - Caspian marine shad.



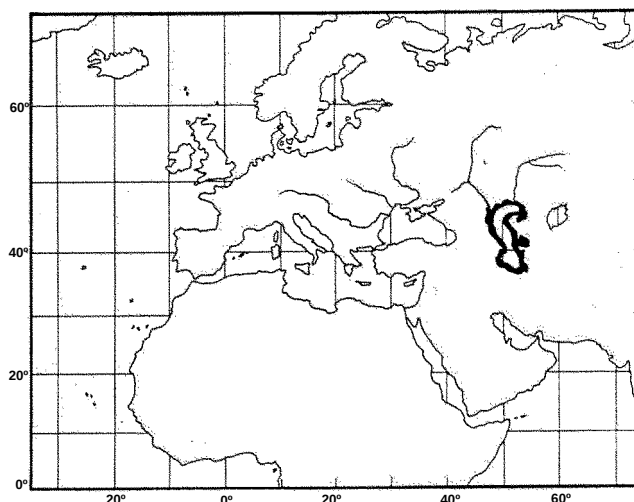
Diagnostic Features : Body fairly elongate, more 'herring-like' than 'shad-like'. Total gillrakers 18 to 47, thick and coarse, shorter, equal to or a little longer than gill filaments, either straight or curved, pointed or blunt, occasionally even bifurcated at tips. Teeth well developed in both jaws. Other Caspian shads have deeper, more shad-like bodies (A. caspia, which has more gillrakers, 50 to 180; A. saposhnikovi and A. sphaerocephala).

Geographical Distribution : Caspian Sea (throughout, but mainly in south).

Habitat and Biology : Brackishwater, non-anadromous, and not entering freshwaters, but strongly migratory. Feeds on small clupeids, gobies, atherines, also crustaceans and occasionally insects and molluscs. Various spawning patterns among the subspecies (mostly in spring and summer after an inshore migration and movement northward).

Size : To almost 50 cm standard length, usually around 30 cm (mature at about 20 cm).

Interest to Fisheries : Some of the subspecies are of considerable importance (especially A. brashnikovi, A. brashnikovi agrachanica and A. brashnikovi kisselevitshi). The total catch for all Caspian *Alosa* spp. (including A. brashnikovi) in 1983 was 3 561 tons. Coad (1980:70) claimed stocks depleted in Iranian freshwaters.



Local Names : USSR: Kaspiisko-Chernomorskije morskije sel'di, brashnikovskie sel'di. Svetovidov (1952, 1963) gives further Russian names for the subspecies.

Literature : Mikhailovskaya (1941 - subspecies); Svetovidov (1952, 1963 - synopsis).

Remarks : Svetovidov (1952, 1963) recognized nine subspecies, mainly separated on the number and form of the gillrakers. Following Banarescu (1964:244), Svetovidov's maeotica of the Black Sea is recognized as a distinct species (thus A. brashnikovi becomes entirely Caspian), while his A. curensis is included here as a subspecies of A. brashnikovi (which he seems to have suspected). The following nine subspecies occur:

