Field Manual
for the
Identification of Selected North American Freshwater Fish
by Fillets and Scales
Anglers all want bigger fish and more of them. Yet, fishing with today’s sophisticated techniques and the space age tackle often leaves behind larger populations of young, small fish. Voluntary catch-and-release is the practical solution to the problem. Catch-and-release allows fish to be "recycled," thus increasing the catch rate. It also allows these fish to grow older and larger. As the logo indicates, the future of fishing is in all our hands.
Field Manual
for the
Identification of Selected North American Freshwater Fish
by Fillets and Scales

David W. Oates       Lisa M. Krings       Karen L. Ditz

Nebraska Technical Series No. 19
Nebraska Game and Parks Commission
Lincoln, Nebraska, 1993

Funded by
Federal Aid in Sport Fish Restoration, Project F-89-R
ACKNOWLEDGEMENTS

A great amount of effort was spent on performing a literature search for this project. Our librarian, Barbara Voeltz, was extremely helpful in making this search possible. A list of references is presented at the end of the manual.

Many people from agencies similar to ours made collection of samples possible. A personal thank you to the following states and provinces: Alaska, Colorado, Florida, Idaho, Iowa, Michigan, Missouri, Nebraska, New York, Texas, Virginia, Washington, Washington, D.C., Wisconsin Center for Lake Superior Environmental Studies, Wyoming, Ontario and Saskatchewan. Appreciation to Dr. Robert Howell, Nancy Engelbart and Karen Knap from the University of Nebraska Dental School and to Dr. Dale Benham from Nebraska Wesleyan University.

Thanks to Ruth Wusk, Randy Winter, Patrick McIntosh, Dr. Ed Crossman, Gerald Mestl, Steve Schainost, Liz Huff and Don Cunningham for their help in reviewing the text; to Jim Welitzel, Tina Rohrs, Arvid Olson and Mark Lewallen for their photography; to Amy Baker, Brian Schmidt, Mark Brohman, Dave Nelson, Doug McCully, Gerald Burdick, Mark Lewallen and Matt Oates for their help with measurements of fillets and scales; to Kit Hams for computer work and Randy Bright for artwork. Typing by Margo Ems, Ruth Wusk and Jan Bouc was greatly appreciated. A special thank you to Anker Odum and Peter Buerschaper of the Royal Ontario Museum, to Dr.s Scott and Crossman for the use of materials from Freshwater Fishes of Canada, 1973 and to Eddy and Underhill's How To Know The Freshwater Fishes, 1980.
CONTENTS

ACKNOWLEDGEMENTS ........................................ 2
INTRODUCTION .................................................. 7
GLOSSARY ........................................................ 8
FILLET IDENTIFICATION ........................................ 15
  Points To Remember About Fillets ..................... 26
SCALES .................................................................. 33
  Characteristic Features Of A Fish Scale ............... 34
  Points To Remember About Scales ..................... 36
TERMS USED IN FISH TABLES ............................. 38
  Sturgeon Family ........................................... 40
  Lake Sturgeon ............................................. 41
  Shovelnose Sturgeon ...................................... 42
  Paddlefish Family .......................................... 43
  Paddlefish .................................................. 44
  Gar Family .................................................. 45
  Longnose Gar ............................................... 46
  Shortnose Gar ............................................... 47
  Spotted Gar ................................................ 48
  Alligator Gar ............................................... 49
  Bowfin Family ............................................. 50

  Bowfin ........................................................ 51
  Herring Family ............................................ 52
  Alewife ..................................................... 53
  American Shad ............................................ 54
  Gizzard Shad .............................................. 55
  Salmon Family ............................................. 56
  Pictures of Trout & Salmon .............................. 57
  Pink Salmon ................................................ 58
  Chum Salmon ............................................... 59
  Coho Salmon ............................................... 60
  Kokanee or Sockeye Salmon ............................. 61
  Chinook Salmon .......................................... 62
  Cutthroat Trout ........................................... 63
  Rainbow or Kamloops Trout ............................ 64
  Atlantic Salmon .......................................... 65
  Brown Trout ............................................... 66
  Arctic Char ................................................ 67
  Brook Trout ............................................... 68
  Lake Trout ................................................ 69
  Cisco Lake Herring ....................................... 70
<table>
<thead>
<tr>
<th>Fish Name</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lake Whitefish</td>
<td>71</td>
</tr>
<tr>
<td>Broad Whitefish</td>
<td>72</td>
</tr>
<tr>
<td>Round Whitefish</td>
<td>73</td>
</tr>
<tr>
<td>Mountain Whitefish</td>
<td>74</td>
</tr>
<tr>
<td>Inconnu</td>
<td>75</td>
</tr>
<tr>
<td>Arctic Grayling</td>
<td>76</td>
</tr>
<tr>
<td>Rainbow Smelt</td>
<td>77</td>
</tr>
<tr>
<td>Mooneye Family</td>
<td>78</td>
</tr>
<tr>
<td>Goldeye</td>
<td>79</td>
</tr>
<tr>
<td>Mooneye</td>
<td>80</td>
</tr>
<tr>
<td>Pike Family</td>
<td>81</td>
</tr>
<tr>
<td>Grass Pickerel</td>
<td>82</td>
</tr>
<tr>
<td>Northern Pike</td>
<td>83</td>
</tr>
<tr>
<td>Muskellunge</td>
<td>84</td>
</tr>
<tr>
<td>Chain Pickerel</td>
<td>85</td>
</tr>
<tr>
<td>Minnow Family</td>
<td>86</td>
</tr>
<tr>
<td>Common Carp</td>
<td>87</td>
</tr>
<tr>
<td>Goldfish</td>
<td>88</td>
</tr>
<tr>
<td>Grass Carp</td>
<td>89</td>
</tr>
<tr>
<td>Quillback</td>
<td>90</td>
</tr>
<tr>
<td>River Carpsucker</td>
<td>91</td>
</tr>
<tr>
<td>Highfin Carpsucker</td>
<td>92</td>
</tr>
<tr>
<td>Sucker Family</td>
<td>93</td>
</tr>
<tr>
<td>Blue Sucker</td>
<td>94</td>
</tr>
<tr>
<td>White Sucker</td>
<td>95</td>
</tr>
<tr>
<td>Bigmouth Buffalo</td>
<td>96</td>
</tr>
<tr>
<td>Smallmouth Buffalo</td>
<td>97</td>
</tr>
<tr>
<td>Silver Redhorse</td>
<td>98</td>
</tr>
<tr>
<td>Golden Redhorse</td>
<td>99</td>
</tr>
<tr>
<td>Spotted Sucker</td>
<td>100</td>
</tr>
<tr>
<td>Shorthead Redhorse</td>
<td>101</td>
</tr>
<tr>
<td>Catfish Family</td>
<td>102</td>
</tr>
<tr>
<td>White Catfish</td>
<td>103</td>
</tr>
<tr>
<td>Black Bullhead</td>
<td>104</td>
</tr>
<tr>
<td>Yellow Bullhead</td>
<td>105</td>
</tr>
<tr>
<td>Brown Bullhead</td>
<td>106</td>
</tr>
<tr>
<td>Channel Catfish</td>
<td>107</td>
</tr>
<tr>
<td>Blue Catfish</td>
<td>108</td>
</tr>
<tr>
<td>Flathead Catfish</td>
<td>109</td>
</tr>
<tr>
<td>Cod Family</td>
<td>110</td>
</tr>
<tr>
<td>Burbot</td>
<td>111</td>
</tr>
<tr>
<td>Temperate Bass Family</td>
<td>112</td>
</tr>
<tr>
<td>White Perch</td>
<td>113</td>
</tr>
<tr>
<td>White Bass</td>
<td>114</td>
</tr>
</tbody>
</table>
Striped Bass .......................................................... 115
Yellow Bass .......................................................... 116
Sunfish Family ......................................................... 117
X-ray picture of White Crappie, Pumkinseed, and Largemouth Bass .......... 118
Rock Bass .............................................................. 119
Green Sunfish .......................................................... 120
Bluegill ................................................................. 121
Redear Sunfish ......................................................... 122
Warmouth ............................................................... 123
Smallmouth Bass ..................................................... 124
Largemouth Bass ...................................................... 125
White Crappie .......................................................... 126
Black Crappie ............................................................ 127
Perch Family ............................................................. 128
Yellow Perch ............................................................ 129
Sauger ................................................................. 130
Walleye ................................................................. 131
Drum Family ............................................................. 132
Freshwater Drum ...................................................... 133
SOLVING POTENTIAL PROBLEMS FACED IN WILDLIFE FORENSICS ........ 134
Northern Pike And Muskellunge ........................................ 138
REFERENCES .......................................................... 140
APPENDIX I — Identification Of Fish Fillets
By Use Of Cross-Sections ........................................... 154
APPENDIX II — Fish Identification Key ............................ 156
INDEX TO COMMON AND SCIENTIFIC NAMES .......................... 176

LIST OF TABLES
Table 1. Myotomes found in live fish (fillets have the same or fewer myotomes) .......... 17
Table 2. Identification of fish using myotomes (myomeres) ........................................ 18
Table 3. Rough key for fish fillet identification .......... 29
Table 4. Summary of scale characteristics of North American fishes ....................... 37
LIST OF FIGURES

Figure 1. Fresh fillet shows Ws on head and tail sections and overlapping of myotomes .......... 16

Figure 2. The W-shaped segments at tail of fish ........................................................................ 16

Figure 3. Collagen lines on a fish .................................................................................................. 16

Figure 4. Locations where scales were removed ....................................................................... 33

Figure 5. Characteristic features of fish scales, Lagler, 1947 ....................................................... 35

Figure 6. The focus of the scale separates black crappie and white crappie ............................. 135

Figure 7. The focus of the scale and the circuli around the focus separates walleye and sauger ......................................................................................................................... 136

Figure 8. The focus of the scale is similar, the difference is the length of the cteni margins on the posterior edge of the scale. White bass can be different from a wiper and striped bass, but wipers not from striped bass ......................................................................................................................... 137

Figure 9. Ventral view of the anterior portion of the axial skeleton of muskellunge showing curved path of groove for dorsal aorta. Ventral view of the anterior portion of the axial skeleton of northern pike showing straight path of groove for dorsal aorta ........................................ 138

Figure 10. Y-bones from muskellunge and northern pike .......................................................... 139

Figure 11. Scale from mid-lateral region of muskellunge and northern pike .............................. 139

Figure 12. Walleye fillet verses yellow perch fillet cross-sectioned at the anus and between anas and tail ................................................................................................................. 155

Figure 13. Northern pike, yellow perch, largemouth bass and white bass cross-sectioned just behind head ................................................................. 155
INTRODUCTION

This manual is designed for use in the field to help conservation officers identify fish that have been filleted or skinned. Many North American freshwater gamefish and those caught by commercial fishermen are included.

Our goal was to collect six fish of each species for measurement purposes. Several states and provinces including Alaska, Colorado, Florida, Idaho, Iowa, Michigan, Missouri, Nebraska, New York, Ontario, Saskatchewan, Texas, Virginia, Washington, Washington D.C., Wisconsin and Wyoming furnished samples. Fish may vary from location to location; these differences were not corrected for in this manual.

For identification of fish, we will first examine fillets. Fish fillets, in most connotations, are of a fish skinned and cut along one side of the vertebrae. Two fillets (right and left side) are found on an individual fish (two left sides equal two fish, not one). Identification is much easier if the fish is scaled (number of scales may be counted vertically or horizontally) or if ribs are kept with the fillets. Some states and provinces require a one-inch patch of scales to be retained with each fillet. If this skin is removed, you have an illegal, unidentified fish. Some groups of fishes look so much alike that a close examination of scales or a laboratory analysis of flesh is necessary for identification.

Shape of fillet, color and rib numbers can vary from species to species. Patterns on scales differ between species and can be used like human fingerprints. Many people fillet fish differently, and pieces can be fit together if necessary. Larger fillets may be cut up into smaller sections, but with smaller fish, the fillet is frequently kept whole. Can fillets be identified? Using an electrophoresis technique, some fish species have been identified by flesh alone. This can take a great deal of time and many forensic laboratories are not equipped or able to perform this service.

Very little research, except for identification of larval fish, has examined the use of muscle segments or myotomes. A study in France by Blin, Balea and Prudhomme (1953) examined cross-sections of major fish sold at the market place. Cross-sections just behind the head (the end of sternum), at the tip of the anus and midway between anus and tail were taken. This comparison was taken for some of the fish examined and identification can be made to families.

Can these fillets be identified without employing any fancy scientific equipment? For many species, the answer is yes. This manual was designed to aid in this task.
GLOSSARY

*Abdomen (belly)* — the lower surface of the body, especially the part between the pectoral fins and the anus

*Abdominal pelvic fins* — said of pelvic fins when located on abdomen, far removed from head

*Accessory caudal rays* — short rays on the upper and lower anterior portions of the caudal fin

*Accessory pectoral scale* — an enlarged or elongated scale at dorsal base of pectoral fin in some herringlike fishes

*Adipose fin* — a fleshy fin on the back behind the dorsal fin, as in trouts, salmons, whitefishes, smelts and catfishes

*Anal* — referring to the anus or vent

*Anal fin* — the fin on the median ventral line behind the anus

*Annulus* (plural *annuli*) — a mark or marks formed on a fish scale or bone each year

*Anterior* — the front portion; in front

*Anterior field* — unexposed part of the scale which is toward the head of the fish, bounded by imaginary lines from the front corners (or their equivalent on rounded scales) to focus

*Anus* — the posterior, external opening of the alimentary canal: the vent

*Axillary process* — a daggerlike projection at the base of the pectoral or pelvic fins

*Barb* — hooklike serration, as on pectoral and dorsal fin spine of carp and catfishes

*Barbel* — an elongated, hairlike projection, usually about the mouth, chin, or nose, as in the cods, sturgeons and catfishes

*Basal* — (of fins) skeletal support of fin ray(s)

*Belly* — see *abdomen*

*Branchial* — of the gills

*Breast* — see *pectoral*

*Canines* — conical teeth which are larger than the rest

*Cardiform* — brushlike; said of fine teeth of uniform length in brushlike bands or patches

*Carinate* — keeled: having a sharp median ridge as on the belly of certain herringlike fishes

*Caudal* — pertaining to the tail or caudal fin

*Caudal peduncle* — the fleshy end of the body behind the anal fin and before the caudal or tail fin: the tail minus the tail fin: the "wrist"

*Chin* — anterior ventral portion of the lower jaw
Circuli — raised markings on the outer surface of the scale, usually appearing as lines which more or less follow the outline of the scale

Collagen — gelatinous substance found in connective tissue, found on either side of myomeres

Color of fillet — flesh of fish can be different colors. Sometimes these colors are dietary, such as the orange-pink of trout or salmon. Other colors that may occur are yellow, white, pink and shades in between

Crenate — with a scalloped or notched margin (as on opercular flap at edge of gill cover of sunfishes)

Ctenii — tooth-like structures on posterior portion of scale

Ctenoid — said of scales of most spiny-rayed fishes having posterior margin of scale with needlelike projections

Cycloid — said of the scales (having smooth margins) of typical soft-rayed fishes

Deciduous — said of scales that are easily rubbed off and thus not firmly attached

Dentition — said of teeth, their arrangement and structure

Depth — the vertical diameter or distance through, as of the body of fishes

Distal — farthest from the center; peripheral

Dorsal — pertaining to the back

Dorsal aorta — main artery along back

Dorsal fin — a fin on the back, usually central in position supported by rays or spines

Dorsal fin spine — see barb

Exposed portion — that part of the outer surface of overlapped scales visible when scales are in place on a fish; may be smaller or larger than posterior field; in ctenoid scales ctenii occur on this portion

Eye diameter — the horizontal diameter of the eyeball — in contrast to iris diameter, which is the distance across the black aperture in the center of the eye, or orbit diameter, which is the horizontal distance between anterior and posterior margins of the socket

Fields — quadrants on the surface of the scale, either real as shown by the angulation of the circuli at the four principal corners (forming diagonal lines), or imaginary if the corners or configuration of the circuli are missing (such as a circular type of scale)

Filament — slender or threadlike, said of certain elongated fin rays in some fishes

Fillet myomeres — the number of myomeres usually found in a fillet. There are never more fillet myomeres than fish myomeres
Fingerling — young fish, usually late in first year

Fish bones — bones other than ribs found in a fillet. The Y-bones in northern pike, for example

Fish myomeres — the total number of myomeres found in a fish. Myomeres are muscle segments. They form the segments seen when a fish is skinned or filleted. These segments are usually shaped like a W or V lying on its side

Fish record weight — refers to the largest fish of that species on record

Focus — first part of scale to appear in growth; it is often centered in the scale

Fork length — distance from the anteriormost margin of head to tip of middle ray of the caudal fin

Fry — young fish, newly hatched, after yolk has been used up and active feeding has commenced

Gill arches — the bony supports of the gills

Gill cover — the bony covering of the gill cavity, composed of opercular bones (see operculum)

Gill membrane — the thin wall of skin supported by the bony-support rods, and closing the gill cavity below

Gill rakers — a series of bony projections along the anterior edge of the gill arch. Gill-raker counts are usually made on the left anterior arch. Every raker is counted, including the bony rudiments at the ends of the series that may be difficult to see except under magnification

Graduated — regular or steady increase in length, as of the spines in the fins of some fishes

Gular plate — bony plate or plates located behind the chin and between the sides of the lower jaw

Head length — distance from the most anterior point of the head to the posterior edge of the opercle

Heterocercal — unequally lobed; said of the tail or caudal fin of a fish where the upper lobe is larger than the lower, and in which the last few vertebrae of the vertebral column are bent upward

Homocercal — equally lobed; said of the tail or caudal fin when upper and lower lobes are more or less equal, and the backbone or vertebral column ends at the middle of the base of the fin

Imbedded portion — all of scale other than exposed part, usually including most of the lateral fields and all of the anterior field

Imbricated — overlapping, like shingles on a roof

Immaculate — without spots or pigment pattern, usually white or colorless

Inferior — used in reference to mouth when snout projects beyond lower jaw

Interneurals — the bones to which the dorsal fin rays are attached
Isocercal — with the vertebrae becoming progressively smaller backward, as in the codfishes

Isospondyous — with the anterior vertebrae simple; said of the herringlike fishes which lack the Weberian apparatus

Isthmus — the fleshy space beneath the head and between the gill openings

Jugular — pertaining to the throat; said of the pelvic fins when located ahead of the point of attachment of the pectorals

Keel — a sharp, compressed edge on the ventral surface between the paired fins or the lateral surface of the caudal peduncle

Larva (plural larvae) — the young of an animal when differing markedly from the adult

Lateral field — top and bottom fields remaining after marking off anterior and posterior fields

Lateral line — series of porelike openings (to sensory canal) along the sides of a fish

Lateral line scales — the single row of scales that make up the lateral line

Lingual — pertaining to the tongue

Lingual teeth — teeth on tongue: the serrated teeth on the tongue of lampreys

Lunate — crescentlike, in reference to shape of caudal or tail fin

Major rays (or principal rays) — longer (at least 3/4 height of fin), obvious fin rays as opposed to anterior rudiments often not visible; often comprise all branched rays plus one anterior unbranched ray

Mandible — the lower jaw

Mandibular (or submandibular) pore — small sensory opening in the undersurface of the bones of the lower jaw

Maxillary — the posterior and lateral element of the upper jaw

Median — lying in the midline that divides an animal into right and left halves

Midline — divides the fillet in half and can always be seen on the fillet. The midline is not necessarily the lateral line

Mouth (inferior) — mouth below snout; snout obviously overhanging mouth

(oblique) — line of the mouth (when closed) at an angle of 45° or greater

(subterminal) — mouth slightly overhung by snout, not quite terminal

(terminal) — tips of upper and lower jaw forming foremost part of the head

(ventral) — mouth on ventral surface of head, as in sturgeons

Myomere — see myotome
Myotome — a muscle plate; a section of the repeated muscle
units corresponding to the flakes of a cooked fish

Nasal — one of the paired bones on front of a fish's head,
usually beside the nostril

Notochord — the embryonic cartilaginous vertebral
column persistent in paddlefish

Opercle — the large rectangular bone of the gill cover

Opercular flap — a backward prolongation of the posterior
angle of the opercle

Operculum (also called gill cover) — the bony covering of
the gill cavity composed of opercular bones, i.e.
preopercle, interopercle, subopercle, opercle

Opisthocoelous — convex in front, concave behind. The
condition in the vertebrae of gars

Origin — (of a fin) the anterior end of the base; the end of
base nearest the head

Paired fins — pectoral and pelvic fins, in contrast to vertical
fins

Papilla (plural papillae) — a small fleshy projection or
ridge

Papillose (or papillate) — covered with papillae

Pectinate — having teeth like a comb

Pectoral — the anterior ventral portion of a fish; the breast

Pectoral arch — shoulder girdle; the complex of bones
usually connected with the skull, to which the pectoral
fins are attached

Pectoral fins — the most anterior or uppermost of the paired
fins, usually dorsal to pelvic fins

Pectoral fin spine — see barb

Peduncle — the fleshy end of the body behind the anal fin
(see caudal peduncle)

Pelvic arch (or girdle) — the bones to which the pelvic fins
are attached; pubic bones

Pelvic axillary process (scale) — a slender scale-like
process or tab of tissue that develops at the base of the
pelvic fins of many salmonid and other bony fishes

Pelvic fin — ventral, paired fin lying below the pectoral fin
or between it and the anal fin

Plate — hard, bony shield in various places on body, usually
larger than scales, found especially in sturgeons and
sticklebacks

Plicate — with wrinkle-like folds

Posterior — behind

Posterior field — exposed part of the scale toward the tail
of the fish, bounded by imaginary lines from the back
corners to focus
Pre-maxillary — the paired bones usually bearing teeth that form the front of the upper jaw in troutlike fishes, and the entire lower border of the upper jaw in higher percomorph fishes