A. brashnikovi agrachanica: total gillrakers 20 to 46 (M 33); western Caspian, or southeast in winter

A. brashnikovi autumnalis: total gillrakers 21 to 37 (usually 26 to 33); southern Caspian

A. brashnikovi brashnikovi: total gillrakers 27 to 47 (M 34); throughout Caspian, spawning in north

A. brashnikovi curensis: total gillrakers 32 to 38 (M 34); western part of southern Caspian

A. brashnikovi grimmi: total gillrakers 18 to 27 (M 22); eastern coasts of southern Caspian

A. brashnikovi kisselevitshi: total gillrakers 30 to 49 (usually 34 to 42); southern Caspian, mainly southwest

A. brashnikovi nirchi: total gillrakers 20 to 30 (M 25); eastern part of Caspian Linck, 1790,

A. brashnikovi orientalis: total gillrakers 24 to 34 (M 28); eastern part of southern Caspian

A. brashnikovi sarensis: total gillrakers 23 to 32 (M 27); western part of southern Caspian.

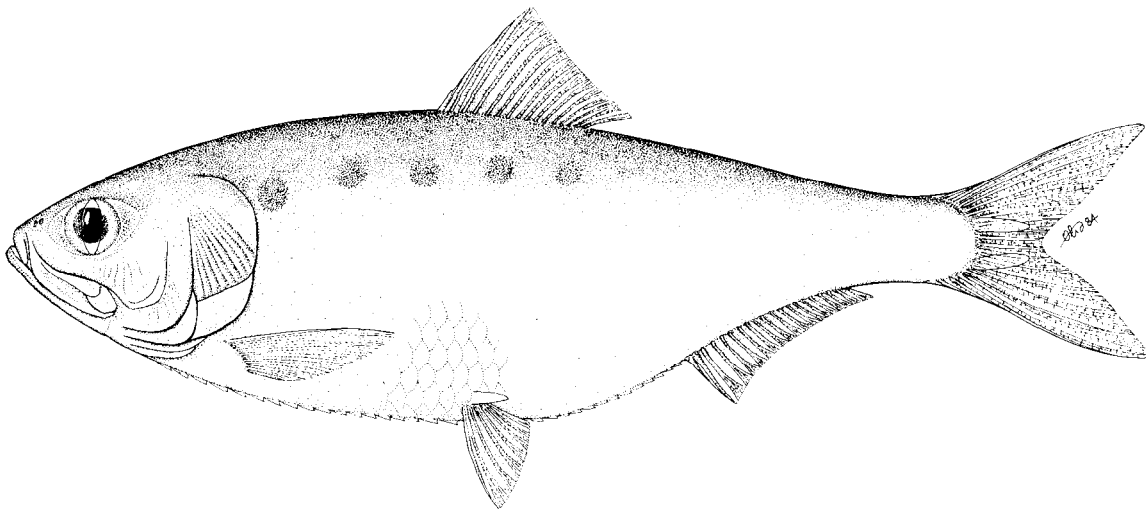
Alosa caspia (Eichwald, 1838)

CLUP Alos 7

Clupea caspia Eichwald, 1838, Bull.Soc.Nat.Moscou, 11(2):134 (Caspian, toward the south).

Synonyms : Clupea tanaica Grimm, 1901:59, 62, 67 (Sea of Azov); Alosa nordmanni Antipa, 1906:28, pl. 2, figs 6-10 (Black Sea, northwestern part); Clupea macedonica Vinciguerra, 1921:4 (Lake Volvi); Caspialosa knipowitscha Il'in, 1927:69, fig. (Enzeli Bay); Caspialosa caspia var. persica Il'in, 1927:72 (on data by Suvarov, 1907); Alosa bulgarica Drensky, 1934:79, figs 1, 2 (Black Sea, southward from Burgas); Caspialosa tanaica palaestomi Sadowsky, 1934:139 (Paläeostome lagoon); Alosa alosa bulgarica:Svetovidov, 1952:313, pl. 25, fig. 1 (synopsis); Idem, 1963:352, pl. 25, fig. (same); Caspialosa caspia salina Svetovidov, 1963:51 (Caspian Sea, northeast part); Alosa alosa macedonica:Svetovidov, 1952:313 mention); Idem, 1963:352 (mention); Alosa caspia - Svetovidov, 1952:229 et seq., pls 10-15, fig. 1 (synopsis; subspecies caspia, knipowitschi, salina, persica, tanaica, nordmanni, alaeostomi); Idem, 1963:254 et seq., pls 10-15, fig. 1 (same); Bănărescu, 1964:245, fig. 107 (Black Sea; as Alosa) (Caspialosa) caspia nordmanni); CLOFNAM, 1973:106 (synonymies; includes subspecies bulgarica, nordmanni, palaestomi, tanaica); FNAM, 1984:270, fig. (synopsis; subspecies as in CLOFNAM, diagnosed).

FAO Names : En - Caspian shad.



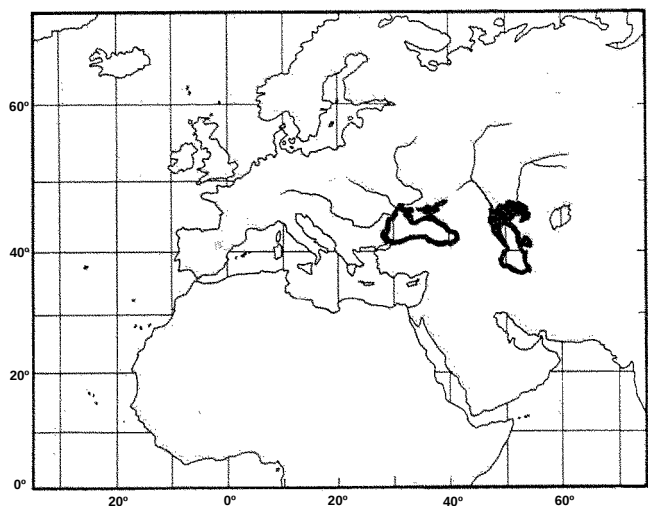
Diagnostic Features : Body 'shad-like', usually rather deep and compressed. Total gillrakers 50 to 180, long and thin, distinctly longer than gill filaments. Teeth poorly developed in jaws, sometimes barely detectable. A black spot posterior to gill opening and occasionally further black spots on flank in some cases. Resembles A. kessleri in gillraker numbers, but that species is more slender and 'herring-like'; other Caspian shads have fewer gillrakers (A. brashnikovi 18 to 47; A. sapashnikovi 25 to 41; A. sphaerocephala 26 to 42), while other Black Sea shads also have fewer gillrakers and are more slender and 'herring-like' A. pontica 47 to 69, thus a slight overlap; A. maeotica 33 to 46).

Geographical Distribution : Caspian Sea, Black Sea, Sea of Azov.

Habitat and Biology : Euryhaline, migratory, chiefly in brackishwaters, but entering freshwaters to spawn; one of the most warm-loving Alosa of the Caspian. Feeds on plankton. Depending on the subspecies some are semi-anadromous and spawn in fresh or slightly saline waters, mainly in the lower reaches, whereas others are practically marine and spawn in brackish or even fully saline oceanic waters.

Size : To 28 cm standard length, usually 18 to 22 cm (Caspian) or to 20 cm standard length, usually only 14 to 16 cm (Black Sea, Sea of Azov).

Interest to Fisheries : Only Alosa caspia caspia of the Caspian Sea is of importance, the other subspecies contributing little. The total catch for Caspialosa spp. (including A. caspia) in 1983 was 3 561 tons.



Local Names : USSR: Kaspiisko puzanok (numerous other names for the subspecies - see Svetovidov, 1963:257 *et seq.*).

Literature : Svetovidov (1952, 1963 - synopsis); Banarescu (1964, Black Sea).

Remarks : Svetovidov (1952, 1963) recognized 7 subspecies, mainly separated on body shape, gillraker numbers, pectoral fin length and distribution, adding a further subspecies subsequently (his previous *A. alosa bulgarica* - Svetovidov, 1973:106, i.e. CLOFNAM). Economidis (1973) has shown that Svetovidov's *A. alosa macedonica* (Vinciguerra, 1921, of Lake Volvi, Greece), is a true '*Caspialosa*' (teeth on vomer and palatines) and thus not *A. alosa*; since its gillraker count is within the range for the widespread *A. caspia* is and its body is deep and 'shad-like', it seems best regarded as a subspecies of *A. caspia*. Economidis & Sinis in press) have described yet another lacustrine subspecies, from Lake Vistonis (Greece). This makes 10 subspecies altogether:

Caspian subspecies

A. caspia caspia: total gillrakers 70 to 150 (usually 100 to 140); Caspian (mainly western half, but to south and east in winter).

A. caspia knipowitschi: total gillrakers 120 to 180 (usually 130 to 160); Caspian Sea (southern part, mainly western half).

A. caspia persica: total gillrakers 50 to 110 (usually 60 to 90); Caspian Sea (southern part, mainly in east).

A. caspia salina: total gillrakers 60 to 120 (usually 80 to 100); Caspian Sea (eastern half).

Black Sea, Sea of Azov subspecies

A. caspia bulgarica: total gillrakers 100 to 107; Black Sea (southwestern part).

A. caspia macedonica: total gillrakers 106 to 128; Lake Volvi only (Macedonia).

A. caspia nordmanni: total gillrakers 66 to 88 (average about 80); Black Sea (western part).

A. caspia palaeostomi: total gillrakers 73 to 87 (average about 76); Black Sea (south eastern part).

A. caspia tanaica: total gillrakers 62 to 85 (average about 76); Sea of Azov and adjacent eastern parts of Black Sea.

A. caspia subsp. A of Economidis & Sinis total gillrakers 78 to 97; Lake Vistonis only (Macedonia).

The scheme adopted here is compiled from the literature and merely represents a synopsis of all the forms of *Alosa* that have a deep, 'shad-like' body, numerous gillrakers (50 or more) and teeth on the vomer and palatines. The true relationships, in spite of Svetovidov's painstaking studies, are yet to be discovered; a separation of Caspian from Black Sea forms might be expected, but no morphometric or meristic basis for this exists at present.