Preopercle — the most anterior of the opercular series, the bone of the cheek

Primary radii — radii that extend from the focus to the edge of the scale

Principal rays — longer (at least ¾ height of fin) obvious fin rays as opposed to anterior rudiments often not visible; often comprise all branched rays plus one anterior unbranched ray

Procurrent — the stiff rays at base of caudal fin

Proximal — nearest the point of attachment

Pyloric — the pylorus; that section of the intestinal tract immediately following the stomach

Pyloric caeca — fingerlike extensions attached to the pylorus

Radii — grooves or lines, usually more or less radiating from the focus to the edge of the scale

Ray — an articulated or jointed rod that supports the membrane of a fin

Replacement scale — a scale which has formed in the place of one lost; it lacks the pattern of radii and circuli in an area about the size of the original scale when lost

Rhombic (or rhomboid) scale — the type of heavy, bony, diamond-shaped, nonoverlapping scales found in gars

Scales taken from different parts of the same fish can vary greatly in size, shape and structure. Fish with ctenoid scales will often have cycloid scales on certain parts of the body such as the breast or belly. The scales examined for the keys in this manual were those more apt to be found in fillet cuts. The scales were taken from the top and bottom of the fish near the head and the top and bottom of the fish near the tail. The most typical scale used for research is taken on the side of the fish between the dorsal fin and midline

Scale radius — line radiating from the focus of a scale. The angle subtended by the outer two is used to distinguish between species

Scute — a bony or horny plate

Secondary radii — radii that do not originate at the focus

Snout — technically that part of the head of a fish in front of the eyes

Snout length — distance from the most anterior point of the head or upper jaw to the front margin of the eye socket

Soft dorsal — the dorsal fin or portion of it that consists of soft rays only (cf. spinous dorsal)
Spine — fin rays that are not branched, without obvious segments, and more or less stiffened and sharpened at the apex; or similar straight or curved, sharp structures on other parts of the body (operculum, cheek)

Spinous dorsal — the dorsal fin or portion of it which consists of spines only

Standard length — distance from the most anterior part of the head to the posterior margin of the last whole vertebral centrum

Striations — grooves or streaks

Subopercle — the bone below the opercle (see operculum)

Subspecies — a group of local populations of a species, inhabiting a geographic subdivision of the range of the species, and differing taxonomically from other populations of the species

Swim bladder (also called gas bladder, air bladder) — gas-filled sac in dorsal portion of body cavity of most fishes which aids in buoyancy, and in respiration in some

Teleost — a name applied to fishes having the skeleton fully ossified; in other words a "bony fish" in contrast to a shark, which is a cartilaginous fish

Terminal — at the end (see mouth)

Thoracic — pertaining to the chest or thorax; anterior to the abdomen

Thoracic pelvic fins — pelvic fins which are attached far forward below the pectorals; the pelvic bones usually connected with the shoulder girdle

Tubercle — a soft or hardened lump or projection on the surface; usually a modified scale

Vent — the external opening of the alimentary canal; the anus

Ventral — on the lower surface; pertaining to the abdomen or belly

Vermiculations — markings resembling worm tracks

VertebrA (plural vertebrae) — a single bone of the spinal column

Vertical fins — the fins (dorsal, anal and caudal) on the median (center) line of the body, in contrast to the paired fins (pectoralis and pelvics)

Vomer — the anterior bone on the roof of the mouth

Weberian apparatus — the modified, first four or five vertebrae in minnows, suckers, carps, catfishes and their relatives (Ostariophysi) that connect the swim bladder to the inner ear by a series of small bones or ossicles
Several items are useful in fillet identification.

**Shape of fillet** — The shape of the fillet can refer to species type involved. For example, a short, wide fillet can refer to a sunfish or a crappie; a long, narrow shape can refer to northern pike or a gar. See fish and fillets for this distinction.

**Color of a fillet** — The color of a fillet can be related to type of fish or diet. Just as crappie tend to be white-fleshed, trout and salmon tend to have reddish or orangish flesh, and bullheads and pike (Esox) tend to have yellowish flesh. Fish like carp, buffalo, suckers, redhorse, usually scavenger fish have a reddish layer of muscle next to the skin.

**Ribs found in a fillet** — The size and number of ribs left in a fillet may aid in identification. Different fish have specific numbers of ribs present, and some have finer bone elements than other species. The length and depth of the stomach cavity relates to species as does the color of the stomach lining when present. Normally, after the anal opening, the myotomes are more W shaped. One may approximate the number of ribs that can be estimated by using this characteristic (one rib per myotome).

**Fins/rays** — Fin placement can sometimes be visible on a fillet. Dorsal and anal fins can be useful because their location varies on different species of fish (see fish pictures).

**Bones found in a fillet** — Bones other than rib bones are often found in fillets. Frequently, these are found in canned or smoked fish. Species in the pike family (Esox) have Y bones. Carp, suckers, goldeye and buffalo have free-floating, intermuscular bones in their fillets. Identifying these bones in the fillet can eliminate species such as bass, crappie, sunfish, walleye, catfish, perch etc.

**Myotomes (Myomeres)** — A key feature in identifying fish fillets is the number of myotomes. Myotomes can vary from species to species. To function properly, myotomes don't run perpendicular to the body axis and are structurally more complicated. They are bent in a zig-zag shape and frequently look like a misshaped W on its side. On most fish, the best shaped W is from anus to tail. The Ws are usually less well defined near the head (Figure 1). Observations are most obvious with an extra light source.

There are two types of myomeres. One consists of broad fibers of white muscle; the second is a narrow fiber containing myoglobin which provides the red color (red muscle).

The white fibers contain no fat and contract rapidly for a short period of time. Fish considered capable of quick movements and incapable of sustained activity are included in this group (pike, sunfish, crappie and perch). Red
muscles are slower than white ones but are capable of prolonged performance because of the increased blood supply (drum). They are also found in continuous food-seeking species (carp and buffalo) and scavenger fish.

Reading myotomes — From tail to head, count the W-like segments. Even if the tail is partially removed, the segments can sometimes be observed by slicing overlapping myotomes (Figure 2). The head area may be more difficult. You may have to check the cut nearest the head to get a final count. Turn it and look at the fillet head on. Count collagen lines carefully — may be two lines for each myotome (Figure 3).

Figure 1. Fresh fillet shows Ws on head and tail sections and overlapping of myotomes.

Figure 2. The W-shaped segments at tail of fish.

<table>
<thead>
<tr>
<th>Myotomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
</tr>
<tr>
<td>4</td>
</tr>
<tr>
<td>3</td>
</tr>
<tr>
<td>2</td>
</tr>
<tr>
<td>1</td>
</tr>
<tr>
<td>1</td>
</tr>
<tr>
<td>2</td>
</tr>
</tbody>
</table>

Figure 3. Collagen lines on a fish.

A listing of fish species and the typical number of myotomes is presented in Table 1.

An identification of fish using myotomes is found in Table 2.
Table 1. Myotomes found in live fish (fillets have the same or fewer myotomes)

<table>
<thead>
<tr>
<th>25 or Less</th>
<th>26-33</th>
<th>33-40</th>
<th>40-45</th>
<th>45-50</th>
<th>50-55</th>
<th>55-60</th>
<th>60-80</th>
</tr>
</thead>
<tbody>
<tr>
<td>Freshwater Drum</td>
<td>Black Craple</td>
<td>Black Buffalo</td>
<td>Brown Bullhead</td>
<td>Alewife</td>
<td>Brown Trout</td>
<td>Alligator Gar</td>
<td>Arctic Char</td>
</tr>
<tr>
<td>Striped Bass</td>
<td>Goldfish</td>
<td>Black Bullhead</td>
<td>Grass Carp</td>
<td>Blue Sucker</td>
<td>Chain Pickerel</td>
<td>American Shad</td>
<td>Bowfin</td>
</tr>
<tr>
<td>White Bass</td>
<td>Largemouth Bass</td>
<td>Brown Bullhead</td>
<td>Northern Hog Sucker</td>
<td>Channel Catfish</td>
<td>Goldeye</td>
<td>Arctic Char</td>
<td>Lake Sturgeon</td>
</tr>
<tr>
<td>White Perch</td>
<td>Rock Bass</td>
<td>Common Carp</td>
<td>Redhorse</td>
<td>Gizzard Shad</td>
<td>Lake Whitefish</td>
<td>Arctic Char</td>
<td>Lake Trout</td>
</tr>
<tr>
<td>Wiper</td>
<td>Smallmouth Bass</td>
<td>Highfin Carpsucker</td>
<td>Grass Pickeral</td>
<td>Grass Pickerel</td>
<td>Mooneye</td>
<td>Arctic Char</td>
<td>Longnose Gar</td>
</tr>
<tr>
<td>(White Bass X Striped Bass)</td>
<td>Sunfish</td>
<td>Largemouth Buffalo</td>
<td>Largemouth Buffalo</td>
<td>Largemouth Sucker</td>
<td>Mountain Whitefish</td>
<td>Muskellunge</td>
<td>Muskellunge</td>
</tr>
<tr>
<td>Yellow Bass</td>
<td>(Bluegill, Green, Pumpkinseed, Red-earred Sunfish, Warmouth, etc.)</td>
<td>Quillback</td>
<td>Quillback</td>
<td>Longnose Sucker</td>
<td>Paddlefish</td>
<td>Arctic Char</td>
<td>Northern Pike</td>
</tr>
<tr>
<td></td>
<td>White Craple</td>
<td>River Carpsucker</td>
<td>River Carpsucker</td>
<td>White Sucker</td>
<td>Shovelnose Sturgeon</td>
<td>Arctic Char</td>
<td>Rainbow Smelt</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Smallmouth Buffalo</td>
<td>Smallmouth Buffalo</td>
<td></td>
<td></td>
<td>Arctic Char</td>
<td>Rainbow Trout</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Spotted Sucker</td>
<td>Spotted Sucker</td>
<td></td>
<td></td>
<td>Arctic Char</td>
<td>Tiger Muskie</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Yellow Perch</td>
<td>Yellow Perch</td>
<td></td>
<td></td>
<td>Arctic Char</td>
<td>(Northern Pike X Muskie)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 2. Identification of fish using myotomes (myomeres) 25 or less.

<table>
<thead>
<tr>
<th>Species</th>
<th>Fillet</th>
<th>Color</th>
<th>Size*</th>
<th>Bones**</th>
<th>Scales</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperate Bass</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>White Perch</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>White Bass</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yellow Bass</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wiper</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Striped Bass</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Freshwater Drum</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Fish usually weigh under five pounds = A  
Fish can be under or over five pounds = A, B  
**Bones found in a fillet with ribs and vertebrae removed

Myotomes widely spaced.  
Scales from white bass can be separated from wiper and striped bass, see page 131. Striped bass and wiper can be longer in length versus height, than the other Temperate Bass.

Myotomes widely spaced, myotomes differ from Temperate Bass near tail of fish
### Table 2. Identification of fish using myotomes (myomeres) 26 to 33.

<table>
<thead>
<tr>
<th>Species</th>
<th>Fillet</th>
<th>Color</th>
<th>Size*</th>
<th>Bones**</th>
<th>Scales</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sunfish</td>
<td></td>
<td>Red midline</td>
<td>A</td>
<td>No</td>
<td></td>
<td>Fish can be scaled, head and intestines removed, fillet height compared to length is important.</td>
</tr>
<tr>
<td>Bluegill</td>
<td></td>
<td>Whitish yellow</td>
<td>A</td>
<td>No</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fish with Sunfish in name</td>
<td></td>
<td>Whitish</td>
<td>A</td>
<td>No</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Black Crappie</td>
<td></td>
<td>Whitish</td>
<td>A</td>
<td>No</td>
<td></td>
<td>Scales can be differentiated between white and black crappie. White flesh frequently has dark lines on outside of fillet (blood vessels). Fillet height to width is important.</td>
</tr>
<tr>
<td>White Crappie</td>
<td></td>
<td>Whitish gray</td>
<td>A</td>
<td>No</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bass</td>
<td></td>
<td>Red midline</td>
<td>A,B</td>
<td>No</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Largemouth Bass</td>
<td></td>
<td>Whitish gray</td>
<td>A</td>
<td>No</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Smallmouth Bass</td>
<td></td>
<td>Red outside</td>
<td>A</td>
<td>Yes</td>
<td></td>
<td>Top line above midline usually well defined. Fillet has similar myotomes to crappie and bluegill, but length is longer than height for same size fish.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Yellowish pink</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Goldfish</td>
<td></td>
<td>Red outside</td>
<td>A</td>
<td>Yes</td>
<td></td>
<td>Only fish with this number of myotomes with bones in fillet and this color.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Yellowish pink</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 2. Identification of fish using myotomes (myomeres) 33 to 40.

<table>
<thead>
<tr>
<th>Species</th>
<th>Fillet</th>
<th>Color</th>
<th>Size*</th>
<th>Bones**</th>
<th>Scales</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Common Carp</td>
<td></td>
<td>Red outside</td>
<td>A,B</td>
<td>Yes</td>
<td></td>
<td>Color of flesh differs from suckers, buffalo and carpsuckers</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Yellowish pink</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Buffalo</td>
<td></td>
<td>Red outside</td>
<td>A,B</td>
<td>Yes</td>
<td></td>
<td>Scales large and roundish for these species.</td>
</tr>
<tr>
<td>Black Buffalo</td>
<td></td>
<td>Yellowish white</td>
<td>A,B</td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Largemouth Buffalo</td>
<td></td>
<td>Yellowish white</td>
<td>A,B</td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Smallmouth Buffalo</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Carpsucker</td>
<td></td>
<td>Yellowish white</td>
<td>A,B</td>
<td>Yes</td>
<td></td>
<td>Usually weigh less than five lbs.</td>
</tr>
<tr>
<td>Hightfin Carpsucker</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Quillback</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>River Carpsucker</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Spotted Sucker</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Black Bullhead</td>
<td></td>
<td>Yellowish</td>
<td>A</td>
<td>No</td>
<td></td>
<td>Fish skinned, may be whole, fish fins may be attached, not always filleted. Dorsal fin removal may be obvious.</td>
</tr>
<tr>
<td>Brown Bullhead</td>
<td></td>
<td>Whitish</td>
<td>A</td>
<td>No</td>
<td></td>
<td>Ribs, scales and myotomes differentiate yellow perch from walleye and sauger (ribs are twice as heavy for same length walleye).</td>
</tr>
<tr>
<td>Yellow Perch</td>
<td></td>
<td>Red midline</td>
<td>A</td>
<td>No</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Species</td>
<td>Fillet</td>
<td>Color</td>
<td>Size*</td>
<td>Bones**</td>
<td>Scales</td>
<td>Remarks</td>
</tr>
<tr>
<td>-------------------------------</td>
<td>-------------------------</td>
<td>--------------------</td>
<td>-------</td>
<td>---------</td>
<td>--------</td>
<td>-------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Brown Bullhead</td>
<td>Fish skinned, may be kept without filleting</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yellow Bullhead</td>
<td></td>
<td>Yellowish</td>
<td>A</td>
<td>No</td>
<td>None</td>
<td></td>
</tr>
<tr>
<td>Yellow Catfish</td>
<td></td>
<td>Yellowish pink</td>
<td>A</td>
<td>No</td>
<td>None</td>
<td>Fish skinned, very large stomach muscle, can be large fish</td>
</tr>
<tr>
<td>Grass Carp</td>
<td></td>
<td>Red outside</td>
<td>A,B</td>
<td>Yes</td>
<td></td>
<td>Fish long and lean, looks like a torpedo.</td>
</tr>
<tr>
<td>Redhorse</td>
<td>Scales large and roundish. Usually weighs under five lbs.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Black Redhorse</td>
<td></td>
<td>Yellowish pink</td>
<td>A,B</td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Copper Redhorse</td>
<td></td>
<td>Whitish</td>
<td>A,B</td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gray Redhorse</td>
<td></td>
<td>Whitish</td>
<td>A,B</td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Greater Redhorse</td>
<td></td>
<td>Whitish</td>
<td>A,B</td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>River Redhorse</td>
<td></td>
<td>Whitish</td>
<td>A,B</td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shortnose Redhorse</td>
<td></td>
<td>Whitish</td>
<td>A,B</td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Silver Redhorse</td>
<td></td>
<td>Whitish</td>
<td>A,B</td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>etc. Redhorse</td>
<td></td>
<td>Whitish</td>
<td>A,B</td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sauger</td>
<td>Fish may be filleted around ribs leaving more stomach muscle.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Saugeye</td>
<td></td>
<td>Whitish</td>
<td>A,B</td>
<td>No</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Walleye</td>
<td></td>
<td>Whitish</td>
<td>A,B</td>
<td>No</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 2. Identification of fish using myotomes (myomeres) 45 to 50.

<table>
<thead>
<tr>
<th>Species</th>
<th>Fillet</th>
<th>Color</th>
<th>Size*</th>
<th>Bones**</th>
<th>Scales</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alewife</td>
<td></td>
<td>Red outside</td>
<td>A</td>
<td>Yes</td>
<td></td>
<td>Thin fish, not much thickness if filleted, many bones, usually forage fish.</td>
</tr>
<tr>
<td>Gizzard Shad</td>
<td></td>
<td>Whitish</td>
<td>A</td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Blue Sucker</td>
<td></td>
<td>Red outside,</td>
<td>A,B</td>
<td>Yes</td>
<td></td>
<td>Usually less than five lbs., big scales, when more abundant, blue sucker was considered an excellent eating fish.</td>
</tr>
<tr>
<td>Largescale Sucker</td>
<td></td>
<td>Whitish</td>
<td>A,B</td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Longnose Sucker</td>
<td></td>
<td>Whitish</td>
<td>A,B</td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>White Sucker</td>
<td></td>
<td>Whitish</td>
<td>A,B</td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other Suckers</td>
<td></td>
<td>Whitish</td>
<td>A,B</td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Catfish</td>
<td></td>
<td>Yellowish</td>
<td>A,B</td>
<td>No</td>
<td>None</td>
<td>Frequently skinned, on larger fish fat in front of dorsal fin and by adipose fin. Myotomes in front of dorsal not easy to see. Small fish may be kept as whole fish, fins not removed in many fillets, sold in stores.</td>
</tr>
<tr>
<td>Channel Catfish</td>
<td></td>
<td>Yellowish</td>
<td>A,B</td>
<td>No</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Blue Catfish</td>
<td></td>
<td>Yellowish</td>
<td>A</td>
<td>Yes</td>
<td></td>
<td>Small fish has Y- bones like northern pike.</td>
</tr>
<tr>
<td>Grass Pickerel</td>
<td></td>
<td>Yellowish</td>
<td>A</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 2. Identification of fish using myotomes (myomeres) 50 to 55.

<table>
<thead>
<tr>
<th>Species</th>
<th>Fillet</th>
<th>Color</th>
<th>Size*</th>
<th>Bones**</th>
<th>Scales</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chain Pickerel</td>
<td></td>
<td>Red midline</td>
<td>A,B</td>
<td>Yes</td>
<td></td>
<td>Small, thin fish, may be smoked, many bones in these fish. Scales may be present if smoked.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Yellowish</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Goldeye</td>
<td></td>
<td>Red outside</td>
<td>A</td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mooneyeye</td>
<td></td>
<td>Whitish yellow</td>
<td>A</td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Paddlefish</td>
<td></td>
<td>Yellowish white</td>
<td>A</td>
<td>No</td>
<td></td>
<td>This fish is uncommon, collected by poaching for eggs (caviar), fish destroyed after eggs taken, red midline usually removed to improve flavor.</td>
</tr>
<tr>
<td>Shovelnose Sturgeon</td>
<td></td>
<td>Yellowish white</td>
<td>A</td>
<td>No</td>
<td></td>
<td>May be difficult to skin and some of the top muscles on back may be removed because of dorsal scales.</td>
</tr>
<tr>
<td>Brown Trout</td>
<td></td>
<td>Pinkish orange</td>
<td>A,B</td>
<td>Yes</td>
<td></td>
<td>On smaller fish, scales may not be removed.</td>
</tr>
<tr>
<td>Whitefish</td>
<td></td>
<td>Red midline</td>
<td>A,B</td>
<td>Yes</td>
<td></td>
<td>Can be similar to trout except for scales and color.</td>
</tr>
<tr>
<td>Lake Whitefish</td>
<td></td>
<td>Yellowish white</td>
<td>A</td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mountain Whitefish</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Species</td>
<td>Fillet</td>
<td>Color</td>
<td>Size*</td>
<td>Bones**</td>
<td>Scales</td>
<td>Remarks</td>
</tr>
<tr>
<td>------------------------------</td>
<td>------------------</td>
<td>------------------</td>
<td>-------</td>
<td>---------</td>
<td>--------</td>
<td>-------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Gar</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Difficult to remove scales, once filleted may see lines on flesh where scales were attached, on larger fish, may just keep meat above stomach cavity.</td>
</tr>
<tr>
<td>Alligator Gar</td>
<td></td>
<td>Whitish</td>
<td>A,B</td>
<td>No</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Longnose Gar</td>
<td></td>
<td></td>
<td>A,B</td>
<td>No</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Spotted Gar</td>
<td></td>
<td></td>
<td>A,</td>
<td>No</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shortnose Gar</td>
<td></td>
<td></td>
<td>A</td>
<td>No</td>
<td></td>
<td></td>
</tr>
<tr>
<td>American Shad</td>
<td></td>
<td>Red outside</td>
<td>A,B</td>
<td>Yes</td>
<td></td>
<td>Thin fish, not much thickness of fillet, many bones, usually a forage fish</td>
</tr>
<tr>
<td>Whitish</td>
<td></td>
<td>Whitish</td>
<td>A</td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Salmon</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Arctic Char</td>
<td></td>
<td></td>
<td>A,B</td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Arctic Grayling</td>
<td></td>
<td></td>
<td>A,B</td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Atlantic Salmon</td>
<td></td>
<td></td>
<td>A,B</td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chinook Salmon</td>
<td></td>
<td></td>
<td>A,B</td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chum Salmon</td>
<td></td>
<td></td>
<td>A,B</td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Coho Salmon</td>
<td></td>
<td></td>
<td>A,B</td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pink Salmon</td>
<td></td>
<td></td>
<td>A,B</td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sockeye Salmon</td>
<td></td>
<td></td>
<td>A,B</td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inconnu</td>
<td></td>
<td></td>
<td>A,B</td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Brook Trout</td>
<td></td>
<td></td>
<td>A,B</td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Round Whitefish</td>
<td></td>
<td>Red midline</td>
<td>A</td>
<td>Yes</td>
<td></td>
<td>Troutlike (except for color). Scales, if present, can aid in identification.</td>
</tr>
<tr>
<td>Whitish</td>
<td></td>
<td>Whitish yellow</td>
<td>A</td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rainbow Smelt</td>
<td></td>
<td>Whitish yellow</td>
<td>A</td>
<td>Yes</td>
<td></td>
<td>Small fish, kept whole with head and entrails removed, scales left attached.</td>
</tr>
</tbody>
</table>
Table 2. Identification of fish using myotomes (myomeres) 60-80.

<table>
<thead>
<tr>
<th>Species</th>
<th>Fillet</th>
<th>Color</th>
<th>Size*</th>
<th>Bones**</th>
<th>Scales</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arctic Char</td>
<td></td>
<td>Pinkish orange</td>
<td>A,B</td>
<td>Yes</td>
<td></td>
<td>Smaller fish may be gutted and gills removed, scales may be left on fish making identification easier.</td>
</tr>
<tr>
<td>Lake Trout</td>
<td></td>
<td></td>
<td>A,B</td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rainbow Trout</td>
<td></td>
<td></td>
<td>A,B</td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bowfin</td>
<td></td>
<td>Yellowish</td>
<td>A,B</td>
<td>Yes</td>
<td></td>
<td>My fillets were very mushy (texture of baby food).</td>
</tr>
<tr>
<td>Lake Sturgeon</td>
<td></td>
<td>Yellowish</td>
<td>A,B</td>
<td>Yes</td>
<td></td>
<td>Difficult to fillet, flesh on top of fillet may be removed, large fish steaked, has notochord</td>
</tr>
<tr>
<td>Longnose Gar</td>
<td></td>
<td>Whitish</td>
<td>A,B</td>
<td>No</td>
<td></td>
<td>Difficult to remove scales, may see marks on fillet showing scale patterns.</td>
</tr>
<tr>
<td>Rainbow Smelt</td>
<td></td>
<td>Yellowish white</td>
<td>A</td>
<td>Yes</td>
<td></td>
<td>Head or entrails frequently removed, scales and vertebrae left intact.</td>
</tr>
<tr>
<td>Northern Pike</td>
<td></td>
<td>Yellowish</td>
<td>A,B</td>
<td>Yes</td>
<td></td>
<td>Y-bones in fillet can be removed, structure of fillet can change if Y-bones are removed.</td>
</tr>
<tr>
<td>Tiger Muskie</td>
<td></td>
<td></td>
<td>A,B</td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Muskellunge</td>
<td></td>
<td></td>
<td>A,B</td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Points To Remember About Fillets

1. Myotomes vary with fish species
2. Catfish and fish with ctenoid scales have no bones in fillet with vertebrae and ribs removed
3. The number of ribs is dependent on species (not always counted at first but can be important if left on fillet)
4. Bones (free floating bones) other than rib and vertebrae are very important for eliminating species and keying in on potential suspects
5. A large size fillet can eliminate some species
6. Width over length of fillet can eliminate some species
7. Length of stomach section removed can be important for identification
8. Lines more W shaped behind anus
9. Some fish small at head end, others larger
10. Number of myotomes behind anus can sometimes be guessed from fillet drawings or from larval fish guides
11. Heavy rib bones hard to cut through, usually filleted out
12. Big fish cut in pieces (can fit pieces together)
13. Y-bones can be filleted out of Esox
14. Different front end (myotomes) on northern pike family and gars (see cross-section near head on northern pike)
15. Wide band of red near skin on carp, buffalo, goldeye, suckers and redhorse
16. Bigger fish of same species have more red muscle on outside of fillet than a smaller fish
17. Sharpness of W varies with fishes
18. Fish are filleted differently by various people
19. In scaled fish (skin present), one can possibly pick up number of vertical and horizontal scales
20. Pieces cut off of head can give you odd pieces of head flesh (catfish and cheek meat on a walleye [one on each cheek])
21. Color of stomach section, if left intact, can be important — can be white, gray or black
22. To remove bones, fish sections normally kept may be eliminated and small boneless pieces kept
23. Any scales left on fish especially helpful if attached to skin
24. Myotomes not easy to see on catfish family (dorsal fin toward head)
25. Red muscle may be removed from exterior of fillet and high areas of fat removed
26. Small fish — scales or skin removed may be kept with vertebrae and ribs included
27. Fish may be filleted differently, especially if bone removal is required, ie. Y-bones in northern pike, bones along ribs in walleye and one/fourth inch cross sections across fillet in fish with free floating bones in the fillet
28. Some fish have flesh more difficult to obtain (Ganoid scales on gar can be difficult to remove and skin on whole sturgeon)
29. Heaviness of ribs, if left, can be important (can tell walleye from perch)
30. Stomach on flathead catfish can be separated from fillet (heavy piece of boneless meat)
31. Fin placement important — pectoral fin placement is important to differentiate species
32. Dorsal fin placement also important as is adipose fin
33. Don't try to match fish from fillet sizes, depending on how fish are filleted — one side can differ in length from opposite side
34. Bottom of W sometimes not seen on bottom of fish because of stomach removal
35. At tail end of some fish, lines, but W may not be obvious
36. Fish can be skinned, scaled, filleted with a knife or dipped in hot water so skin is easier to remove or methods not covered here
37. Scales sometimes present on fish fillets
38. On pieces with the vertebrae present — the fish can be fluoroscoped to view ribs and vertebrae. At University of Nebraska Dental School, we used DF 75 film, a distance of 2 feet and exposure of 1/15 or 1/30 second
39. Fins in scaled fish can help point to species involved
40. Round scales only from cycloid fish

41. Scales only from ctenoid fish

42. Scales only from pike family (*Esox*)

43. Fish with unremoved red myotomes along entire surface next to skin can be pike, walleye, perch, sunfish, crappie, black bass, smallmouth bass, temperate bass

44. Small fish — like trout or smoked fish may have skin left with flesh

45. Some fish are saved for smoking, if not normally saved otherwise. Many of these fish have free floating bones in their musculature. Some of these fish are good eating

46. Fish can also be scored or canned with spices to remove bones

47. Lateral line may be present on fillets

48. Some dark lines along myotomes typical in crappie

49. Parasites (white grub, black grub) may be present in flesh, may be present in only certain species of fish

50. Sandy flesh in walleye

51. To mark fish, a chemical can be used to be fluorescent in the bone — may make some identifications exact

52. Heads cut off fish with fins attached much easier to identify

53. Some whole fish are placed in a grinder to make Vietnamese sauce. I can't identify species but scales will be present

54. Best identification is with a whole fillet, not pieces

55. The first fillet I was supposed to identify as a walleye (15 years ago) was not a walleye but after examining the fish for this study, I know it was not even a freshwater fish

A rough key covering 23 commonly caught fish species is presented in Table 3.
Table 3. Rough key for fish fillet identification.

<table>
<thead>
<tr>
<th>Common Names</th>
<th>Typical Myotomes</th>
<th>Fillet Shape</th>
<th>Flesh Color</th>
<th>Bones in Fillet</th>
<th>Scale Type</th>
<th>Typical Scale Shape</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bowfin</td>
<td>~ 60</td>
<td></td>
<td>Yellowish</td>
<td>Yes</td>
<td>Cycloid</td>
<td></td>
</tr>
<tr>
<td>Bullhead</td>
<td>~ 40</td>
<td></td>
<td>Yellowish, yellowish pink</td>
<td>No</td>
<td>None</td>
<td></td>
</tr>
<tr>
<td>Burbot</td>
<td>~ 55</td>
<td></td>
<td>Whitish</td>
<td>No</td>
<td>Cycloid</td>
<td></td>
</tr>
<tr>
<td>Common Carp</td>
<td>~ 35</td>
<td></td>
<td>Red outside, yellowish pink</td>
<td>Yes</td>
<td>Cycloid</td>
<td></td>
</tr>
<tr>
<td>Catfish</td>
<td>~ 50</td>
<td></td>
<td>Yellowish</td>
<td>No</td>
<td>None</td>
<td></td>
</tr>
<tr>
<td>Crappie</td>
<td>~ 30</td>
<td></td>
<td>Whitish</td>
<td>No</td>
<td>Ctenoid, Cycloid</td>
<td></td>
</tr>
</tbody>
</table>
Table 3. Rough key for fish fillet identification.

<table>
<thead>
<tr>
<th>Common Names</th>
<th>Typical Myotomes</th>
<th>Fillet Shape</th>
<th>Flesh Color</th>
<th>Bones in Fillet</th>
<th>Scale Type</th>
<th>Typical Scale Shape</th>
</tr>
</thead>
<tbody>
<tr>
<td>Freshwater Drum</td>
<td>~ 25</td>
<td>![Image]</td>
<td>Red midline, whitish</td>
<td>No</td>
<td>Ctenoid</td>
<td>![Image]</td>
</tr>
<tr>
<td>Gar</td>
<td>~ 60</td>
<td>![Image]</td>
<td>Whitish-yellow</td>
<td>No</td>
<td>Ganoid</td>
<td>![Image]</td>
</tr>
<tr>
<td>Goldeye</td>
<td>~ 55</td>
<td>![Image]</td>
<td>Red outside, whitish-yellow</td>
<td>Yes</td>
<td>Cycloid</td>
<td>![Image]</td>
</tr>
<tr>
<td>Largemouth Bass</td>
<td>~ 30</td>
<td>![Image]</td>
<td>Red midline, whitish-gray</td>
<td>No</td>
<td>Ctenoid, Cycloid</td>
<td>![Image]</td>
</tr>
<tr>
<td>Northern Pike</td>
<td>~ 60</td>
<td>![Image]</td>
<td>Red midline, yellowish</td>
<td>Yes</td>
<td>Cycloid</td>
<td>![Image]</td>
</tr>
<tr>
<td>Redhorse</td>
<td>~ 40</td>
<td>![Image]</td>
<td>Red outside, whitish</td>
<td>Yes</td>
<td>Cycloid</td>
<td>![Image]</td>
</tr>
</tbody>
</table>
Table 3. Rough key for fish fillet identification.

<table>
<thead>
<tr>
<th>Common Names</th>
<th>Typical Myotomes</th>
<th>Fillet Shape</th>
<th>Flesh Color</th>
<th>Bones in Fillet</th>
<th>Scale Type</th>
<th>Typical Scale Shape</th>
</tr>
</thead>
<tbody>
<tr>
<td>Salmon</td>
<td>~60</td>
<td></td>
<td>Pinkish-orange</td>
<td>Yes</td>
<td>Cycloid</td>
<td></td>
</tr>
<tr>
<td>Sauger</td>
<td>&gt; 40</td>
<td></td>
<td>Light red outside, whitish-yellow</td>
<td>No</td>
<td>Ctenoid</td>
<td></td>
</tr>
<tr>
<td>Smallmouth Bass</td>
<td>~ 30</td>
<td></td>
<td>Red midline, whitish-gray</td>
<td>No</td>
<td>Ctenoid, Cycloid</td>
<td></td>
</tr>
<tr>
<td>Sturgeon</td>
<td>~ 55</td>
<td></td>
<td>Yellowish-white</td>
<td>No</td>
<td>Ganoid</td>
<td></td>
</tr>
<tr>
<td>Sucker</td>
<td>~ 45</td>
<td></td>
<td>Red outside, whitish</td>
<td>Yes</td>
<td>Cycloid</td>
<td></td>
</tr>
<tr>
<td>Sunfish</td>
<td>~ 30</td>
<td></td>
<td>Red midline, whitish-yellow</td>
<td>No</td>
<td>Ctenoid, Cycloid</td>
<td></td>
</tr>
</tbody>
</table>
Table 3. Rough key for fish fillet identification.

<table>
<thead>
<tr>
<th>Common Names</th>
<th>Typical Myotomes</th>
<th>Fillet Shape</th>
<th>Flesh Color</th>
<th>Bones in Fillet</th>
<th>Scale Type</th>
<th>Typical Scale Shape</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trout</td>
<td>~ 60</td>
<td><img src="image" alt="Image" /></td>
<td>Pinkish-orange</td>
<td>Yes</td>
<td>Cycloid</td>
<td><img src="image" alt="Image" /></td>
</tr>
<tr>
<td>Walleye</td>
<td>&gt; 40</td>
<td><img src="image" alt="Image" /></td>
<td>Light red outside, whitish-yellow</td>
<td>No</td>
<td>Ctenoid</td>
<td><img src="image" alt="Image" /></td>
</tr>
<tr>
<td>White Bass</td>
<td>~ 25</td>
<td><img src="image" alt="Image" /></td>
<td>Red midline, pinkish-white</td>
<td>No</td>
<td>Ctenoid</td>
<td><img src="image" alt="Image" /></td>
</tr>
<tr>
<td>Whitefish</td>
<td>~ 55-60</td>
<td><img src="image" alt="Image" /></td>
<td>Red midline, yellowish-white</td>
<td>Yes</td>
<td>Cycloid</td>
<td><img src="image" alt="Image" /></td>
</tr>
<tr>
<td>Yellow Perch</td>
<td>&lt; 40</td>
<td><img src="image" alt="Image" /></td>
<td>Red midline, whitish</td>
<td>No</td>
<td>Ctenoid</td>
<td><img src="image" alt="Image" /></td>
</tr>
</tbody>
</table>
Scales are often found sticking to fillets and these can be very helpful in identifying the species from which the fillet was taken. Consideration must be given to contamination from other fish, however. Fish are commonly filleted at fish-cleaning stations where scales from many different species are present.

Scales are not uniform in size, shape or structure over the surface of a fish. Since filleting results in cuts through skin in consistent locations, certain scales are routinely dislodged. Scales displayed in this manual are from the following locations on the body of a fish (Figure 4).

Two types of fish scales are found in our manual, ganoid and bony-ridge. Bony-ridge scales are divided into cycloid and ctenoid scales.

Figure 4. Locations where scales were removed.

Ganoid scales are frequently thick and diamond shaped (rhomboid). They provide the armor-like protection that is found on gar. They also occur on selected areas of sturgeon and paddlefish (not diamond shaped). Ganoid scales are sometimes referred to as scutes.

Bony-ridge scales are thin and transparent or translucent. They have ridges on their exposed surface that may resemble a human fingerprint. Ctenoid scales characteristically have rough projections resembling teeth (exposed area of scale — posterior edge). By contrast, cycloid scales are smooth. Many fish that have ctenoid scales also have a few cycloid scales (Sunfish Family, Centrarchidae). However, we are not familiar with fish dominated by cycloid scales that also have ctenoid scales.

Fish scale research by Seyler (1931), Takos (1942), Lagler (1947, Figure 5.), Galkin (1958), McCully (1961), Bilton (1964) and Casteel (1972, 1973) was helpful with this project. More detailed works by DeLamater and Courtenay (1973, 1974) using electron microscopy and Emery and Strange (1984) examining scale microstructure were most useful. Unfortunately, many of these useful materials were not published in American journals (e.g. Seyler, Takos, McCully, Galkin [Russian], Emery and Strange).
Characteristic Features Of A Fish Scale

_Circuli_ — raised markings on the surface of the scale, usually appearing as lines which more or less follow the outline of the scale.

_Focus_ — first part of scale to appear in growth, it is often centered in the scale, can be more anterior or posterior.

_Annuli_ — markings on the surface of the scale which coincide with years of growth for many fishes; characterized by various features of the ridges and often by a difference in deeper structure of the scale

_Radii_ — grooves or lines, usually more or less radiating from the focus to the edge of the scale

_Primaries radii_ — radii that extend from the focus to the edge of the scale

_Secondary radii_ — radii that do not originate at the focus

_Ctenii_ — tooth-like structures on posterior portion of scale

_Fields_ — quadrants on the surface of the scale, either real as shown by the angulation of the circuli at the four principal corners (forming diagonal lines) or imaginary if the corners or configuration of the circuli are missing (such as a circular type of scale)

_Anterior field_ — unexposed part of the scale which is toward the head of the fish, bounded by imaginary lines from the front corners (or their equivalent on rounded scales) to focus

_Posterior field_ — exposed part of the scale which is toward the tail of the fish, bounded by imaginary lines from the back corners to focus

_Lateral field_ — top and bottom fields remaining after marking off anterior and posterior fields

_Exposed portion_ — that part of the outer surface of overlapped scales visible when scales are in place on a fish; may be smaller or larger than posterior field; in ctenoid scales, ctenii occur on this portion

_Imbedded portion_ — all of scale other than exposed part, usually including most of the lateral fields and all of the anterior field, section used for aging fish

_Replacement scale_ — a scale which has formed in the place of one lost; it lacks the pattern of radii and circuli in an area about the size of the original scale when lost

Scales taken from different parts of the same fish can vary greatly in size, shape and structure. Fish with ctenoid scales will often have cycloid scales on certain parts of the body such as the breast or belly. The scales examined for the keys in this manual were those more apt to be found in fillet cuts. The scales were taken from the top and bottom of the fish near the head and the top and bottom of the fish near the tail. The most typical scale used for aging is taken on the side of the fish between the dorsal fin and above midline (cycloid fish). Just posterior to pectoral fin and below midline (ctenoid fish).
Figure 5. Character features of fish scales, Lagler, 1947.
Points To Remember About Scales

As fish vary in size so does the size of scales (the number of scales in the lateral line gives you an idea of scale size). Here are a few helpful hints to help you identify or eliminate families.


1. Fish with ctenoid scales, flatter surface on anterior end and radii toward anterior edge are game fish.

2. Fish with this shape are in the Pike Family — pages 81-85.

3. The Salmon Family have smaller scales, 100 to 200 in lateral line. Scales are irregularly shaped ovals or rings (trout, salmon) no radii.

4. Large roundish scales with both anterior and posterior radii (30-45 scales in lateral line). Common carp or Sucker Family — pages 86-101.

5. Gar Family have squarish, rectangular ganoid scales, no radii — pages 45-49.

Several points need to be considered when examining scales; some of the features to be noted are presented in Table 4.
Table 4. Summary of scale characteristics of North American fishes.

<table>
<thead>
<tr>
<th>Family</th>
<th>Scaleless or Apparent</th>
<th>Bony Scutes</th>
<th>Extremity of Caudal Peduncle Only</th>
<th>Ctenoid Scales</th>
<th>Radii</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Overlapping</td>
<td>Non-Overlapping</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sturgeon Family — Acipenseridae</td>
<td>. . . . X</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Paddlefish Family — Polyodontidae</td>
<td>. X*</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gar Family — Lepisosteidae</td>
<td>. X</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bowfin Family — Amiidae</td>
<td>. X</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mooneye Family — Hiodontidae</td>
<td>X</td>
<td></td>
<td></td>
<td>X . X . X</td>
<td></td>
</tr>
<tr>
<td>Herring Family — Clupeidae</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td>X . X</td>
</tr>
<tr>
<td>Salmon Family — Salmonidae</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Whitefish Family — Coregonidae</td>
<td>X</td>
<td></td>
<td></td>
<td>X . X . X</td>
<td></td>
</tr>
<tr>
<td>Grayling family — Thymallidae</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Smelt Family — Osmeridae</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pike Family — Esocidae</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sucker Family — Catostomidae</td>
<td>X</td>
<td></td>
<td></td>
<td>X . X . X . X</td>
<td></td>
</tr>
<tr>
<td>Minnow Family — Cyprinidae</td>
<td>X</td>
<td></td>
<td></td>
<td>X . X . X . X</td>
<td></td>
</tr>
<tr>
<td>Catfish Family — Ictaluridae</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cod Family — Gadidae</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Perch Family — Percidae</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sunfish Family — Centrarchidae</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Drum Family — Sciaenidae</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Some non-apparent scales are on the top front surface of caudal peduncle
X = For all species
x = For some species
TERMS USED IN FISH TABLES

Fish record weight — Fish record weight refers to the largest fish of that species on record (National Fresh Water Fishing Hall of Fame, 1992).

Typical lengths — Approximate lengths of fish typically caught, not the largest fish.

No. of ribs — Though this value was not always counted initially, it was found to be important if ribs were left in the fillet. The approximate number of ribs is presented. Fillets may have fewer ribs than mentioned because of individual filleting procedures. This may also help in identifying fillets; i.e., a fillet with 30 ribs can't belong to a fish that may only have 20.

Lateral line scales — The single row of scales that make up the lateral line.

Scale type — Scales typically found on this fish will be (a) ganoid, (b) cycloid or (c) ctenoid (most ctenoid fish examined have some cycloid scales).

Vertebrae — The literal number of vertebrae found in this fish.

Color of fillet — The flesh of fish can be different colors. This color may be due to diet or type of fish. Some have a reddish color because of red muscle next to the skin, and the rest of the flesh can be colored differently. The fillet may be red on the outside, reddish down midline or have no obvious red present. Age of fish or injuries may affect flesh colors.

Larval myotomes — The values presented represent the number of pre-anus and post-anus myotomes (myomeres) found in larval fish for identification purposes. The line for dividing pre-anus from post-anus is a vertical line drawn upward from the anus to where it meets a myotome at the midline. This result may help separate some unknown fish from others. Primary sources of information were Auer, 1982, Hogue, 1976 and Lundberg, 1982.

**The values don't have to represent the values on a whole adult fish. As a general rule, the numbers given represent the same or smaller number found on an adult fish.