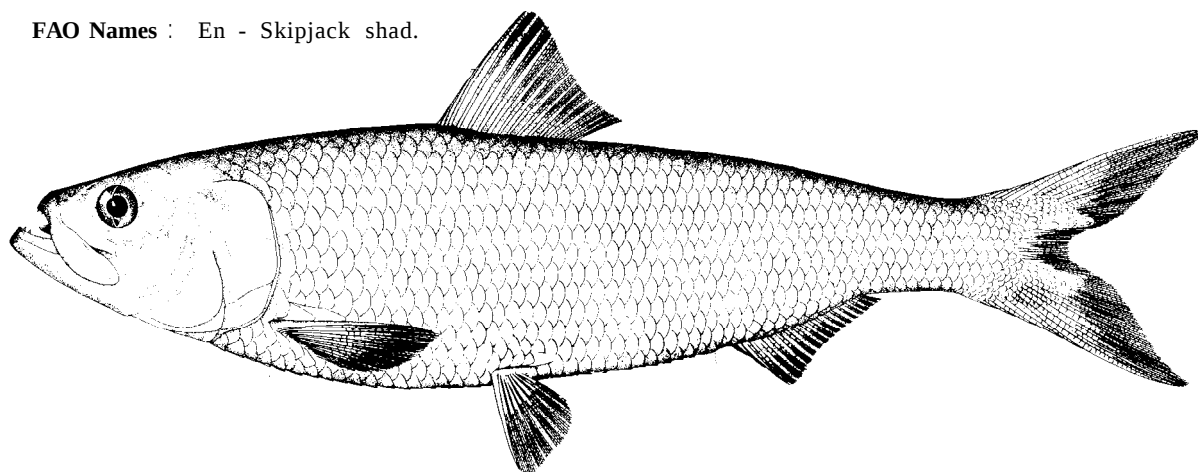
Alosa chrysochloris (Rafinesque, 1820)

CLUP Alos 3

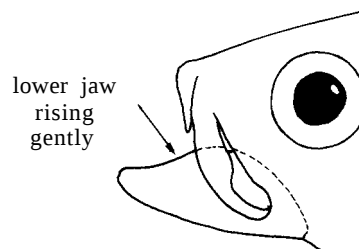
Pomolobus chrysochloris Rafinesque, 1820, West.Rev.Misc.Mag., 2:171 and Ichthyol.Ohiensis:39 (Ohio River, but seldom ascending to Pittsburgh; see Remarks for identity of Rafinesque's species

Synonyms : *Pomolobus chrysochloris*:FWNA, 1964:315, fig. 78 (full synon., descr., biol.).

FAO Names : En - Skipjack shad.



Diagnostic Features : Body fusiform, moderately compressed, belly with a distinct keel of scutes. Lower jaw not rising steeply within mouth; teeth present in jaws, prominent at front of lower jaw, but none on vomer. Lower gillrakers 20 to 24, slender. Back bluish green, abruptly changing to silver on flank; no dark spot at shoulder. The only other shad of the Gulf of Mexico, A. alabamae, has 41 to 48 gillrakers. Closely resembles A. mediocris of Atlantic coasts, which has no upper and weak lower jaw teeth, a dark shoulder spot and the body deeper than head length.



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

Habitat and Biology : Euryhaline, entering brackish- and freshwaters, but perhaps not always or not consistently anadromous, although strongly migratory within rivers, mostly in fast-flowing water where they are renowned for leaping (hence the common name). Feeds on small fishes, the juveniles on insects. Spawning times and places not certain (FWNA, 1964:317). Adults serve as hosts to the larvae (glochidia) of the economically valuable pearly mussel (Fusconaia ebena) of the Mississippi basin.