Fish myotomes — These numbers are usually taken from literature. Numbers can vary because of genetics and/or water temperatures upon hatching and larval stage. Some of the numbers presented come from sources for identifying larval fish. The total number of myotomes was not always given but the myotomes pre-anus and post-anus were presented. Numbers taken were the minimal pre-anus and post-anus for minimal numbers and maximal was the maximal pre-anus and post-anus. The actual value is between these minimal and maximal numbers.
Fillet myotomes — Refers to the number of myotomes observed in fillet examination.

Bones in fillet. — This represents a fillet with the ribs and vertebrae removed.

Cross-sections of a fillet — Fish can be cross-sectioned across the vertebrae at head, anus and between anus and tail. A few fish were examined by this technique. Making cross-sections in the exact locations can vary. If this is done at home, use a meat slicer and a frozen fish (Appendix 1).

Fish scales — Fish scales are sometimes presented to give an idea of what fish scales from selected species represent. Twenty common fish were selected to point out what scales from filleting may resemble. Five scale samples are presented for each species. These fish are maintained at the Royal Ontario Museum, if reference is needed. A computer record is also kept for these scales.
Sturgeon Family — *Acipenseridae*

The sturgeon family has a shovel-shaped snout, an extendible mouth, large fleshy barbels located on the bottom of the head and an upturned tail. Distinguishing features are five rows of bony plates (scales or scutes) on the body (one on top, two on the midline and two on the sides of the belly). Sturgeon have a skeleton which is more cartilage than bone and a spinal notochord or supporting rod in the back of adult fish. The fish tend to be bottom feeders.

The flesh is excellent eating and their eggs are used for caviar. Unfortunately, populations have been depleted by overharvesting and the effects of pollution and habitat degradation. In specific areas in the United States, both the pallid and lake sturgeon are on the endangered species list.


A 60 cm (24") shovelnose sturgeon was x-rayed. At least seven cartilaginous ribs were observed. This x-ray is not presented.
**Description:** Large fish (steaked) • Has notochord (may be cartilage), no vertebrae • Skin removal difficult • No scales • Bony plates less obvious on large fish • Bony plates have several rows • Lateral line straight and not visible on fillet because of midline • Bony plates unique, unlike those of other fish • Five primary rows of bony plates (1) dorsal - top of back, (2) along each midline, (3) one on each outside edge of stomach • Bony plates similar to those found on shovelnose sturgeon • Bony plates posterior to anus may help identify fish • Bony plates similar to those found on shovelnose sturgeon.

**Common Names:** Freshwater, Great Lakes, rock, red, stone, ruddy, common, shell back, bony smoothback, black, dogface, or rubber-nose sturgeon

**Lake Sturgeon**

*Acipenser fulvescens*
Shovelnose Sturgeon
*Scaphirhynchus platorynchus*

**Common Names:** Hackleback, switchtail, sand, duck-billed or flathead sturgeon

**Description:** Small fish • Has notochord (may be cartilage), no vertebrae • Skin removal difficult • Removal of flesh under dorsal bony plates difficult • Lateral line straight and not visible on fillet because of midline • Complete bony plates behind anus • Five primary rows of bony plates (1) dorsal - top of back, (2) along each midline (3) one on each outside edge of stomach • Bony plates.

**External Characteristics**
- **Record Weight**: 4 lbs. 8 oz.
- **Typical Lengths (in.)**: 16-24
- **No. of Ribs**: 7+
- **Lateral Line Scales**: 41-46
- **Scale Type**: ganoid

**Fillet Characteristics**
- **Vertebrae, notochord**
- **Color**: yellowish
- **Larval Myotomes**: not found
- **Fish Myotomes**: 50-53
- **Fillet Myotomes**: 50-52
- **Bones in Fillet**: No

*Shovelnose Sturgeon*

*Magnification 0.5-1.5X for 50 cm (20") fish*
Paddlefish Family — *Polyodontidae*

This large fish is found in the Mississippi River system. It is distinguished by an elongated snout (rostrum) which may cover one-third of its body length, large pointed gill covers, shark-like body, the absence of any scales except a few ganoid scales just preceding the top base of tail. The skeleton is cartilaginous. The fish swims through the water with its mouth open to filter out food such as plankton and crustacea. They cannot be caught on a hook and line with bait but can be snagged. Their meat is excellent, and their roe can be collected for caviar. They can be illegally obtained by gill nets — roe is collected for caviar and dead fish returned to the river. Sex is not obvious so both sexes are destroyed by egg collection activities. Refrigeration is necessary for storage of eggs. On the Missouri River, this illegal activity is a major problem.

The paddlefish family contains only one American species (*Polyodon spathula*).

A 30 cm (12") paddlefish was x-rayed. No ribs were visible on this small fish. This x-ray is not presented.
**Paddlefish**
*Polyodon spathula*

**Common Names:** Spoonbill, boneless, duck-billed, shovel-billed cat or catfish, oarfish, spadefish, spatula fish or shovelfish

**Description:** Can be over 20 pounds • Not caught on hook and line except by snagging • Red midline usually removed from large fish • Can be cut into 1-inch chunks and deep-fat fried • Has notochord (may be cartilage), no vertebrae • Bony plate insert • Can be illegally seined and eggs kept for caviar, both males and females killed • Eggs need refrigeration • A few bony plates at top of tail.

**External Characteristics**
- **Record Weight:** 142 lbs. 8oz.
- **Typical Lengths (In.):** 24-36
- **No. of Ribs:**
- **Lateral Line Scales:** none
- **Scale Type:** ganoid

**Fillet Characteristics**
- **Vertebrae:** notochord
- **Color:** whitish with red midline
- **Larval Myotomes**
  - Pre: 31-35
  - Post: 20-22
- **Fish Myotomes:** 51-57
- **Fillet Myotomes:** 53-57
- **Bones in Fillet:** No
- **Species:** Paddlefish

**Magnification 1-2X for 60 cm (24") fish**
Gar Family — *Lepisosteidae*

The gar family is a primitive species characterized by long, sharply toothed jaws, a long, cylindrically shaped body covered with non-overlapping, rectangular ganoid scales, a dorsal fin just above anal fin and rounded tail. They have a spiral valve and a lung-like gas bladder and can make use of surface air. They often suspend near the surface and feed on other fish species. Most humans don’t eat gar. The meat is difficult to obtain because of the ganoid scales, but it can be very tasty.

Species in North America are **alligator gar**, *Lepisosteus spatula*; **longnose gar**, *Lepisosteus osseus*; **shortnose gar**, *Lepisosteus platostomus*; **spotted gar**, *Lepisosteus oculatus*; **Florida gar**, *Lepisosteus platyrhincus*. 

*Shortnose gar*
Longnose Gar  
*Lepisosteus osseus*

**Common Names:** Billfish, scissorbill, northern mailed fish, bonypike, gar-pike, common gar-pike, needle-nose, billy or pin-nose gar

**Description:** Scale removal may be difficult — scales cut on back (tin snips, wire cutters or axe); ganoid scales can be removed with a knife • Large fish may be cut into steaks • Meat above ribs considered excellent eating • Upon removal of skin, placement of scales may be visible • Many people destroy this fish without attempting to eat it — try one to check edibility • Lateral line straight and not visible on fillet because of midline.

**Scales:** Ganoid plates • Diamond-like shape • Posterior and anterior margins pointed • No focus • No radii • Scales difficult to cut • A side and dorsal scale are presented below.

**External Characteristics**

<table>
<thead>
<tr>
<th>Record Weight</th>
<th>50 lbs. 5 oz.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Typical Lengths (in.)</td>
<td>24-36</td>
</tr>
<tr>
<td>No. of Ribs</td>
<td>~ 35+</td>
</tr>
<tr>
<td>Lateral Line Scales</td>
<td>57-63</td>
</tr>
<tr>
<td>Scale Type</td>
<td>ganoid</td>
</tr>
</tbody>
</table>

**Fillet Characteristics**

<table>
<thead>
<tr>
<th>Vertebrae</th>
<th>61-66</th>
</tr>
</thead>
<tbody>
<tr>
<td>Color</td>
<td>whitish</td>
</tr>
<tr>
<td>Larval Myotomes</td>
<td>Pre 39-44</td>
</tr>
<tr>
<td>Fish Myotomes</td>
<td>58-59</td>
</tr>
<tr>
<td>Fillet Myotomes</td>
<td>52-57</td>
</tr>
<tr>
<td>Bones In Fillet</td>
<td>No</td>
</tr>
<tr>
<td>Species Longnose Gar</td>
<td></td>
</tr>
</tbody>
</table>
Description: Scale removal may be difficult — scales cut on back (tin snips, wire cutters or axe); ganoid scales can be removed with a knife. Meat above ribs considered excellent eating. Upon removal of skin — placement of scales may be visible. Many people destroy this fish without attempting to eat it — try one to check edibility. Lateral line straight and not visible on fillet because of midline. See longnose gar for example of gar scales.

Scales: Ganoid plates • Diamond-like shape • Posterior and anterior margins pointed • No focus • No radii • Very difficult to cut.

Common Names: Billy, shortbill, stubnose, billfish or duck-billed gar

Shortnose Gar
*Lepisosteus platostomus*
**Spotted Gar**  
*Lepisosteus oculatus*

**Common Names:** Shortnose and short-nosed gar, billfish

**Description:** Scale removal may be difficult — scales cut on back (tin snips, wire cutters or axe); ganoid scales can be removed with a knife • Meat above ribs considered excellent eating • Upon removal of skin — placement of scales may be visible • Many people destroy this fish without attempting to eat it — try one to check edibility • Lateral line straight and not visible on fillet because of midline • See longnose gar for example of gar scales.

**Scales:** Ganoid scales • Diamond-like shape • Posterior and anterior margins pointed • No focus • No radii • Very difficult to cut.
**Description:** Scale removal may be difficult — scales cut on back (tin snips, wire cutters or axe); ganoid scales can be removed with a knife • Large fish may be cut into steaks • Meat above ribs considered excellent eating • Upon removal of skin, placement of scales may be visible • Many people destroy this fish without attempting to eat it — try one to check edibility • Lateral line straight and not visible on fillet because of midline • See longnose gar for example of gar scales.

**Scales:** Ganoid scales • Diamond-like shape • Posterior and anterior margins pointed • No focus • No radii • Very difficult to cut.

**Common Names:** Gator, Mississippi alligator, great gar or marjuari

**Alligator Gar**

*Lepisosteus spatula*
Bowfin Family — *Amiidae*

This archaic, predatory fish is characterized by a rounded semi-cartilaginous skull, a bony plate under the throat, a cartilaginous skeleton, a long ribbon-like dorsal spine, and a gill-breathing air bladder so it may make use of low oxygen concentrations by “breathing” surface air. They have a circular tail and the male has an eye spot at the base of the caudal fin.

They feed on small animals, especially fish. To most people, the meat is not very palatable. I couldn’t fillet a fish for drawings unless it was frozen; the meat was as soft as baby food and fell apart on frozen specimens.

Species found in North America is the **bowfin, Amia calva.**
**Description:** Dorsal bones above vertebrae split • Vertebral bones jointed behind anus • To obtain good sample for drawing myotomes, fish was skinned frozen because myotomes were very soft (almost like baby food) • Lateral line straight and not visible on fillet because of midline • Scales unique, the height is much less than length.

**Scales:** Average to large • Anterior edge almost squared • Anterior edge and lateral sides straight • Focus definitely posterior • No radii • Circuli run horizontal — no curving on anterior or posterior margins • Posterior edge curved.

**Common Names:** Dogfish, freshwater dogfish, mudfish, shoepike, western mudfish, cottonfish, blackfish, John A. Grindle, grindle, grinnel, speckled cat, scaley cat, beaverfish, lawyer scaled ling, cypress trout, blackfish or choupique, German bass or brindle fish

**Bowfin**

*Amia calva*
Herring Family — *Clupeidae*

The herring family are smallish, thin fishes with silvery scales and large eyes. They may have spots on the side of their bodies; their scales are sharply pointed and have a very prominent sawtooth edge on the midline of the belly. They feed on small animal life, but some feed on plankton and crustacea. Although their flesh is edible, most of this species are forage fish for larger predators. Some of these species may experience heavy mortality when long periods of ice cover cause winter die-offs.

Several species of *menhaden* occasionally enter into the mouths of streams bordering oceans. They are similar to the American shad but have fluted scales. They are not covered in this manual.

Species in this family are: *Alabama shad*, *Alosa alabamae*; *alewife*, *Alosa pseudoharengus*; *American shad*, *Alosa sapidissima*; *blueback herring*, *Alosa aestivalis*; *gizzard shad*, *Dorosoma cepedianum*; *hickory shad*, *Alosa mediocris*; *skipjack herring*, *Alosa chrysochloris*; and *threadfin shad*, *Dorosoma petenense*. 

Gizzard shad
Description: Small fish • Fish narrow bodied, can be smoked • Normally a forage fish, seldom eaten by humans • Lateral line straight and not visible on fillet because of midline • Inability to adapt to fluctuating water temperatures causes die-offs of alewife, American shad and gizzard shad • See gizzard shad for example of herring family scales.

Common Names: Mulhaden, golden or green shad, gray, blear-eyed, spring, branch, wall-eyed, big-eyed, glut herring, Seth, skipjack, bang, racer, kyak, kiack, ellwife, sawbelly or grayback

Alewife
*Alosa pseudoharengus*
American Shad
*Alosa sapidissima*

**Common Names:** Common, Atlantic, North River, Potomac, Connecticut, Delaware, Susquehanna or white shad, shad and alose

**Description:** Small fish • Fish narrow bodied, can be smoked • Normally a forage fish, seldom eaten by humans • Lateral line straight and not visible on fillet because of midline • Inability to adapt to fluctuating water temperatures causes die-offs of alewife, American shad and gizzard shad • May be caught for roe.

---

**External Characteristics**
- Record Weight
  - 11 lbs. 4 oz.
- Typical Lengths (in.)
  - 12-18
- No. of Ribs
  - ~30
- Lateral Line Scales
  - 50-55
- Scale Type
  - cycloid

**Fillet Characteristics**
- Vertebrae
  - 51-60
- Color
  - whitish, red outside
- Larval Myotomes
  - not found
- Fish Myotomes
  - 55-57
- Fillet Myotomes

**Bones In Fillet**
- Yes

**Species**
- American Shad
**Description:** Small fish • Fish narrow bodied, can be smoked • Normally a forage fish, seldom eaten by humans • Lateral line straight and not visible on fillet because of midline • Inability to adapt to fluctuating water temperatures causes die-offs of alewife, American shad and gizzard shad.

**Scales:** Average to large • Roundish • Focus definitely posterior • No radii • Circuli only in anterior field • Annulus runs vertical • Poster edge ∼1/4 of scale.

**Magnification 2-3X for 25 cm (10") fish.**

**Common Names:** Hickory, nanny shad, hairyback, golden eyes, slicks, silver crappie, slime-ball, skipjack, jackshad, mud, lake, eastern gizzard or stink shad, shad, sawbelly or flatfish

**Gizzard Shad**

* *Dorosoma cepedianum*
Salmon Family — Salmonidae

The salmon family includes salmon, trout, char and whitefish. Some species may be marine or freshwater, and several are being stocked in freshwater sites (not all covered on map). The salmon, trout and char members of this family possess more than 100 scales in the lateral line, and the mouth is strong, large and well-toothed. Whitefish and grayling possess less than 100 scales in the lateral line, and their mouth is weak and has few or no teeth. All salmonids have an adipose fin and an axillary process at the base of each pelvic fin. They require cold, well-oxygenated water. They are primarily insect eaters but are also fish eaters, especially the larger fish.

They are considered by many to be excellent eating fish. The salmon and trout frequently have an orangish or pinkish colored flesh.

Species found in North America are broad whitefish, Coregonus nasus; lake whitefish, Coregonus clupeaformis; Alaska whitefish, Coregonus nelsoni; humpback whitefish, Coregonus pidschian; Atlantic whitefish, Coregonus huntsmani; cisco or lake herring, Coregonus artedii; least cisco, Coregonus sardinella; Arctic cisco, Coregonus autumnalis; shortjaw cisco, Coregonus zenithicus; blackfin cisco, Coregonus nigripinnis; kiyi, Coregonus kiyi; bloater, Coregonus hoyi; Inconnu, Stenodus leucichthys; Bonneville cisco, Prosopium glemfiferum; pygmy whitefish, Prosopium columbiae; Bear Lake whitefish, Prosopium abyssicola; Bonneville whitefish, Prosopium splionotus; mountain whitefish, Prosopium williamsoni; round whitefish, Prosopium cylindraceum; Arctic grayling, Thymallus arcticus; lake trout, Salvelinus namaycush; brook trout, Salvelinus fontinalis; Arctic char, Salvelinus alpinus; Dolly Varden, Salvelinus malma; bull trout, Salvelinus confluentus; Angayukasurak char, Salvelinus anaktuvukensis; Atlantic salmon, Salmo salar; brown trout, Salmo trutta; sockeye or red salmon, Oncorhynchus nerka; chum salmon, Oncorhynchus keta; chinook or king salmon, Oncorhynchus tshawytscha; coho or silver salmon, Oncorhynchus kisutch; pink salmon, Oncorhynchus gorbuscha; cutthroat trout, Oncorhynchus clarki; gila trout, Oncorhynchus gilae; Apache trout, Oncorhynchus apache; rainbow trout or steelhead, Oncorhynchus mykiss; golden trout, Oncorhynchus aguabonita; Prosopium williamsoni; round whitefish, Prosopium cylindraceum; Arctic grayling, Thymallus arcticus; lake trout, Salvelinus namaycush; brook trout, Salvelinus fontinalis; Arctic char, Salvelinus alpinus; Dolly Varden, Salvelinus malma; bull trout, Salvelinus confluentus; Angayukasurak char, Salvelinus anaktuvukensis; Atlantic salmon, Salmo salar; brown trout, Salmo trutta; sockeye or red salmon, Oncorhynchus nerka; chum salmon, Oncorhynchus keta; chinook or king salmon, Oncorhynchus tshawytscha; coho or silver salmon, Oncorhynchus kisutch; pink salmon, Oncorhynchus gorbuscha; cutthroat trout, Oncorhynchus clarki; gila trout, Oncorhynchus gilae; Apache trout, Oncorhynchus apache; rainbow trout or steelhead, Oncorhynchus mykiss; golden trout, Oncorhynchus aguabonita.
Rainbow trout  Sockeye salmon
Pink Salmon
*Oncorhynchus gorbuscha*

**Common Names:** Fall, humpback salmon or pink humpback

**Description:** Color of trout and salmon diet-related — normally pinkish-orange, but can be whitish to orange-red. Some fish may be kept whole (scales attached without gills and intestines). Larger fish can be steaked, cut for smoking. Lateral line straight and not visible on fillet because of midline. See sockeye salmon for example of salmon scales.

**Scales:** Small • Longer than wide • Small central focus • No radii.

---

**External Characteristics**

- **Record Weight:** 12 lbs. 9 oz.
- **Typical Lengths (in.):** 16-22
- **No. of Ribs:** < 30
- **Lateral Line Scales:** 147-205
- **Scale Type:** cycloid

**Fillet Characteristics**

- **Vertebrae:** 63-72
- **Color:** pink-orange
- **Larval Myotomes:** not found
- **Fish Myotomes:**
- **Fillet Myotomes:**
- **Bones in Fillet:** Yes
- **Species:** Pink Salmon
Description: Fillets of salmon and trout can be different colors due to diet • Skin sometimes left on fish • Large fish may be steaked or smoked • Lateral line straight and not visible on fillet because of midline • Bilton et al., 1964, identified salmon scales to species. See sockeye salmon for example of salmon scales.

Scales: Small • Longer than wide • Small central focus • No radii.

Common Names: Fall, autumn or dog salmon, chum or keta

Chum Salmon
Oncorhynchus keta

External Characteristics
Record Weight
24 lbs. 4 oz.
Typical Lengths (in.)
18-24
No. of Ribs
<30
Lateral Line Scales
124-153
Scale Type
cycloid

Fillet Characteristics
Vertebrae
59-71
Color
pink-orange
Larval Myotomes
not found
Fish Myotomes

Fillet Myotomes
Bones in Fillet
Yes
Species
Chum Salmon
Coho Salmon
*Oncorhynchus kisutch*

**Common Names:** Medium red or silver salmon, coho, blueback, sea trout, hooknose or silver sides

**Description:** Fillets of salmon and trout can be different colors due to diet • Skin sometimes left on fish • Large fish may be steaked or smoked • Lateral line straight and not visible on fillet because of midline • Bilton et al., 1964, identified salmon scales to species • See sockeye salmon for example of salmon scales.

**Scales:** Small • Longer than wide • Small central focus • No radii.

---

**External Characteristics**
- **Record Weight:** 33 lbs. 4 oz.
- **Typical Lengths (in.):** 18-24
- **No. of Ribs:** < 30
- **Lateral Line Scales:** 121-148
- **Scale Type:** cycloid

**Fillet Characteristics**
- **Vertebrae:** 61-69
- **Color:** pink-orange
- **Larval Myotomes:** not found
  - **Fish Myotomes:**
- **Fillet Myotomes:**
- **Bones In Fillet:** Yes
- **Species:** Coho Salmon

Fillet similar to trout
**Description:** Fillets of salmon and trout can be different colors due to diet • Skin sometimes left on fish • Large fish may be steaked or smoked • Lateral line straight and not visible on fillet because of midline • Bilton et al., 1964, identified salmon scales to species • Scales: five scales depicted which could represent those found when fillet is taken.

**External Characteristics**
- **Record Weight**: 9 lbs. 6 oz.
- **Typical Lengths (In.)**: 16-22
- **No. of Ribs**: ~35
- **Lateral Line Scales**: 120-150
- **Scale Type**: cycloid

**Fillet Characteristics**
- **Vertabrae**: 56-67
- **Color**: pink-orange
- **Larval Myotomes**: not found
- **Fish Myotomes**: not found
- **Fillet Myotomes**: not found
- **Bones In Fillet**: Yes
- **Species**: Kokanee or Sockeye Salmon

**Common Names:** Kickininee, little redfish, silver trout, yank, land-locked sockeye, Kennerly's salmon or trout, red or blueback salmon

**Kokanee or Sockeye Salmon**
*Oncorhynchus nerka*
Chinook Salmon
*Oncorhynchus tshawytscha*

**Common Names:** Spring or king salmon, tyee, spring chinook, king quinnat or blackmouth

**Description:** Fillets of salmon and trout can be different colors due to diet • Skin sometimes left on fish • Large fish may be steaked or smoked • Lateral line straight and not visible on fillet because of midline • Bilton et al., 1964, identified salmon scales to species • See sockeye salmon for example of salmon scales.

**Scales:** Small • Longer than wide • Small central focus • No radii.

---

**External Characteristics**
- **Record Weight**: 44 lbs. 9 oz.
- **Typical Lengths (in.)**: 20-30
- **No. of Ribs**: ~< 39
- **Lateral Line Scales**: 130-165
- **Scale Type**: cycloid

**Fillet Characteristics**
- **Vertebrae**: 67-75
- **Color**: pink-orange
- **Larval Myotomes**: not found
- **Fish Myotomes**: 63-69
- **Fillet Myotomes**:
- **Bones In Fillet**: Yes
- **Species**: Chinook Salmon
Description: Trout, char and salmon fillets differ in color based on diet. Small fish frequently kept whole (gills and viscera may be removed, skin may be left on fish). Larger fish may have skin removed, cut in pieces. Trout filleted with only tail section kept, remainder discarded because of bones. Lateral line straight and not visible on fillet because of midline. See rainbow trout for example of trout scales.

Scales: Small • Longer than wide • Central small focus • No radii • Circuli normally unbroken concentric circles.

Common Names: Red-throated, Clarks Lake, sea, short-tailed, blackspotted, native mountain, lake, brook or harvest trout, coastal Yellowstone, Snake River, Lakotan, Rio Grande, Colorado, Utah or Piute cutthroat

Cutthroat Trout
*Oncorhynchus clarki*
Rainbow or Kamloops Trout
Steelhead Trout
*Oncorhynchus mykiss*

**Common Names:** Shasta, Kern River, Nelson, Whitney, Eagle Lake, San Gorgonio silver or salmon trout, steelhead, redside, California trout, coastal rainbow and hardhead or redband

**Description:** Trout, char and salmon fillets differ in color based upon diet. Small fish frequently kept whole (gills and viscera may be removed, skin may be left on fish). Larger fish may have skin removed, cut in pieces. Trout filleted with only tail section kept, remainder discarded because of bones. Lateral line straight and not visible on fillet because of midline.

**Scales:** Small • Longer than wide • Central small focus • No radii • Circuli normally unbroken concentric circles.

---

**External Characteristics**

- **Record Weight:** 42 lbs. 3 oz.
- **Typical Lengths (In.):** 12-18
- **No. of Ribs:** < 32
- **Lateral Line Scales:** 100-160
- **Scale Type:** cycloid

---

**Fillet Characteristics**

- **Vertebrae:** 60-66
- **Color:** pink-orange
- **Larval Myotomes:** Pre 38-40 Post 18-20
- **Fish Myotomes:** 59-63
- **Fillet Myotomes:** 56-60
- **Bones in Fillet:** Yes
- **Species:** Rainbow or Kamloops Trout

---

*Length 215mm • ROM #03561 • Magnification 12-24X*
Description: Fillets of salmon and trout can differ in color due to diet. Skin sometimes left on fish. Large fish may be steaked or smoked. Lateral line straight and not visible on fillet because of midline. See sockeye salmon for example of salmon scales.

Scales: Small • Longer than wide • Small central focus • No radii.

Common Names: Lake Atlantic, Kennebec, landlocked, Sebago, black salmon Sebago, grilse, kelt, grayling, slink, grill, fiddler, smolt, pan, saumon or bratan

Atlantic Salmon
Salmo salar

External Characteristics

| Record Weight | 22 lbs. 11 oz. |
| Typical Lengths (In.) | 16-24 |
| No. of Ribs | ~32 |
| Lateral Line Scales | 109-121 |
| Scale Type | cycloid |

Fillet Characteristics

| Vertebrae | 58-61 |
| Color | pink-orange |
| Larval Myotomes | not found |
| Fish Myotomes | 59-60 |
| Fillet Myotomes | 58-59 |
| Bones in Fillet | Yes |
| Species | Atlantic Salmon |
Brown Trout
*Salmo trutta*

**Common Names:** German, English sea, lake, brook, river, bull Von Behr, Lochleven, Loch Leven, European brown or liberty trout, brownie or gealag

**Description:** Trout, char and salmon fillets differ in color based on diet • Small fish frequently kept whole (gill and viscera may be removed, skin may be left on fish) • Larger fish may have skin removed, cut in pieces • Trout filleted with only tail section kept, remainder discarded because of bones • Lateral line straight and not visible on fillet because of midline • See rainbow trout for example of trout scales.

**Scales:** Small • Longer than wide • Small central focus • No radii • Circuli normally unbroken concentric circles.

**External Characteristics**
- **Record Weight**
  - 38 lbs. 9 oz.
- **Typical Lengths (In.)**
  - 12-22
- **No. of Ribs**
  - ~30
- **Lateral Line Scales**
  - 115-150
- **Scale Type**
  - cycloid

**Fillet Characteristics**
- **Vertebrae**
  - 56-61
- **Color**
  - pink-orange
- **Larval Myotomes**
  - Pre 35-37  Post 17-19
- **Fish Myotomes**
  - 52-59
- **Fillet Myotomes**
  - 53-57
- **Bones in Fillet**
  - Yes
- **Species**
  - Brown Trout
Description: Trout, char and salmon fillets differ in color based on diet • Small fish frequently kept whole (gill and viscera may be removed, skin may be left on fish) • Larger fish may have skin removed, cut in pieces • Trout filleted with only tail section kept, remainder discarded because of bones • Lateral line straight and not visible on fillet because of midline • See rainbow trout for example of trout scales.

Scales: Small • Longer than wide • Small central focus • No radii.

Common Names: Blueback, alpine, European or Greenland char, Hearne's, Hudson Bay or Copper-mine River salmon, sea, Sunapee, golden or Quebec Red trout

Arctic Char
Salvelinus alpinus
Brook Trout
*Salvelinus fontinalis*

**Common Names:** Eastern brook, spotted, speckled, aurora, sea, common brook, mud, eastern speckled, native, mountain or squaretailed trout, square-tail or speckled char, coaster, breac, whitefin, brookie or salter

**Description:** Trout, char and salmon fillets differ in color based upon diet. Small fish frequently kept whole (gill and viscera may be removed, skin may be left on fish). Larger fish may have skin removed, cut in pieces. Trout filleted with only tail section kept, remainder discarded because of bones. Lateral line straight and not visible on fillet because of midline. See rainbow trout for example of trout scales.

**Scales:** Small • Longer than wide • Small central focus • No radii • Circuli normally unbroken concentric circles.

---

**External Characteristics**

- **Record Weight:** 14 lbs. 8 oz.
- **Typical Lengths (in.):**
  - 10-14
- **No. of Ribs:** ~ 34
- **Lateral Line Scales:** 110-130
- **Scale Type:** cydoid

**Fillet Characteristics**

- **Vertebrae:** 55-62
- **Color:** pink-orange
- **Larval Myotomes**
  - Pre: 33-35  Post: 19-20
- **Fish Myotomes:** 50-56
- **Fillet Myotomes:** 55-57
- **Bones In Fillet:** Yes
- **Species:** Brook Trout
Description: Trout, char and salmon fillets differ in color based upon diet • Small fish frequently kept whole (gill and viscera may be removed, skin may be left on fish) • Larger fish may have skin removed, cut in pieces • Trout filleted with only tail section kept, remainder discarded because of bones • Lateral line straight and not visible on fillet because of midline • See rainbow trout for example of trout scales.

Scales Small • Longer than wide • Small central focus • No radii • Circuli normally unbroken concentric circles.

Common Names: Great Lakes, lean, fat, bank, mackinaw, salmon, grey, great grey or mountain trout, laker, namaycush, nasamacush, toque, taque, landlocked salmon, Great Lakes char, tongue, paperbelly, siscowet or humper

Lake Trout
Salvelinus namaycush

External Characteristics

| Record Weight | 65 lbs. |
| Typical Lengths (in.) | 15-20 |
| No. of Ribs | < 30 |
| Lateral Line Scales | 116-138 |
| Scale Type | cycloid |

Fillet Characteristics

| Vertebrae | 61-69 |
| Color | pink-orange |
| Larval Myotomes | Pre 37-40 Post 17-20 |
| Fish Myotomes | 63-65 |
| Fillet Myotomes | 59-61 |
| Bones In Fillet | Yes |
| Species | Lake Trout |
Cisco Lake Herring
*Coregonus artedi*

**Common Names:** Freshwater, Bear Lake or sand herring, tullibee, grayback, blueback, shallowwater or common cisco, herring-salmon or cisco

**Description:** Smaller fish • May be kept whole, used for smoking • Fish retained for smoking may be scaled • Lateral line straight and not visible on fillet because of midline • Typical scale used for aging fish shown for herring.

**Scales:** Longer than wide • Rounded with irregular margin • Central focus • No radii • Circuli in posterior field wider than other fields.

**External Characteristics**
- **Record Weight**: 7 lbs. 4 oz.
- **Typical Lengths (in.)**: 8-12
- **No. of Ribs**: ~ 36
- **Lateral Line Scales**: 63-105
- **Scale Type**: cycloid

**Fillet Characteristics**
- **Vertebrae**: 50-63
- **Color**: white red midline
- **Larval Myotomes**: Pre 33-44 Post 9-13
- **Fish Myotomes**: 46-56
- **Fillet Myotomes**: 50-53
- **Bones In Fillet**: Yes
- **Species**: Cisco Lake Herring

*Magnification 5-6X for 35 cm (14") fish*
Description: Color of fish, number of myotomes should help to identify • Myotomes for larval fish inconsistent with adult fillets • We found from 53-59 myotomes per fillet • We guess that whitefish should possess <55 myotomes • Color, size and scales located should eliminate trout, salmon, goldeye, gar and sturgeon • Lateral line straight and not visible on fillet because of midline.

External Characteristics
- Record Weight: 14 lbs. 6 oz.
- Typical Lengths (In.): 12-18
- No. of Ribs: ~ 38
- Lateral Line Scales: 70-97
- Scale Type: cycloid

Fillet Characteristics
- Vertebrae: 55-64
- Color: yellowish-white, red midline
- Larval Myotomes: Pre ~ 39, Post ~ 13
- Fish Myotomes: 52
- Fillet Myotomes: 57-59
- Bones in Fillet: Yes
- Species: Lake Whitefish

Common Names: Common, Sault, humpback, high back, bow back, buffalo back, eastern Great Lakes or inland whitefish or gizzard fish

Lake Whitefish
*Coregonus clupeaformis*

Length 165mm • ROM #04276 • Magnification 6-8X
**Broad Whitefish**

*Coregonus nasus*

**Common Names:** Atlantic, Sault, round-nosed or sheep-nosed whitefish

**Description:** Color of fish, number of myotomes should help to identify. Myotomes for larval fish inconsistent with adult fillets. We found from 53-59 myotomes per fillet. We guess that whitefish should possess <55 myotomes. Color, size and scales located should eliminate trout, salmon, goldeye, gar and sturgeon. Lateral line straight and not visible on fillet because of midline. Example of whitefish scales shown with the lake whitefish.

---

**External Characteristics**

<table>
<thead>
<tr>
<th>Record Weight</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Typical Lengths (in.)</strong></td>
<td></td>
</tr>
<tr>
<td>8-12</td>
<td></td>
</tr>
<tr>
<td><strong>No. of Ribs</strong></td>
<td>~35</td>
</tr>
<tr>
<td><strong>Lateral Line Scales</strong></td>
<td>84-102</td>
</tr>
<tr>
<td><strong>Scale Type</strong></td>
<td>cycloid</td>
</tr>
</tbody>
</table>

---

**Fillet Characteristics**

<table>
<thead>
<tr>
<th>Vertebrae</th>
<th>60-63</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Color</strong></td>
<td>yellowish-white, red midline</td>
</tr>
<tr>
<td><strong>Larval Myotomes</strong></td>
<td>not found</td>
</tr>
<tr>
<td><strong>Fish Myotomes</strong></td>
<td>52-53</td>
</tr>
<tr>
<td><strong>Fillet Myotomes</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Bones In Fillet</strong></td>
<td>Yes</td>
</tr>
<tr>
<td><strong>Species</strong></td>
<td>Broad Whitefish</td>
</tr>
</tbody>
</table>
**Description:** Color of fish, number of myotomes should help to identify. Myotomes given for larval fish inconsistent with adult fillets. We found from 53-59 myotomes per fillet. We guess that whitefish should possess <55 myotomes. Color, size and scales located should eliminate trout, salmon, goldeye, gar and sturgeon. Lateral line straight and not visible on fillet because of midline. See lake whitefish for example of whitefish scales.

**Scales:** Average. Longer than wide. Anterior corners sharply squared. Central focus. Radii in posterior field. Circuli very wavey and widest in posterior fields. Circuli not continuous.

**Fillet similar to lake whitefish**

**Common Names:** Menominee whitefish, pilot, frost or round fish

**Round Whitefish**

*Prosopium cylindraceum*
Mountain Whitefish
Prosopium williamsoni

Common Names: Rocky Mountain or Williamson's whitefish, grayling or grayback

Description: Color of fish, number of myotomes should help to identify • Myotomes given for larval fish inconsistent with adult fillets • We found from 53-59 myotomes in a fish fillet • We guess that whitefish should possess <55 myotomes • Color, size and scales located should eliminate trout, salmon, goldeye, gar and sturgeon • Lateral line straight and not visible on fillet because of midline • See lake whitefish for example of whitefish scales.

Scales: Average • Wider than long • Central focus • ~15 indistinct posterior radii • Circuli not continuous, widest and rippled in posterior field • Bumps on posterior edge almost resembles ctenii.

External Characteristics
- Record Weight: 5 lbs. 4 oz.
- Typical Lengths (in.): 8-12
- No. of Ribs: ~35
- Lateral Line Scales: 74-90
- Scale Type: cycloid

Fillet Characteristics
- Vertebrae: 53-61
- Color: yellowish-white
- red midline
- Larval Myotomes: not found
- Fish Myotomes: 53-57
- Fillet Myotomes: 47-50
- Bones In Fillet: Yes
- Species: Mountain Whitefish
Description: Color of fish, number of myotomes should help to identify. Myotomes given for larval fish inconsistent with adult fillets. We found from 53-59 myotomes per fillet. We guess that whitefish should possess <55 myotomes. Color, size and scales located should eliminate trout, salmon, goldeye, gar and sturgeon. Lateral line straight and not visible on fillet because of midline. Normally found only in Alaska and Northwest Territories of Canada. Large whitefish frequently smoked.

Scales: Average • Wider than long • Roundish • Central focus • 8-20 typical of radii in posterior field • Circuli continuous, unbroken circles • Small dips in circuli in posterior field.

Common Names: Sheefish, connie or conny

Inconnu

Stenodus leucichthys

External Characteristics

<table>
<thead>
<tr>
<th>Record Weight</th>
<th>53 lbs.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Typical Lengths (In.)</td>
<td>18-30</td>
</tr>
<tr>
<td>No. of Ribs</td>
<td>~ 40</td>
</tr>
<tr>
<td>Lateral Line Scales</td>
<td>90-110</td>
</tr>
<tr>
<td>Scale Type</td>
<td>cycloid</td>
</tr>
</tbody>
</table>

Fillet Characteristics

| Vertebrae | 64-69 |
| Color | yellowish |
| Larval Myotomes | not found |
| Fish Myotomes | 60-63 |
| Fillet Myotomes | 62-63 |
| Bones In Fillet | Yes |
| Species | Inconnu |
Arctic Grayling
*Thymallus arcticus*

**Common Names:** American, Back's, sailfin, grayling, bluefish, arctic trout or tillimeg

**Description:** Trout, char and salmon fillets differ in color based upon diet • Small fish frequently kept whole (gills and viscera may be removed, skin may be left on fish) • Found in Alaska and northwestern Canada • Can be used for food like trout and whitefish • Typical scales used for aging fish shown below • Scales more typical for whitefish than trout.

**Scales:** Average • Wider or less wide than long • Wavy anterior margin • Central focus • Appears to be 8-25 secondary posterior radii • Circuli in anterior field • Posterior edge almost looks like weak blunt ctenii • Posterior edge dark.

---

**External Characteristics**

- **Record Weight**
  - 5 lbs. 15 oz.
- **Typical Lengths (In.)**
  - 12-15
- **No. of Ribs**
  - ~ 34
- **Lateral Line Scales**
  - 77-98
- **Scale Type**
  - cycloid

**Fillet Characteristics**

- **Vertebrae**
  - 58-62
- **Color**
  - pink-orange
- **Larval Myotomes**
  - not found
- **Fish Myotomes**
  - 54-58
- **Fillet Myotomes**
  - 54-58
- **Bones In Fillet**
  - Yes
- **Species**
  - Arctic Grayling
**Description:** Not in salmon family but smelt family, *Osmeridae* • Small fish • Often cooked whole • Usually kept with scales attached, head and viscera removed • Lateral line straight and not visible on fillet because of midline • Typical scale used for aging fish shown below.

**Scales:** Small • Wider than long • Focus large, centered near posterior edge • No radii • Anterior field is small and circuli are compressed.

**Rainbow Smelt**  
*Osmerus mordax*

**Common Names:** American or freshwater smelt, leefish, frost fish or icefish

**External Characteristics**
- **Record Weight**
- **Typical Lengths** (in.)
  - 7-8
- **No. of Ribs**
  - ~40
- **Lateral Line Scales**
  - 62-72
- **Scale Type**
  - cycloid

**Fillet Characteristics**
- **Vertebrae**
  - 58-70
- **Color**
  - whitish yellow
- **Larval Myotomes**
  - Pre 43-48  Post 14-17
- **Fish Myotomes**
  - 52-60
- **Fillet Myotomes**
  - 48-62
- **Bones in Fillet**
  - Yes
- **Species**
  - Rainbow Smelt
Mooneye Family — *Hiodontidae*

The mooneye family are strictly a North American species with thin silvery bodies, small heads and large shiny eyes. They can be shaped like a herring but don't possess the sawtooth or keel edge on the stomach. They also have well-developed teeth on the roof of the mouth, tongue and both jaws (sometimes called toothed herring). They feed on insects, invertebrates and minnows. Many people, consider them inedible because of the many bones present. In northern states and Canada, they are considered excellent for smoking.

There are two species in this family, the **goldeye** *Hiodon alosoides* and **mooneye** *Hiodon tergisus*.
Description: Small, narrow fish • Can be smoked, canned or pickled • Scales may be attached on smoked fish • For bone removal, meat can be scored (1/4"-3/8" vertical cuts) • Lateral line straight and not visible on fillet because of midline • Typical scale for aging fish shown below.

Scales: Average to large • Same or longer than wide • Focus slightly posterior • 10 to 30 radii in both anterior and posterior • Circuli circular around focus except at posterior edge, they are absent or move to scale margin • Anterior appears split by 1 or 2 central radii.

Magnification 1.5-2.0X for 33 cm (13") fish

Common Names: Yellow, toothed or freshwater herring, shad, shad mooneye, slicker, golden mooneye, webechee, northern goldeye, Winnipeg goldeye, western goldeye or mooneye

Goldeye
Hiodon alosoides
Mooneye
Hiodon tergisus

**Common Names:** Toothed or freshwater herring, river whitefish, slicker, cisco, white shad or notch-finned Hiodon

**Description:** Small, narrow fish • Can be smoked, canned, pickled • Scales may be attached on smoked fish • For bone removal, meat can be scored (1/4"-3/8" vertical cuts) • Lateral line straight and not visible on fillet because of midline • Scales typical to those found on goldeye

**Scales:** Average to larger • Anterior corners rounded • Same, wider than long • Focus posterior • 5-40 radii in both anterior and posterior field • Circular circuli around focus • Weak circuli on posterior margin.

**External Characteristics**
- **Record Weight**
  - 1 lb. 7 oz.
- **Typical Lengths (In.)**
  - 9-12
- **No. of Ribs**
  - ~28
- **Lateral Line Scales**
  - 52-57
- **Scale Type**
  - cycloid

**Fillet Characteristics**
- **Vertebrae**
  - 53-57
- **Color**
  - white
  - red outside
- **Larval Myotomes**
  - Pre 34-36  Post 17-20
- **Fish Myotomes**
  - 52-56
- **Fillet Myotomes**
  - 48-50
- **Bones in Fillet**
  - Yes
- **Species**
  - Mooneye
Pike Family — *Esocidae*

Their body shape is cylindrical with a large duckbill-like snout. The body is covered with many small cycloid scales with the dorsal and anal fins (dorsal just above anal fin) located far back near the tail. The mouth contains numerous needle-like teeth. The members of this family are voracious predators.

They prefer shallow water that is cool and clean in lakes or slowly flowing streams. These fish hide and wait for their meals which consist of fish, frogs, mice and small ducks.

They are fighters. Their flesh is tasty but bony.

Species found in North America are *grass or redfin pickerel*, *Esox americanus*; *chain pickerel*, *Esox niger*, *northern pike*, *Esox lucius*; *muskellunge*, *Esox masquinongy*, *tiger-muskie hybrid of northern pike*, *Esox lucius* and *muskellunge*, *Esox masquinongy*.
Grass Pickerel
*Esox americanus*

**Common Names:** Western grass, mud, little, central redfin, brook, barred, slough, banded or trout pickerel, grass, pond or mud pike

**Description:** Small fish, usually less than one foot long. Y-bones in fillet can be removed (may change fillet structure, or have 2 sections per fillet). Lateral line straight and not visible on fillet because of midline. Scales for the pike family unique; see northern pike scales.