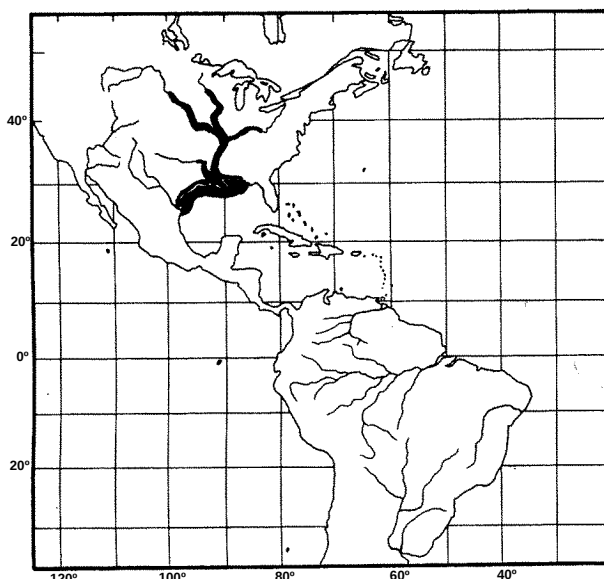
Size : To 50 cm standard length; usually 30 to 45 cm.

Interest to Fisheries : Little or none.

Local Names : USA: Blue or Green herring, Golden shad, River herring, Skipjack, Skipjack herring (AFS list).

Literature : Hildebrand (i.e. FWNA, 1964 - biol., etc.).

Remarks : Hildebrand (i.e. FWNA, 1964:315, footnote) noted that in the original description of Pomolobus chrysochloris, Rafinesque described the jaws as toothless, the flesh as 'esteemed' and the name as Ohio shad, all of which point to A. alabamae and not A. chrysochloris; however, to reverse the nomenclature would simply cause confusion.



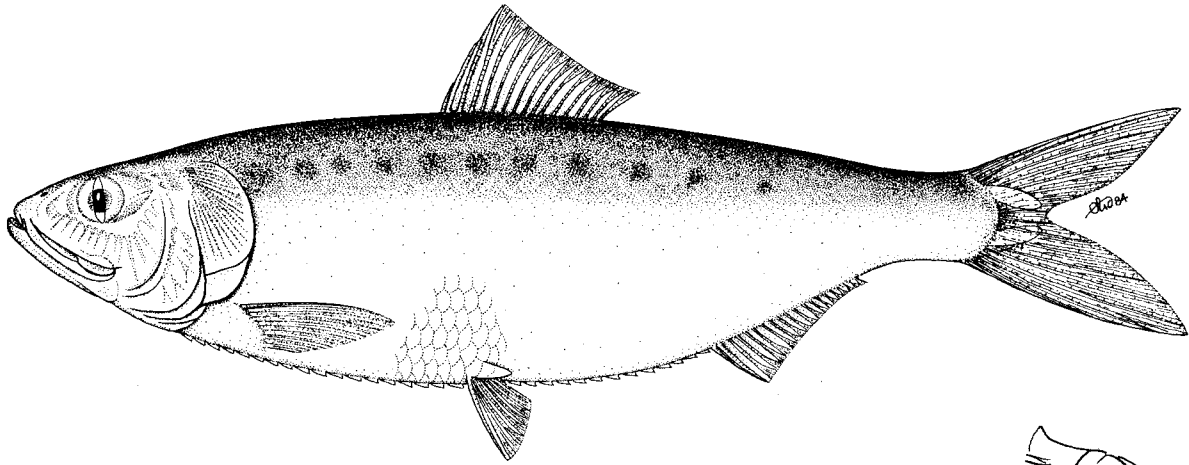
Alosa fallax (Lacepède, 1803)

CLUP Alos 6

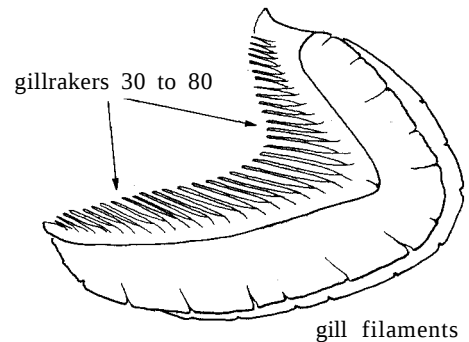
Clupea fallax Lacepède, 1803, Hist.nat.poiss., 5:452 (Seine).