**Scales:** Average. Longer than wide. Focus slightly posterior. No radii. 1 to 4 overlapping anterior lobes. Circuli closely spaced. Posterior margin may have small bump or can be indented.

**Fillet Characteristics:**
- **Vertebrae:** 42-51
- **Color:** White to yellow
- **Larval Myotomes:** Pre ~31 Post ~15
- **Fish Myotomes:** 45-47
- **Fillet Myotomes:** 47-49
- **Bones in Fillet:** Yes

**External Characteristics:**
- **Record Weight:** 2 lbs. 10 oz.
- **Typical Lengths (in.):** 8-10
- **No. of Ribs:** ~ 25
- **Lateral Line Scales:** 93-118
- **Scale Type:** cycloid

Fillet similar to chain pickerel
**Description:** Larger fish, may have size limits • Y-bones in fillet can be removed (may change fillet structure, or have 2 sections of flesh per fillet) • Fillet may be pieced for frying • Lateral line straight and not visible on fillet because of midline • Fillet can be cross-sectioned • Section near head unique for pike; only gar, which has no Y-bones, is similar.

- Length 253mm • ROM #60361 • Magnification 8-12X • Scales unique for the pike family, enclosed portion being lobed • Pike can be differentiated from muskellunge, see pages 138-139

**Common Names:** Great northern, common or American pike or pickerel, Northern jack, jack, jackfish, pickerel, pike, wolf or snake

**Northern Pike**

**Esox lucius**
**Muskellunge**

*Esox masquinongy*

**Common Names:** Maskinonge, musky, lunge, purebred musky, tiger muskellunge, mascalonge, masquinouge, Great Lakes, Ohio, Wisconsin or great pike, silver or tiger muskie, white pickerel, white, blue, great or Allegheny River pike or jack

**Description:** Larger fish, may have size limits • Y-bones in fillet can be removed (may change fillet structure, or have 2 sections of flesh per fillet) • Fillet may be pieced for frying • Lateral line straight and not visible on fillet because of midline • See northern pike for fillet cross-section and scales • Muskellunge can be differentiated from northern pike, pages 138-139.

**Scales:** Average • Longer than wide • Focus slightly posterior • No radii • 1 to 4 overlapping anterior lobes • Circuli closely spaced • Posterior margin has small bump
**Description:** Smaller than northern pike and muskellunge • Fillet similar except fewer myotomes • Y-bones in fillet can be removed (may change fillet structure, or have 2 sections of flesh per fillet) • Lateral line straight and not visible on fillet because of midline • Cross-sectioned fillets and scales similar to northern pike.

**Scales:** Average • Longer than wide • Focus slightly posterior • 1 to 4 overlapping anterior lobes • Circuli closely spaced • Posterior margin may have a small bump or indentation (notch)

**Common Names:** Eastern, mud, grass, black, lake, reticulated or federation pickerel, pike, green, chain or duck-billed pike, chainsides, jack or snake

---

**Chain Pickerel**

*Esox niger*
Most minnows are small fish normally taken by predators. Fish examined vary since the fins contain spines where they are non-existent in the other minnows. The introduced species are common carp, goldfish and grass carp. They normally stir up the bottom mud and feed on insects and plant material. Feeding on aquatic vegetation was the reason for introduction of the grass carp. The fish can be good fighters and the meat is considered good by some people.

The introduced species examined in North America are common carp, *Cyprinus carpio*; grass carp, *Ctenopharyngodon idella* and goldfish, *Carassius auratus*.

**Common carp**
Description: Can be smoked • Scored (1/4" - 3/8") vertically • Bones removed by canning or pickling • Lateral line straight and not visible on fillet because of midline • Myotomes wide at head, narrow by tail.

Scales: Large • Rounded • Small central focus • 4-6 radii in both anterior and posterior fields • Circuli wider apart, wavey and broken looking in posterior field

Length 113mm • ROM #37322 • Magnification 3-4X

Common Names: German, European, Israeli, scaled, king, mirror or leather carp, buglemouth bass, carp or German bass

Common Carp

Cyprinus carpio
Goldfish
*Carassius auratus*

Common Names: Crucian, silver, fancy crucian or golden carp, carp or bubble-eye

Description: Small fish • Scored (1/4" - 3/8") vertically • Bones removed by canning or pickling • Lateral line straight and not visible on fillet because of midline • Myotomes wide at head, narrow near tail • Orange color on scales.

Scales: Average to large • Focus central • 5-20 radii in both posterior and anterior fields • Some lateral radii • Circuli much wider and less on posterior edge • Goldish-colored scales.

<table>
<thead>
<tr>
<th>External Characteristics</th>
<th>Fillet Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Record Weight</td>
<td>Vertebrae</td>
</tr>
<tr>
<td>Typical Lengths (in.)</td>
<td>28-32</td>
</tr>
<tr>
<td>10-16</td>
<td>Color</td>
</tr>
<tr>
<td>No. of Ribs</td>
<td>yellowish-pink</td>
</tr>
<tr>
<td>~ 15</td>
<td>red outside</td>
</tr>
<tr>
<td>Lateral Line Scales</td>
<td>Larval Myotomes</td>
</tr>
<tr>
<td>27-32</td>
<td>Pre ~ 22</td>
</tr>
<tr>
<td>Scale Type</td>
<td>Post ~ 12</td>
</tr>
<tr>
<td>cycloid</td>
<td>Fish Myotomes</td>
</tr>
<tr>
<td></td>
<td>26-34</td>
</tr>
<tr>
<td></td>
<td>Fillet Myotomes</td>
</tr>
<tr>
<td></td>
<td>Bones In Fillet</td>
</tr>
<tr>
<td></td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>Species</td>
</tr>
<tr>
<td></td>
<td>Goldfish</td>
</tr>
</tbody>
</table>
Description: Large, torpedo-shaped fish • Can be smoked • Scored (1/4" - 3/8") vertically • Bones removed by canning or pickling • Lateral line straight and not visible on fillet because of midline • Typical scale used for aging shown below.

Scales: Large • Roundish • Central focus • 10-20 radii in both posterior and anterior fields • Circuli in posterior field bowed toward scale margin • Circuli not continuous

Fillet similar to carp, but more myotomes

Magnification 1.3-1.7X for 50 cm (20") fish

Common Names: White amur

Grass Carp
Ctenopharyngodon idella
Quillback
_Carpiodes cyprinus_

**Common Names:** Lake quillback, eastern or plains carpsucker, carpsucker, quillback or long-finned sucker, broad mullet, mullet, carp, drum lake carp, white carp or silver carp

**Description:** Not a large fish • Can be smoked • Scored (1/4” - 3/8”) vertically • Bones removed by canning or pickling • Lateral line straight and not visible on fillet because of midline.

**Scales:** Large • Anterior corners rounded • Posterior edge rounded • Focus slightly posterior • Normally more radii anterior (10-50) than posterior (10-20) • Circular circuli • Broken circuli lines, heavier, wider spaced in posterior field.

---

**External Characteristics**

<table>
<thead>
<tr>
<th>Record Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Typical Lengths (In.)</td>
</tr>
<tr>
<td>10-15</td>
</tr>
<tr>
<td>No. of Ribs</td>
</tr>
<tr>
<td>~ 17</td>
</tr>
<tr>
<td>Lateral Line Scales</td>
</tr>
<tr>
<td>33-42</td>
</tr>
<tr>
<td>Scale Type</td>
</tr>
<tr>
<td>cycloid</td>
</tr>
</tbody>
</table>

**Fillet Characteristics**

| Vertebrae |
| 38-40 |
| Color |
| whitish-pink |
| red midline |
| Larval Myotomes |
| Pre 26-27 Post 6-8 |
| Fish Myotomes |
| 33-38 |
| Fillet Myotomes |
| 36-38 |
| Bones In Fillet |
| Yes |
| Species |
| Quillback |
Description: Not a large fish • Can be smoked • Scored (1/4" - 3/8") vertically • Bones removed by canning or pickling • Lateral line straight and not visible on fillet because of midline.

Scales: Average to large • Variable shape • Central focus • Variable posterior and anterior radii • Normally more anterior than posterior radii • Edges of scale scalloped • Broken circuli lines, heavier and wider spaced in posterior field.

Common Names: White, common river or silver carp

River Carpsucker
Carpiodes carpio
Highfin Carpsucker
*Carpiodes velifer*

**Common Names:** Skirnback, spearfish, sailor, sailing sucker, humpbacked or bluntnose river carp

**Description:** Not a large fish • Can be smoked • Scored (1/4" - 3/8") vertically • Bones removed by canning or pickling • Lateral line straight and not visible on fillet because of midline.

**Scales:** Large • Anterior corners rounded • Posterior edge rounded • Focus central • More radii anterior (5-50) than posterior (5-20) • Circular circuli • Broken circuli lines • Heavier, wider spaced in posterior field.

---

### External Characteristics

<table>
<thead>
<tr>
<th>Record Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Typical Lengths (in.)</td>
</tr>
<tr>
<td>10-16</td>
</tr>
<tr>
<td>No. of Ribs</td>
</tr>
<tr>
<td>~ 20</td>
</tr>
<tr>
<td>Lateral Line Scales</td>
</tr>
<tr>
<td>33-35</td>
</tr>
<tr>
<td>Scale Type</td>
</tr>
<tr>
<td>cycloid</td>
</tr>
</tbody>
</table>

### Fillet Characteristics

| Vertebrae |
| 36-38 |
| Color |
| whitish-pink |
| red midline |
| Larval Myotomes |
| Pre 26-29 | Post 6-10 |
| Fish Myotomes |
| 35-38 |
| Fillet Myotomes |
| 35-38 |
| Bones in Fillet |
| Yes |
| Species |
| Highfin Carpsucker |
Sucker Family — *Catastomidae*

Suckers are a large family that have large, thick lips. The suckers have no jaw teeth but numerous molar-like teeth in a single row on each pharyngeal arch. They have soft rays in their fins with cycloid scales on the body and no scales on the head. Their mouth and lips are used to “vacuum” and ingest invertebrates from stream and lake beds. They are extremely bony as the ribs plus a set of accessory bones are distributed from the head all the way to the tail. For some, the flesh is considered quite edible.

Species found in North America are **bigmouth buffalo**, *Ictiobus cyprinellus*; **smallmouth buffalo**, *Ictiobus bubalis*; **black buffalo**, *Ictiobus niger*; **quillback**, *Carpiodes cyprinus*; **river carpsucker**, *Carpiodes carpio*; **highfin carpsucker**, *Carpiodes velifer*; **blue sucker**, *Cycleptus elongatus*; **June sucker**, *Chasmistes liorus*; **Cui Ul*, *Chasmistes cujus*; **shortnose sucker**, *Chasmistes brevirostris*; **white sucker**, *Catostomus commersoni*; **largescale sucker**, *Catostomus macrocheilus*; **flannelmouth sucker**, *Catostomus latipinnis*; **longnose sucker**, *Catostomus catostomus*; **razorback sucker**, *Xyrauchen texanus*; **spotted sucker**, *Minytrema melanops*; **creek chubsucker**, *Erimyzon oblongus*; **lake chubsucker**, *Erimyzon succette*; **northern hog sucker**, *Hypentelium nigricans*; **greater redhorse**, *Moxostoma valenciennesii*; **copper redhorse**, *Moxostoma hubbsi*; **river redhorse**, *Moxostoma carinatum*; **shorthead redhorse**, *Moxostoma macrolepidotum*; **black redhorse**, *Moxostoma duquesnei*; **golden redhorse**, *Moxostoma erythrurum*; **silver redhorse**, *Moxostoma anisurum*; **suckermouth redhorse**, *Moxostoma pappillosum*; **gray redhorse**, *Moxostoma congestum*.
Blue Sucker
*Cycleptus elongatus*

**Common Names:** Missouri, gourdseed, sweet or slenderhead sucker, suckerel, bluefish, blackhorse, schooner or long buffalo

**Description:** Can be smoked • Scored (1/4" - 3/8") vertically • Bones removed by canning or pickling • Lateral line straight and not visible on fillet because of midline • Example of sucker scales shown with white sucker.

**Scales:** Average to large • Longer than wide • Small central focus • 20-30 radii in anterior and posterior fields • Circuli frequently sharply curved between radii in posterior field • Circuli fine, broken, heavier posterior.

---

**External Characteristics**

- **Record Weight**
  14 lbs. 3 oz.

- **Typical Lengths (in.)**
  14-20

- **No. of Ribs**
  ~ 15

- **Lateral Line Scales**
  49-57

- **Scale Type**
  cycloid

**Fillet Characteristics**

- **Vertebrae**
  49-50

- **Color**
  yellowish red outside

- **Larval Myotomes**
  not found

- **Fish Myotomes**
  45-53

- **Fillet Myotomes**
  47-49

- **Bones in Fillet**
  Yes

- **Species**
  Blue Sucker
Description: Can be smoked • Scored (1/4" - 3/8") vertically • Bones removed by canning or pickling • Lateral line straight and not visible on fillet because of midline.

Common Names: Common, common white, coarse scaled, fine scaled, slender, eastern, brook, mud, June, grey or black sucker carp, sucker or black mullet

White Sucker
Catostomus commersoni
Bigmouth Buffalo
_Ictiobus cyprinellus_

**Common Names:** Redmouth, blue, bullnosed, chubnosed, brown, pugnosed, common, mud, lake, slough, stubnose or gourdhead buffalo, buffalo, buffalofish or carp

**Description:** Not a large fish • Can be smoked • Scored (1/4" - 3/8") vertically • Bones removed by canning or pickling • Lateral line straight and not visible on fillet because of midline.

**Scales:** Large • Roundish • Small central focus • 40+ radii in anterior and 12+ in posterior field • Circuli in posterior field wider than anterior field • Circuli with breaks, not continuous • Circuli frequently sharply bent between radii in posterior field.

---

**External Characteristics**
- **Record Weight**
  - 70 lbs. 5 oz.
- **Typical Lengths (in.)**
  - 16-24
- **No. of Ribs**
  - ~15
- **Lateral Line Scales**
  - 39-41
- **Scale Type**
  - cycloid

**Fillet Characteristics**
- **Vertebrae**
  - 36-37
- **Color**
  - whitish
  - red outside
- **Larval Myotomes**
  - Pre 28-31 Post 5-9
- **Fish Myotomes**
  - 34-39
- **Fillet Myotomes**
  - 35-38
- **Bones In Fillet**
  - Yes
- **Species**
  - Bigmouth Buffalo
**Description:** Not a large fish • Can be smoked • Scored (1/4" - 3/8") vertically • Bones removed by canning or pickling • Lateral line straight and not visible on fillet because of midline.

**Scales:** Large • Roundish • Central focus • 30+ radii in anterior and 10-15 in posterior field • Radii much closer spaced anterior than posterior.

**Common Names:** Brown, thicklipped, suckermouth, razorback, quillback, round, channel, baitnet or humpbacked buffalo, blue pancake, rooter, razorbill, white carp, highback, carp, liner or roachback

**Smallmouth Buffalo**  
*Ictiobus bubalus*
Silver Redhorse
*Moxostoma anisurum*

**Common Names:** Whitenose redhorse, silver or white nosed, bay, redfin mullet or white nosed, longtailed sucker

**Description:** Can be smoked • Scored (1/4" - 3/8") vertically • Bones removed by canning or pickling • Lateral line straight and not visible on fillet because of midline • Example of redhorse scales shown with shorthead redhorse.

**Scales:** Large • Anterior edge curved • Posterior edge roundish • Central focus • 10 to 25 anterior and posterior radii • Circuli continuous through radii • Circuli circular around focus • Broken line around annulus • Heavier lines on posterior margin

---

**External Characteristics**
- **Record Weight**: 11 lbs. 7 oz.
- **Typical Lengths (In.)**: 12-16
- **No. of Ribs**: ~ 19
- **Lateral Line Scales**: 38-48
- **Scale Type**: cycloid

**Fillet Characteristics**
- **Vertebrae**: 40-44
- **Color**: whitish red outside
- **Larval Myotomes**: not found
- **Fish Myotomes**: 42-43
- **Fillet Myotomes**: 41-43
- **Bones in Fillet**: Yes
- **Species**: Silver Redhorse
Description: Can be smoked • Scored (1/4" - 3/8") vertically • Bones removed by canning or pickling • Lateral line straight and not visible on fillet because of midline • Example of redhorse scales shown with shorthead redhorse.

Scales: Large • Round anterior corners • Raised anterior surface after corners • Roundish posterior • Focus posterior • More anterior radii (10-40) than posterior (10-20) • Circuli broken at radii • Heavier circuli on posterior margin

Common Names: Common redhorse and golden or smallheaded, golden mullet or golden sucker

Golden Redhorse
*Moxostoma erythrurum*
Spotted Sucker
*Minotrema melanops*

**Common Names:** Striped, speckled, sand, winter, black or corn cob sucker or spotted redhorse

**Description:** Can be smoked • Scored (1/4" - 3/8") vertically • Bones removed by canning or pickling • Lateral line straight and not visible on fillet because of midline • Example of redhorse scales shown with shorthead redhorse • Scales black marked.
Description: Can be smoked • Scored (1/4" - 3/8") vertically • Bones removed by canning or pickling • Lateral line straight and not visible on fillet because of midline • Scales.

Common Names: Northern shorthead or common redhorse, short headed, red, eastern, brook or common mullet, redfin, river sucker, Des Moines plunger, redfin, red or bigscale sucker

Shorthead Redhorse
*Moxostoma macrolepidotum*
Catfish Family — *Ictaluridae*

All catfish are bottom-dwellers that consume worms, insects, fish, frogs and occasionally plant material. This family is easily identified because of the scaleless bodies. Their heads are broad and flat and have long barbels about the mouth. They possess numerous bands of bristle-like teeth in their jaws. They are mostly nocturnal — using their barbels to locate food. Three serrated spines are present: 1 dorsal and 2 pectoral — a prick from these spines may cause discomfort because of a venom that may be introduced.

This family includes large catfish, bullheads and madtoms (omitted). The meat of several species in this family is considered excellent. In stores, fins are left on channel catfish fillets.

Description: Small fish • Fish usually skinned • May not be filleted, fins may be left attached • Easy to see if dorsal spine cut or pulled • Adipose fin or anal fin removal may be obvious • No ribs before dorsal spine • On large fish may have yellow (fat) by dorsal and an adipose fin • No scales • If spines left attached, can be identified to species • Difficult to see myotomes ahead of dorsal fin • Lateral line straight and not visible on fillet because of midline • Muscle texture not as firm as channel catfish.

Common Name: Potomac Cat or White Cat of the Potomac

White Catfish
Ameiurus catus
Black Bullhead  
*Ameiurus melas*

**Common Names:** Black catfish, small, brown, yellow belly, common bullhead, mudcat, slick, polliwog, stinger, chucklehead, horned-pout catfish, or river snapper

**Description:** Small fish • Fish usually skinned • May not be filleted, fins may be left attached • Easy to see if dorsal spine cut or pulled • Adipose fin or anal fin removal may be obvious • No ribs before dorsal spine • No scales • If spines left attached, can be identified to species • Difficult to see myotomes ahead of dorsal fin • Lateral line straight and not visible on fillet because of midline • Muscle texture not as firm as channel catfish.

**External Characteristics**
- **Record Weight:** 8 lbs. 15 oz.
- **Typical Lengths (in.):** 7-12
- **No. of Ribs:** ~ 9
- **Lateral Line Scales:** scaleless
- **Scale Type:** none

**Fillet Characteristics**
- **Vertebrae:** 38-39
- **Color:** yellowish
- **Larval Myotomes:** Pre 15-17 Post 23-27
- **Fish Myotomes:** 33-37
- **Fillet Myotomes:** 33-37
- **Bones in Fillet:** No
- **Species:** Black Bullhead
**Description:** Small fish • Fish usually skinned • May not be filleted, fins may be left attached • Easy to see if dorsal spine cut or pulled • Adipose fin or anal fin removal may be obvious • No ribs before dorsal spine • No scales • If spines left attached, can be identified to species • Difficult to see myotomes ahead of dorsal fin • Lateral line straight and not visible on fillet because of midline • Muscle texture not as firm as it would be on a channel catfish.

**Common Names:** Bullhead, yellowbelly, brown, Mississippi, white-whiskered, slick bullhead, yellow catfish or cat, butterball, buttercat, polliwog, greaser, paper skin

**Yellow Bullhead**

*Ameiurus natalis*
Brown Bullhead  
*Ameiurus nebulosus*

**Common Names:** Marbled, speckled or common bullhead, brown, or common catfish, catfish, mudcat, horn-pout, horned, common or bull pout, minister, Schuylkill, wooly, red or Sacramento cat

**Description:** Small fish • Fish usually skinned • May not be filleted, fins may be left attached • Easy to see if dorsal spine cut or pulled • Adipose fin or anal fin removal may be obvious • No ribs before dorsal spine • No scales • If spines left attached, can be identified to species • Difficult to see myotomes ahead of dorsal fin • Lateral line straight and not visible on fillet because of midline • Muscle texture not as firm as channel catfish.

---

**External Characteristics**

- **Record Weight**: 7 lbs. 1 oz.
- **Typical Lengths (In.)**: 8-14
- **No. of Ribs**: ~ 9
- **Lateral Line Scales**: scaleless
- **Scale Type**: none

**Fillet Characteristics**

- **Vertebrae**: 38-43
- **Color**: yellowish-pink
- **Larval Myotomes**: Pre ~ 15-17 Post ~ 23-27
- **Fish Myotomes**: 38-44
- **Fillet Myotomes**: 36-37
- **Bones in Fillet**: No
- **Species**: Brown Bullhead
**Description:** Fish usually skinned • May not be filleted, fins may be left attached • Easy to see if dorsal spine cut or pulled • Adipose fin or anal fin removal may be obvious • No ribs prior to dorsal spine • No scales • Difficult to see myotomes ahead of dorsal fin • Lateral line straight and not visible on fillet because of midline • Higher amounts of fat pre-dorsal and near adipose fin • Sometimes meat above eyes collected • Larger fish, may be steaked.