Synonyms : Clupea rufa Lacepède, 1803:452 (Seine); Clupea nilotica E. Geoffroy Saint-Hilaire, 1808:pl. 10 (Nile); Clupea finta Cuvier, 1829:399 (Mediterranean); Alosa finta var. lacustris Fatio, 1890:51 (Lakes Como, Maggiore and Lugano); Alosa benacensis Barbieri, 1907 (Lake Garda); Alosa finta algeriensis, killarnensis and gracilis Regan, 1916:9, 10 (see Remarks); Alosa finta rhodanensis Roule, 1924:263 (Rhône) Alosa fallax bolivari Lozano y Rey, 1929:660, pl. 30, fig. 3 (costas del Rif); Alosa fallax - Svetovidov, 1952:310, figs 51, 52 (gillrakers), pl. 24, fig. 2 (synopsis); Idem, 1963:346, figs 51, 52, pl. 24, fig. 2 (same); Wheeler, 1969:128, fig. (synopsis); CLOFNAM, 1973:107 (synonymy); Wheeler, 1978:68, fig. (synopsis); Eiras, 1980:7 (Portugal, meristics); FNAM, 1984:271, fig. (synopsis); CLOFETA, in press (synonymy); Whitehead & Bauchot, in press (some types of A. vulgaris Valenciennes, 1847 = A. fallax, not A. alosa; types of Clupea rufa and A. f. rhodanensis).

FAO Names : En - Twaite shad.



Diagnostic Features : Body somewhat compressed, moderately deep (but depth at pectoral fin less than head length), scutes apparent along belly. Upper jaw notched, lower jaw fitting into it; no teeth on vomer. Gillrakers fairly short and stout, total 30 to 80, shorter than gill filaments. A dark spot posterior to gill opening, followed by 7 or 8 similar spots along flank (but sometimes faint or absent). Resembles *A. alosa*, which has more and longer gillrakers (total 85 to 130) and at most only 3 dark spots on flank. See CLUP Alos 6, Fishing Areas 34, 47 (in part).

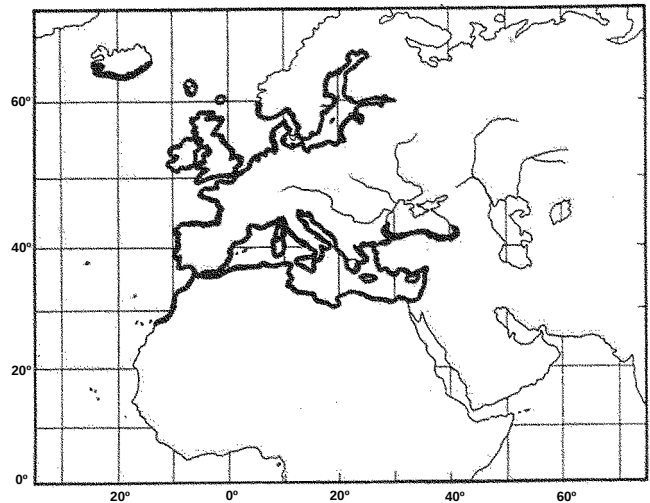


Geographical Distribution : Coasts of Europe, from southern coast of Iceland, British Islands, Baltic; south to Morocco; also whole of Mediterranean (but not Black Sea - Banarescu, 1964).

Habitat and Biology : Marine, pelagic, schooling and strongly migratory, but apparently not penetrating far up rivers. Enters tidal parts of rivers in May or early June to spawn there or a little above; eggs demersal, scattered over gravel or sand, the fry moving down as they develop. Feeds on small fishes and crustaceans, the young taking the fry of herrings, sprats and gobies. More common and widespread than *A. alosa*, but similarly suffers from river pollution and to some extent from river barrages.

Size : To 55 cm standard length and 1.5 kg.

Interest to Fisheries : Palatable, but bony. Not always separated from *A. alosa* in fishery records but probably makes up the major part of *Alosa* catches reported from France, Portugal and Morocco (267 tons in 1983).



Local Names : Very many names are given by Palombi & Santarelli (1961:9), including variants on Ceppa, Fint, Lacia, Losa, Savel, etc.

Literature : Svetovidov (1952, 1963 - synopsis); Wheeler (1969, 1978 - synopsis); FNAM (1984 -synopsis).

Remarks : Regan (1916:7) recognized six subspecies and subsequent authors (e.g. Svetovidov, 1952, 1963 and Wheeler, 1969) have accepted at least some of these, based mainly on gillraker counts:

Anadromous subspecies

A. fallax fallax: total gillrakers 37 to 42; Atlantic coasts.

A. fallax nilotica: total gillrakers 34 to 37; Mediterranean, Adriatic (common), perhaps Marmara and Black Seas (if so, then rare).

Landlocked lacustrine subspecies (high gillraker counts)

A. fallax benacensis: Lake Garda, Italy (30 to 40 or more lower gillrakers *vide* Regan, 1916 in his *A. fallax gracilis*, overlooking the earlier name *benacensis* of Barbieri, 1907).