**Common Names:** Spotted, blue, sand eel, white, river, silver, speckled, government, forked tail, lake, Great Lakes or willow catfish or cat, fiddler, sharpies, blue fulton, squealer or chucklehead.

**Channel Catfish**

*Ictalurus punctatus*

---

**External Characteristics**

- **Record Weight**: 58 lbs.
- **Typical Lengths (in.)**: 12-20
- **No. of Ribs**: ~9
- **Lateral Line Scales**: scaleless
- **Scale Type**: none

**Fillet Characteristics**

- **Vertebrae**: 46-48
- **Color**: yellowish
- **Larval Myotomes**: Pre 19-23 Post 26-31
- **Fish Myotomes**: 45-49
- **Fillet Myotomes**: 45-48
- **Bones in Fillet**: No
- **Species**: Channel Catfish
Blue Catfish
_Ictalurus furcatus_

Common Names: Catfish, bluecat, white or blue fulton, fulton, great blue, Mississippi, white, blue channel or forktail cat, chucklehead, humpback, highfin blue, Arkansas cat, boarder or mad tom

Description: Fish usually skinned. May not be filleted, fins may be left attached. Easy to see if dorsal spine cut or pulled. Adipose fin or anal fin removal may be obvious. No ribs before dorsal spine. No scales. Difficult to see myotomes ahead of dorsal fin. Lateral line straight and not visible on fillet because of midline. High amount of fat pre-dorsal and near adipose fin. Sometimes meat above eyes collected. Larger fish may be steaked.

External Characteristics

| Record Weight | 100 lbs. 8 oz. |
| Typical Lengths (in.) | 12-20 |
| No. of Ribs | ~9 |
| Lateral Line Scales | scaleless |
| Scale Type | none |

Fillet Characteristics

| Vertebrae | 51-53 |
| Color | yellowish |
| Larval Myotomes | Pre 19-21 Post 31-34 |
| Fish Myotomes | 50-55 |
| Fillet Myotomes | 48-52 |
| Bones In Fillet | No |
| Species | Blue Catfish |
**Description:** Can be a large fish • Fish usually skinned • May not be filleted, fins may be left attached • Easy to see if dorsal spine cut or pulled • Adipose fin or anal fin removal may be obvious • No ribs prior to dorsal spine • No scales • Difficult to see myotomes ahead of dorsal fin • Lateral line straight and not visible on fillet because of midline • Higher amounts of fat pre-dorsal and near adipose fin • Sometimes meat above eyes collected • Larger fish may be steaked • Has a very large stomach muscle which may be collected separately.

**Common Names:** Yellow, mud, shovelhead, morgan, appaloosa, Mississippi, Russian, granny or pieded catfish or cat, flatbelly, bean eye, tabby, goujon or bashaw

**Flathead Catfish**

*Pylodictis olivaris*
Codfish Family — *Gadidae*

Most members of this fish family are ocean-dwellers. One species lives in the freshwaters of North America. They have an elongate body with cycloid scales. Their head is very large characterized by a single, long barbel at the tip of the chin. The dorsal fin is long and soft and may be divided into two or three parts. The cods are important food fishes. Their jaws and vomer are equipped with numerous small teeth in wide bands. The cods are bottom-dwelling fish which like cover and feed on small fish and insects.

Species found in North America is **burbot**, *Lota lota* and **Atlantic tomcod**, *Microgadus tomcod*.
**Description:** Long fish • Lateral line straight and not visible on fillet because of midline • Found in northern United States and Canada • Fin placement may be obvious on fillet • Scales differ only in size and all are represented by the scale shown below.

**Scales:** Small • Circular • Central focus • No radii • Concentric circuli in concentric circles • Only fish covered whose scales don't overlap • May think fish not scaled • Lateral line scales smaller than other scales, opening not found in scale.

**Common Names:** Ling, eelpout, loche, freshwater cod, maria, methy, lush, lawyer, dogfish, cusk, spineless cat, mother eel or sand ling

**Burbot**

**Lota lota**

**External Characteristics**

- **Record Weight**
  - 18 lbs. 4 oz.
- **Typical Lengths (In.)**
  - 12-18
- **No. of Ribs**
  - ~ 21
- **Lateral Line Scales**
  - none
- **Scale Type**
  - cycloid

**Fillet Characteristics**

- **Vertebrae**
  - 50-66
- **Color**
  - whitish
- **Larval Myotomes**
  - not found
- **Fish Myotomes**
  - 51-62
- **Fillet Myotomes**
  - 48-54
- **Bones in Fillet**
  - No
  - **Species**
    - Burbot

**Length 179mm • ROM #30631 • Magnification 40X**
Temperate Bass Family — *Percichthyidae*

This family has two dorsal fins with stout spines, a complete lateral line, ctenoid scales (some cycloid) and well-developed jaws containing numerous teeth. They feed mostly in the top layer of water on small fishes and insects. They have a small number of myotomes (24), lower than all species except the freshwater drum. The meat is well liked, and fish such as stripers can reach a large size. The number of fish over a certain size may be restricted, as may undersized fish.

**Description:** Small fish • May be scaled and not filleted • Myotomes few and evenly spaced • Lateral line straight and not visible on fillet because of midline.

**Scales:** Average • Anterior corners sharply squared • Lateral edge flattened • Posterior edge curved • Focus posterior • Radii (8-20) anterior field • Long and pointed ctenii at posterior edge • Circuli heavier on lateral edges, not as heavy as for white bass • Anterior margin fairly straight • Example of scales shown for white bass.

**Common Names:** Silver, gray, blue-nose or sea perch, bass, narrow-mouthed bass, perch, gatte or stiffback

**White Perch**

*Morone americana*
**White Bass**

*Morone chrysops*

**Common Names:** Silver, sand, striped, gray, striped lake or black-striped bass, streaker, linesides or barfish

**Description:** Small fish • May be scaled and not filleted • Myotomes few and evenly spaced • Lateral line straight and not visible on fillet because of midline.

---

**External Characteristics**

<table>
<thead>
<tr>
<th>Record Weight</th>
<th>5 lbs. 14 oz.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Typical Lengths (in.)</td>
<td>10-12</td>
</tr>
<tr>
<td>No. of Ribs</td>
<td>~ 9</td>
</tr>
<tr>
<td>Lateral Line Scales</td>
<td>52-60</td>
</tr>
<tr>
<td>Scale Type</td>
<td>ctenoid</td>
</tr>
</tbody>
</table>

**Fillet Characteristics**

| Vertebrae | 24-25 |
| Color | pinkish-white red midline |
| Larval Myotomes | Pre 11-13 Post 7-9 |
| Fish Myotomes | 20-26 |
| Fillet Myotomes | 22-26 |
| Bones in Fillet | No |
| Species | White Bass |

---

*Length 106mm • ROM #24483 • Magnification 8-20X*
**Description:** Can be large fish • Lateral line straight and not visible on fillet because of midline • Myotomes few and evenly spaced • Length and height not as great as white bass • No other large freshwater fish has so few myotomes.

**Common Names:** Striper bass, linesider, roller, rockfish, rock, greenhead or squid hound

**Striped Bass**

*Morone saxatilis*
Yellow Bass
*Morone mississippiensis*

**Common Names:** Gold, sand or brassy bass, barfish, yellow perch, striped jack, streaker, stripe or rock fish

**Description:** Small fish • May be scaled and not filleted • Myotomes few and evenly spaced • Lateral line straight and not visible on fillet because of midline.

**Scales:** Average • Anterior corners squared • Lateral edge flattened • Posterior edge curved • Posterior focus • Radii (5-12) in anterior field • Long pointed ctenii at posterior edge • Circuli heavier on lateral margins • Anterior margins fairly straight • Example of scales shown for white bass.

---

**External Characteristics**

- **Record Weight**: 2 lbs. 2 oz.
- **Typical Lengths (in.)**: 7-10
- **No. of Ribs**: ~ 9
- **Lateral Line Scales**: 49-52
- **Scale Type**: ctenoid

**Fillet Characteristics**

- **Vertebrae**: 24-25
- **Color**: pinkish-white
- **Larval Myotomes**
  - Pre 11-13  Post 7-9
- **Fish Myotomes**: 23-24
- **Fillet Myotomes**: 24-25
- **Bones In Fillet**: No
- **Species**: Yellow Bass
Sunfish Family — *Centrarchidae*

The sunfish occur naturally only in the freshwaters of North America. This family prefers warmer waters. Their mouths contain bands of villiform teeth on the jaws, vomer, palatines and tongue in most species. The dorsal fins of this family consist of a spinous portion and a soft-rayed portion, to a varying degree jointed as one fin. The family has ctenoid scales; some cycloid scales from fillet cuts are found. All species are predators that like to remain near submerged objects. This family tends to feed in the upper layers of water. The sunfish family also includes black basses and crappies. Bag limits on large/smallmouth bass are lower than limits on crappie, and bass size may also be restricted. Some anglers fillet extra bass or undersize bass and say they are crappie. These fillets can be differentiated.

Species found in North America are *Sacramento perch*, *Archoplites interruptus*; *filer*, *Centrarchus macropterus*; *black crapple*, *Pomoxis nigromaculatus*; *white crapple*, *Pomoxis annularis*; *Roanoke bass*, *Ambloplites rupestris*; *Ozark bass*, *Ambloplites constellatus*; *shadow bass*, *Ambloplites ariommus*; *mud sunfish*, *Acantharchus pomotis*; *banded sunfish*, *Enneacanthus obsesus*; *bluespotted sunfish*, *Enneacanthus gloriosus*; *blackbanded sunfish*, *Enneacanthus chaetodon*; *largemouth bass*, *Micropterus salmoides*; *Suwannee bass*, *Micropterus notius*; *spotted bass*, *Micropterus punctulatus*; *Guadalupe bass*, *Micropterus treculi*; *redeye bass*, *Micropterus coosae*; *smallmouth bass*, *Micropterus dolomieu*; *warmouth*, *Lepomis gulosus*; *green sunfish*, *Lepomis cyanellus*; *bantam sunfish*, *Lepomis symmetricus*; *spotted sunfish*, *Lepomis punctatus*; *bluegill*, *Lepomis macrochirus*; *redear sunfish*, *Lepomis microlophus*; *pumpkinseed*, *Lepomis gibbosus*; *longear sunfish*, *Lepomis megalotis*; *dollar sunfish*, *Lepomis marginatus*; *redbreast sunfish*, *Lepomis auritus*; *orangespotted sunfish*, *Lepomis humilis*. 
Description: Smaller fish, may get over 2 pounds • May be skinned and not filleted • Lateral line arched and may be visible on fillet • Height versus length very important for identifying sunfish.

Common Names: Redeye bass, reeye, goggle eye or garguncle

Rock Bass
*Ambloplites rupestris*
Green Sunfish
*Lepomis cyanellus*

**Common Names:** Blue, buffalo, bluespotted sunfish, black, branch, pond, shade and green perch, perch, sand, rock or blue bass, redeye, slicks, goggle-eye, ricefield slick, rubbertail, sunperch or sunfish

**Description:** Small fish • May be skinned and not filleted • Lateral line arched and may be visible on fillet • Height versus length very important for identifying sunfish.

**Scales:** Average • Rounded anterior corners • Anterior edge fairly straight • Focus slightly posterior • 5-15 anterior radii • Circuli much heavier on posterior field • Anterior field very fine circuli • Most scales without ctenii • Ctenii found, not deep • Example of scales shown for bluegill.
**Description:** Small fish • May be skinned and not filleted • Lateral line arched and may be visible on fillet • Height versus length very important for identifying sunfish.

**Common Names:** Blue or redbreasted sunfish, common bluegill, sunfish, bream bluegill or coppernose bream, roach, pond, blue, gold, pond or sun perch, copperbelly, copperhead, dollardee, yellowbelly, pumpkinseed, plumb granny, blue joe, chainside or baldface

**Bluegill**  
*Lepomis macrochirus*
Redear Sunfish
*Lepomis microlophus*

Common Names: Fire cracker, shellcracker, stump-knocker, strawberry, G.I., tupelo, Texas-improved or yellow bream

Description: Small fish • May be skinned and not filleted • Lateral line arched and may be visible on fillet • Height versus length very important for identifying sunfish • If the ribs are left in the fish, it can be seen that the air bladder and stomach are the same length; in crappie, the air bladder is longer than the stomach.

Scales: Average • Anterior corners rounded • Anterior edge fairly straight • Focus posterior • 5-8 anterior radii • Short ctenii in narrow band • Wider circuli in posterior field • Circuli end at narrow band of ctenii • Example of scales shown for bluegill.

External Characteristics

<table>
<thead>
<tr>
<th>Record Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 lbs. 13 oz.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Typical Lengths (in.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>7-9</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>No. of Ribs</th>
</tr>
</thead>
<tbody>
<tr>
<td>~ 12</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Lateral Line Scales</th>
</tr>
</thead>
<tbody>
<tr>
<td>39-44</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Scale Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>ctenoid</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Fillet Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vertebrae</td>
</tr>
<tr>
<td>30</td>
</tr>
</tbody>
</table>

| Color |
| whitish-yellow |

<table>
<thead>
<tr>
<th>Larval Myotomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre 11-13</td>
</tr>
<tr>
<td>Post 15-17</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Fish Myotomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>29-30</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Fillet Myotomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>28</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Bones In Fillet</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Species</th>
</tr>
</thead>
<tbody>
<tr>
<td>Redear Sunfish</td>
</tr>
</tbody>
</table>
**Description:** Small fish • May be skinned and not filleted • Lateral line arched and may be visible on fillet • Height versus length very important for identifying sunfish.

**Scales:** Average • Anterior corners rounded • Anterior edge fairly straight • Focus posterior • 6-12 anterior radii • Short ctenii in narrow band • Posterior curved • Heavy posterior circuli • Circuli end at ctenii • Example of scales shown for bluegill.

**Common Names:** Wood, rock, weed or mud bass, goggle-eye, stump-knocker, bigmouth, black warmouth, perchmouth bream, strawberry or yawnmouth perch, jugmouth, mud chub, Indian fish, redeye, red-eyed bream, mudgapper, mo-mouth, morgan, molly or open mouth

**Warmouth**

*Lepomis gulosus*
**Smallmouth Bass**  
*Micropterus dolomieu*

**Common Names:** Oswego, small-mouthed black, black, brown, swago, streaked-cheek, river, gold, trout or green bass, green, white, brown or mountain trout, jumper, bronzeback or smallie

**Description:** May be skinned or scaled and not filleted • Arched lateral line may be visible on fillet • Difference in myotomes at top of fish compared to crappie • Height of bass fillet not as great as crappie of same length.

**External Characteristics**
- **Record Weight**: 11 lbs. 15 oz.
- **Typical Lengths (In.)**: 8-15
- **No. of Ribs**: ~ 12
- **Lateral Line Scales**: 68-78
- **Scale Type**: ctenoid

**Fillet Characteristics**
- **Vertebrae**: 31-33
- **Color**: whitish-gray
- **Larval Myotomes**: Pre 13-16 Post 16-18
- **Fish Myotomes**: 29-33
- **Fillet Myotomes**: 29-30
- **Bones in Fillet**: No

**Species:** Smallmouth Bass
Description: May be skinned or scaled and not filleted • Arched lateral line may be visible on fillet • Difference in myotomes at top of fish compared to crappie • Height of bass fillet not as great as crappie of same length • Fillet can be cross-sectioned so difference between largemouth bass and crappie can be determined.

Scales: Average • Anterior corners rounded • Fairly flat anterior margin • Focus posterior • 6-12 anterior radii • Circuli not continuous • Heavier circuli in posterior field • Posterior radii end at ctenii • Ctenii, when present, close together, short tines • See smallmouth for example of scales.

Common Names: Largemouth black, bigmouth, bucketmouth, open-mouth, Welshman, straw, slough, Florida, Oswego, mud, cow, river, lake or green bass, bass, mossback, chub jumper, hog, hawg, speckled hin or green trout

Largemouth Bass
*Micropterus salmoides*
White Crappie
*Pomoxis annularis*

**Common Names:** Timber crappie, crappie, crawpie, strawberry, silver, white or calico bass, silver, white, speckled or bridge perch, papermouth, sac-a-lait, barfish, bachelor, newlight, campbellite, John Demon, goldring, goggle eye or shad

**Description:** May be skinned or scaled on smaller fish • Lateral line arched and may be visible on fillet • Whiter meat than on bass • Difference in myotomes on top of fish compared to bass • Crappie are greater in height than bass of the same length • Fillet can be cross-sectioned so difference between crappie and bass can be determined • Example of scales shown for black crappie • White crappie and black crappie scales used for aging fish are different at the focus. Page 135 • If the ribs are left in the fish, it can be seen that the air supply bladder is longer than the stomach; it is the same length for bluegill.

**Scales:** Average • Anterior corners rounded • Fairly flat anterior margin • Focus posterior • 8-18 anterior radii • Posterior field, weak ctenii from focus to margin at 60° to 120° angles • Crappie can be differentiated from largemouth bass from their scales • See black crappie for example of scales.
Description: May be skinned or scaled on smaller fish • Lateral line arched and may be visible on fillet • Whiter meat than on bass • Difference in myotomes on top of fish compared to bass • Crappie are greater in height than bass of the same length.

Common Names: Crappie, crawpie, back-lick, straw, calico, strawberry, speckled, Oswego, or grass bass, shiner, moonfish, white or Mason perch, specks, slab, tinmouth, bachelor, sac-a-lait, bitterhead, bream and lamplighter

Black Crappie
*Pomoxis nigromaculatus*
Perch Family — *Percidae*

Three groups compose the *Percidae*, five perches, pike perches and darters (omitted). The perches are characterized by a dorsal fin divided into separate spiny and soft-rayed portions. The anal fin bears one or two spines. All species are predaceous and have elongated bodies, have a flat spine on the gill cover, and sharp teeth rimming the mouth. The perch family are primarily deepwater fish that come into shallower water to feed on minnows and other fish. They are considered among the best eating of freshwater fish. One problem that may exist with this family is number and size restrictions for walleye and not for yellow perch. A small walleye can be filleted and "called" a yellow perch. Walleye and sauger can be differentiated from yellow perch.

Species found in North America are sauger, *Stizostedion canadense*; walleye, *Stizostedion vitreum*; yellow perch, *Perca flavescens*.
**Description:** Small fish • Arched lateral line may be visible on fillet • Fewer myotomes than walleye or sauger (>40) • If ribs are present, are twice as heavy for perch than for walleye or sauger of same length • Scales more deeply scalloped than for sauger and walleye.

**Common Names:** Lake, American, ring, redfin, raccoon, coon, Eisenhower, red, ring-tail, ringed, river sand, green, jack or striped perch, perch, convict, coontail, yellow ned, bandit fish or redfin trout

**Yellow Perch**

*Perca flavescens*
Sauger
*Stizostedion canadense*

**Common Names:** Sand, blue or grey pickerel, blue or grey perch, sand, blue or grey pike perch, gray, river, spotfin or rattlesnake pike, jack, jack salmon, horsefish, pickering or spotted trout

**Description:** Arched lateral line may be visible on fillet • More myotomes than yellow perch • If ribs are present, are half as heavy as for yellow perch of same size • Scales not as deeply lobed as yellow perch (<40).

**Length 210mm • ROM #22433 • Magnification 6-12X • Sauger and walleye scales used for aging fish can be differentiated at the focus • Page 136**
Description: Arched lateral line may be visible on fillet • More myotomes than yellow perch • If ribs are present, are half as heavy as for yellow perch of same size • Scales not as deeply lobed as yellow perch.

Common Names: Yellow walleye, pickerel, pike-perch, yellow, blue, gray or green pike or pike-perch, wall-eyed pike or pickerel, jack salmon, jackfish, dory, glass eye, white eye, marble eye or yellow pickerel

Walleye
Stizostedion vitreum

Length 150mm • ROM #35176 • Magnification 8-16X • Walleye and sauger scales used for aging fish can be differentiated at the focus • Page 136

External Characteristics
Record Weight
25 lbs.

Typical Lengths (In.)
13-20

No. of Ribs
~20

Lateral Line Scales
80-108

Scale Type
ctenoid

Fillet Characteristics
Vertebrae
44-48

Color
whitish-yellow
light red outside

Larval Myotomes
Pre 16-21 Post 22-29

Fish Myotomes
38-53

Fillet Myotomes
42-47

Bones in Fillet
No

Species
Walleye
Drum Family — *Sciaenidae*

The drum family is primarily marine but occupies coastal areas and sometimes brackish or freshwater where a river enters the sea. The drum is a silvery fish with a highly arched back, and an extension of the lateral line onto the tail. The dorsal fin has a deep notch between the spiny and soft portions. The drum is a bottom feeder grinding its food (snails, crayfish, insects, clams) with a powerful set of flat pharyngeal teeth. The drum possess large ivory-like ear bones within its skull which are unlike those of other freshwater fish. The drum can produce a loud sound by vibrating the walls of its air bladder. Drums have ctenoid scales on head and body.

One species is restricted to the freshwaters of North America, the **freshwater drum**, *Aplodinotus grunniens*. 

*Freshwater drum*
Description: Small number of myotomes for a fish that can be large. Arched lateral line may be visible on fillet. Differs from temperate bass because myotomes narrow greatly near tail.

Common Names: Freshwater river, sheepshead or lake drum, sunfish, silver or gray bass, grunter, white or gray perch, croaker,goo, crocus, thunderpumper, grunt, campbellite, jewel-head, bubbler or grinder.

Freshwater Drum
*Aplodinotus grunniens*
SOLVING POTENTIAL PROBLEMS FACED IN WILDLIFE FORENSICS

With the facilities available for fish production and the illegal overharvesting of wild species, violators are selling wild fish as domestically raised fish. Can wild fish be differentiated from domestic fish? Fish diets are the key to this problem and are used to separate these fish. Fatty acid comparisons of muscle segments using gas chromatography can answer this important question (Suzuki et. al. 1986, Jahncke et. al. 1988 and Villarreal 1992).

Many families of fish can be identified by their fillets; to identify them to a species, other characteristics should be examined. Fish fillets pick up scales like mammal meats pick up hair and avian meats pick up feathers. If you identify a fillet, and the scale differs from the fillet, this is possible because of fish-cleaning benches. If the scale matches the fillet, great. Several species of fish scales were examined with a scanning electron microscope to see if species can be differentiated using the scales used for aging fish.

Species examined were northern pike and muskellunge, walleye, sauger and saugeye, white bass, striped bass and their hybrid the wiper, white crappie and black crappie. We examined a scale to find differences, then five additional fish were viewed to see if this feature was consistent. Scales were taken from Nebraska fish so they may vary from fish taken in other locations. These are the differences found in Nebraska.

For northern pike and muskellunge, works by Crossman and Casselman, 1969, and Casselman et. al, 1986, were useful in separating these species.

Key features for segregation of scales for muskellunge, white crappie and black crappie, walleye and sauger are based upon the focal point of the scale, Figures 6 and 7. White bass and striped bass rely upon the cteni fragments for separation, Figure 8.
Figure 6. The focus of the scale separates black crappie and white crappie.
Figure 7. The focus of the scale and the circuli around the focus separates walleye and sauger.
Figure 8. The focus of the scale is similar, the difference is the length of the cteni margins on the posterior edge of the scale. White bass can be different from a wiper and striped bass, but wipers not from striped bass.
Identification of *Esocides* to species is difficult, yet frequently possible. Muskellunge can be distinguished from northern pike if the dorsal aorta or Y-bones are examined. In addition, scales can be used if they are present. In a skinned fish with the head removed, identification can be made by examining the dorsal aorta lying against the vertebra just anterior to the pelvic fins. In northern pike, the aorta is straight and in the muskellunge it is curved (Figure 9).

If the fish is filleted, examine the fillet for Y-bones. (Caution! Y-bones have variation from head towards tail, use Y-bones near head for true results.) The length of the dorsal rami is about as long as the ventral rami in muskellunge, but the ventral rami is longer in the northern pike (Figure 10). When comparing fillets whose dimensions suggest the host fishes from which they came were about the same size, the shape of the Y-bones also can be used to distinguish the two species. The Y-bones of northern pike are finer and noticeably curved (Figure 10).

When scales are present, the focus of the scale when viewed under a microscope, also can assist in identification (Figure 11). The muskellunge scale's focus is visibly more open than the northern pike's.

As additional identification, muskellunge scales have a more uniform width to height shape while northern pike scales are noticeably taller than wide (Figure 11). Length versus width ranges from 1.77-1.98 in northern pike and 1.41-1.49 in muskellunge.
Caution! Y-bones have variation from head towards tail, only use Y-bones near head for best results.

Figure 10. Y-bones from muskellunge (left) and northern pike (right).

Figure 11. Scale from mid-lateral region of muskellunge (left) and northern pike (right).
REFERENCES


Battle, H. I. 1940. The embryology and larval development of the goldfish (Carassius auratus) from Lake Erie. Ohio J. Sci. 40(2):82-93.


Casteel, R. W. 1972. A key, based on scales, to the families of native California freshwater fishes. Proceedings of the California Academy of Sciences,


Emery, A. R. and A. Strange. 1984. Fish scale microstructure as a means to species identification. Authors must be contacted for this publication. Contact Royal Ontario Museum for there location.


Henderson's guide to freshwater & saltwater state game fish records. 1989 ed., Published by Outdoor Statistical Resources.


________________________ 1952. Comparative studies of the scales in Japanese freshwater fishes, with special reference to phylogeny and evolution. Department of Biology, Aiti Gakugei University. I. Introduction & II. Table of Fishes Used in this Study. 183-191.


Pevsner, V. V. 1926. Zur frage uber die struktur und die entwicklung der schuppen einiger knochenfische. Zoologischer Anzeiger, LXVIII. Band Nr. 11/12, 20 Oktober 1926.


Smith, Dr. C. L. Key to the species of sturgeons that occur in New York state, Family Acipenseridae. AMNH Dept., Ichthyology.


Takos, M. J. 1942. A preliminary study of the scales of Maine fresh-water fishes, with a scale key to the families. Mimeographed.


Van Oosten, J. 1957. The skin and scales. The Physiology of Fishes. pp. 207-244.


In identifying a fish fillet, the process of elimination can be very important. Fillet color, fillet shape, myotomes, bone placement and scales are all useful. Cross-sectioning can also be a helpful tool for examination of fillets or pieced fillets for identifying species.

The speed and endurance of a fish is different from species to species and is reflected in the muscle structure. The fillet shows external myotomes (myomeres) which will vary among fish families. A cross-section will reveal the internal myotomes which don't resemble the external myotomes. These structures can also be a distinct aid in species identification.

Blin et al. 1953, sampled cross-sectioned fillets just behind head, at the anus and midway between the anus and the tail to separate several saltwater species. Freshwater fish can also be identified through application of this technique. In cycloid fish (trout, salmon and pike), the section prior to the anus contains bones (intermuscular) in the fillet other than the ribs. The tail section behind the anus does not have these bones. All ctenoid fish studied have no bones other than ribs and vertebrae. Note that some ctenoid fish may possess cycloid scales, especially toward the head, but a cycloid scale doesn't necessarily mean a cycloid fish.

Problems in forensics can involve closely related species or similar species when there is a distinction between bag limits and legal size restrictions. Walleye may have size restrictions and the daily bag is much less between them and yellow perch. When yellow perch are suspected of being walleye, the cross-sections may be used to aid in identification. This difference can be compared at the anus and between anus and tail for walleye and yellow perch (Figure 12). For pike (Esox) and gar (Lepisosteidae), the section near the head is obviously different from the other species examined. This difference is shown (Figure 13) where a northern pike, yellow perch, largemouth bass and white bass are presented.
A meat slicer (1/8" slice) and a frozen fish provides the best samples.

Figure 12. Walleye fillet versus a yellow perch fillet cross-sectioned at the anus and between anus and tail.

[A meat slicer (1/8" slice) and a frozen fish provides the best samples.]

Figure 13. Northern pike, yellow perch, largemouth bass and white bass cross-sectioned just behind head.
This key may help you identify many fish caught by commercial or sport fishing. Start at 1, noting that two alternatives are presented. Always start at the top of any series of such alternatives. If the statement is true of the fish in question, proceed along the line across the page. If the statement is false, follow the line down the page to the next alternative. Continue this until you find the one that best describes the fish, then move across the page. Moving across may lead to a very quick identification, or it may lead to several other alternatives. It may also direct you to another part of the key, for example, "go to 15". Drawings of fish anatomy are found at the end of this key. This key might not work in all cases, because of hybridization, because of complex identification characteristics, or because they may not have been included. In case of difficulty, consult with a more complete scientific key. "How to Know Freshwater Fishes" by Eddy and Underhill is available for $15.00. They supplied most pictures in this key.

Start

1

Paddle-like snout

Polyodontidae

Polyodon spathula

Paddlefish Family

Cod Family

Gadidae

4 large barbels

Body with several rows of bony plates

Go to 7

Go to 14

Ictaluridae

Catfish Family

Acipenseridae

Sturgeon Family

5 rows thorny scales or plates, 4 barbels by mouth

Flat scales that cover body

Go to 2

8 barbels, adipose fin present

One barbel on chin, rounded tail fin

Scales not visible or not present

Scales visible

Go to 11
Tail fin more or less rounded

1. Adipose fin present
   - Go to 13

2. Tail fin forked or almost straight
   - Adipose fin absent
     - Go to 3

3. Tail fin less rounded
   - Hard plate-like scales, bony snout with sharp teeth
     - Gar Family
       - Lepisosteidae
     - Go to 20

4. Soft dorsal fin much longer than spinous dorsal fin (23 to 32 rays)
   - Drum Family
     - Sciaenidae
     - Freshwater Drum
       - Aplodinotus grunniens

5. No spinous dorsal fin, 45 or more soft dorsal fin rays
   - Bowfin Family
     - Amiidae
     - Bowfin
       - Amia calva
Lateral line scales 36-38, barbels on each side of upper jaw

Minnow Family exceptions

1 dorsal fin (single or double)

Dorsal fin with 1 stiff spine, more than 12 dorsal rays

Go to 5

Dorsal fin with several stiff spines

Go to 5

Dorsal fin without sharp spines

Go to 8

Two dorsal fins

Go to 4

Torpedo shaped body, 1-2 anal fin spines, fewer than 23 rays on soft dorsal fin

Perch Family
Percidae

White tip on lower lobe of tail fin. First dorsal fin has dark spot at posterior where fin meets body.

Go to 4

1 or 2 anal fin spines

Many dark spots on first dorsal fin, dark patches on body

Go to 4

Carps
Cyprinus carpio

Goldfish
Carassius auratus

Yellow Perch
Perca flavescens

Walleye
Stizostedion vitreum vitreum

Sauger
Stizostedion canadense
4 (cont.)

Flat silvery body, lengthwise striped, 3 or more anal fin spines

Temperate Bass Family
Percichthyidae

3 or more anal fin spines

1 tooth patch on base of tongue, broken horizontal lines on side, anal fin spines stair-stepped

White Bass
Morone chrysops

Usually 2 tooth patches on base of tongue, broken and unbroken horizontal lines on side, anal fin spines stair-stepped

Wiper
Female Striped Bass x Male White Bass
Hybrid

2 tooth patches on base of tongue, unbroken horizontal lines on side, anal fin spines stair-stepped

Striped Bass
Morone saxatilis

Sides with 7 longitudinal black stripes

Yellow Bass
Morone mississippiensis

Anal fin spines not stair-stepped, sides plain or with faint horizontal lines

White Perch
Morone americana
Flier
Centrarchus macropterus

10 or more spines in dorsal fin

Vertical bands on body, 5-6 spines in dorsal fin

Spotted body, 7-8 spines in dorsal fin

10 or more spines in dorsal fin

Back corner of mouth extends to back of eye

Back corner of mouth does not extend to back of eye

Vertical lines on side

More or less connected broken row of lateral notches

White Crappie
Pomoxis annularis

Black Crappie
Pomoxis nigromaculatus

Largemouth Bass
Micropterus salmoides

Smallmouth Bass
Micropterus dolomieui

Spotted Bass
Micropterus punctulatus
Pointed pectoral fin

Small mouth

6

Rounded pectoral fin

Lateral line with 40 or more scales, 10-20 rays on soft anal fin, dark spot on soft dorsal fin, opercle tab solid dark blue or black

No distinct spots on soft dorsal fin, rear margin of opercle thin and flexible, opercle tab black with broad red or orange trailing edge

Distinct spots on soft dorsal fin, cheek with wavy bluish line, opercle tab dark in center, margin white top and bottom and red at rear

Lateral line scales fewer than 40, 7-10 rays on soft anal fin, bright orange spots on body

Long black ear flap (opercle)

Bluegill
Lepomis macrochirus

Redear Sunfish
Lepomis microlophus

Pumpkinseed
Lepomis gibbosus

Orangespotted Sunfish
Lepomis humilis

Redbreast Sunfish
Lepomis auritus

Longear Sunfish
Lepomis megalotis
Large mouth, rounded pectoral fin

**6** (cont.)

- **Green Sunfish**
  - *Lepomis cyanellus*
  - Usually 3 anal spines, lateral line complete with 41 or more scales, blue-green streaks on side of head, opercle tab dark with bronze or yellow margin

- **Rock Bass**
  - *Ambloplites rupestris*
  - 5-8 anal spines, brassy color and somewhat mottled, dark spots on scales forming horizontal rows

- **Sacramento Perch**
  - *Archoplites interruptus*
  - 5-8 anal spines, dark back, silvery below, about 7 vertical bars on each side

- **Warmouth**
  - *Lepomis gulosus*
  - 3 anal spines, each scale with dark spot

**7**

- **Cod Family**
  - *Gadidae*
  - Long dorsal fin

- **Dorsal fin in three parts**

- **Burbot**
  - *Lota lota*

- **Tomcod**
  - *Microgadus tomcod*
Sensory pores on lower jaw

Opercle scaled or upper half scaled

Cheek fully scaled, 5 or less sensory pores (per side) on underside of lower jaw, body has small light spots on dark background

Cheek fully or partially scaled, distinct dark vertical bars and spots up to 30" size, hybrid has characteristics of both parents but looks more like muskie, very difficult to distinguish when over 30" long

Cheek scaled on upper half, 6 or more sensory pores (per side) on underside of lower jaw, body with dark vertical bars or spots, markings distinct in younger fish

Cheek scaled only in younger fish

6 or more sensory pores on lower jaw

Sides and back marked with dark wavy or wormy vertical streaks

Side and back marked with dark horizontal network or chain pattern, bar below eye usually vertical

Dusky bar beneath eye alfged slightly backward

Dusky bar beneath eye usually vertical

Northern Pike
Esox lucius

Sensory pores on lower jaw usually 5

Tiger Muskie
Female Muskie x Male
Northern Hybrid

Muskie Lunge
Esox masquinongy

Grass Pickerel
Esox americanus

vermiculatus

Chain Pickerel
Esox niger

Dusky bar beneath eye angled slightly backward

Dusky bar beneath eye usually vertical

Pike Family
Esocidae

Duck-billed snout with sharp teeth, sensory pores on lower jaw

Scales present on side of head

Snout short, not duck billed
Scales absent on side of head, no sensory pores on lower jaw

**Go to 9**

163
Lateral line present, keel midline of belly without sharp saw-tooth projections, dorsal fin partly over anal fin

**Mooneye Family Hiodontidae**

Dorsal fin with 11 or 12 rays

**Mooneye**

*Hiodon tergisus*

Dorsal fin with 9-10 rays

**Go to 16**

Lateral line present, keel midline of belly without sharp saw-tooth projections, dorsal fin partly over anal fin

**Go to 10**

Lateral line absent, keel on midline of belly with sharp saw-tooth projections, dorsal fin forward of anal fin

**Go to 12**

Lateral line absent, keel on midline of belly with sharp saw-tooth projections, dorsal fin forward of anal fin

**Go to 16**

Lateral line absent

Dorsal fin far forward of anal fin

**Go to 10**

Dorsal fin with 10 or more principal rays

**Go to 12**

Dorsal fin with 8 (in one species 9) principal rays

**Go to 10**

**Axillary process at base of pelvic fin, keel on belly**

**Axillary process present**

**Axillary process absent, belly not keeled**

**Axillary process present**

**Axillary process absent**
Many of the species of redhorse and suckers are identified by their mouth parts and are not separated by species in this key. As a general rule, redhorse have grooved lips and suckers have bumpy lips.
Barbels not fringed, lower lip with 2 lobes, adult snout rounded

**Sturgeon Family**
*Acipenseridae*

Barbels not fringed

- Lower lip with 2 lobes

11

Barbels fringed

- Lower lip with 4 lobes

Barbels fringed, lower lip with 4 lobes, snout shovel-shaped

12

Length exceeds 14", anal fin closer to tail fin than in native minnows

**Minnow Family**
*Cyprinidae*

Most minnow species are not included in key.

**Lake Sturgeon**
*Acipenser fulvescens*

- Snout rounded and conical
- Dorsal fin rays 36 or fewer
- Anal fin rays 23 or fewer

**Shovelnose Sturgeon**
*Scaphirhynchus platorynchus*

- Bases of outer barbels in line with bases of inner barbels
- Dorsal fin rays 37 or more
- Anal fin rays 24 or more
- Belly covered with small plates (except in young)

**Pallid Sturgeon**
*Scaphirhynchus albus*

- Bases of outer barbels usually behind base of inner barbels
- Belly smooth (without small plates), 37 or more dorsal fin rays, 24 or more anal fin rays
- Anal fin rays 23 or fewer
- Belly without plates

**Shortnose Sturgeon**
*Acipenser brevirostrum*

- Front of anal fin just below front of dorsal fin
- Bases of outer barbels usually behind bases of inner barbels

**Grass Carp**
*Ctenopharyngodon idella*

- Dorsal fin rays 37 or more
- Anal fin rays 24 or more
- Belly covered with small plates (except in young)

- Bases of outer barbels in line with bases of inner barbels
- Belly covered with small plates (except in young)
Dorsal fin rays more than 17 rays

Dorsal fin rays less than 17

Dorsal fin rays less than 12

Lateral line scales less than 100

Lateral line scales more than 100

Trout Family
*Salmonidae*

Anal fin
13 or more rays

Salmon
*Oncorhynchus*

Go to 18

Anal fin 12 or less rays

Trout
*Salmo & Salvelinus (Char)*

Go to 19

Rainbow Smelt
*Osmerus mordax*

Smelt Family
*Osmeridae*

Go to 15

American Grayling
*Thymallus arcticus*
Adipose fin present

**Catfish Family** ictaluridae

Tail fin not deeply forked

Lower jaw not longer than upper jaw, more than 16 anal fin rays

Barbels under jaw white, usually 24-27 anal fin rays

**White Catfish** Ameiurus catus

Channel Catfish Ictalurus punctatus

Blue Catfish Ictalurus furcatus

Flathead Catfish Pylodictis olivaris

Barbels under jaw dark, usually 17-21 anal fin rays

Black Bullhead Ameiurus melas

Barbels under jaw white, usually 22-23 anal fin rays

Yellow Bullhead Ameiurus natalis

Stonecat Noturus flavus

Adipose fin is thin ridge and appears continuous with tail fin, 8" or less in length

Lower jaw longer than upper, head flattened, fewer than 16 anal rays, usually yellowish or mottled

Barbels under jaw dark, fewer than 16 anal rays, usually yellowish or mottled

**Brown Bullhead** Ameiurus nebulosus

168

Anal fin rounded 19-23 rays not as deeply forked tail

Edge of anal fin rounded with 24-29 rays

Edge of anal fin straight, 30 or more rays

Lower jaw projecting beyond upper jaw, except in smallest young

Anal fin with outer margin rounded and with 24-29 rays

Anal fin with outer margin straight, and with 30-35 rays
Two flaps dividing a nostril

Salmon Family
Salmonidae

Length of maxillary less than twice its width

Mouth inferior, snout overhanging mouth lateral line scales less than 90 (70-94)

Lower maxillary longer than top, body pike-like

Broad Whitefish
Coregonus nasus

Common Whitefish
Coregonus clupeaformis

Inconnu
Stenodus leucichthys

Single flap dividing a nostril

Scales more than 75

Tip of snout below level of eye, profile of head rounded

Mountain Whitefish
Prosopium williamsoni

Tip of snout below level of eye, profile of head not rounded

Round Whitefish
Prosopium cylindraceum
Lower jaw not projecting beyond tip of snout, 29-35 anal fin rays, 55 or more scales in lateral line

Last dorsal fin ray elongated to slender filament, dark spot behind upper end of opercle

Herring Family
Clupeidae

Last dorsal fin ray not elongated to slender filament

Lower jaw projects beyond tip of snout, dark speckles on tip of snout, teeth present on rim of upper jaw

Silver patch on cheek longer than deep, less than 55 gill rakers on lower part of first gill arch

American Shad
Alosa sapidissima

Lower jaw equal to or slightly projecting beyond tip of snout, dark speckles on most of lower jaw, teeth absent on rim of upper jaw

Skipjack Herring
Alosa chrysocloris

Alewife
Alosa pseudoharengus

Gizzard Shad
Dorosoma cepedianum

Rays of anal fin usually 29-35
Body brownish or blackish

Pelvic fins densely speckled with black

Small mouth located well below eye, body surface in front of dorsal fin strongly keeled

Pectoral, pelvic, anal fins dark, opercle rounded along lower edge

Body silvery

Pelvic fins scarcely or not at all speckled with black

Small mouth located well below eye, body surface in front of dorsal fin rounded or weakly keeled

Mouth large, with anterior location; front of upper lip above lower margin of eye

Pectoral, pelvic, anal fins pale, opercle straight along lower edge

Anterior dorsal rays elongated or as long as base of fin

No pimple-like structure on lower jaw

Anterior dorsal rays only slightly elongated, not more than ½ base of fin

Nipple-like structure on lower jaw

Smallmouth Buffalo
Ictiobus bubalus

Black Buffalo
Ictiobus niger

Bigmouth Buffalo
Ictiobus cyrinellus

Quillback Carpsucker
Carpiodes cyrinus

Highfin Carpsucker
Carpiodes velifer

River Carpsucker
Carpiodes carpio
Chinook Salmon
Oncorhynchus tshawytscha

Black gums, spots on both halves of tail

Coho Salmon
Oncorhynchus kisutch

White gums, spots only on top half of tail

Pink Salmon
Oncorhynchus gorbuscha

Mouth not black

Chum Salmon
Oncorhynchus keta

No distinct spots on back or caudal fin, fin speckling

30-40 long slender gill rakers

Sockeye (Kokanee) Salmon
Oncorhynchus nerka

19-26 short stout gill rakers

Distinct black spots on back and caudal fin
Dark shaped "X" spots on sides of adults

Atlantic Salmon
Salmo salar

Brown Trout
Salmo trutta

Rainbow Trout
Oncorhynchus mykiss

Cutthroat Trout
Oncorhynchus clarki

Char Family
Salvelinidae

No teeth on shaft of vomer, dark spots or speckling

Large black spots, many surrounded by halos

No red slash under lower jaw

Red slash under lower jaw

Longitudinal pinkish streak

Dolly Varden
Salvelinus malma

Reddish spots, blue halos, pinkish fins edged in white

Deeply forked tail, light spots

Eastern Brook Trout
Salvelinus fontinalis

Lake Trout
Salvelinus namaycush

No vermiculations on dorsal fin

No vermiculations on back and dorsal fin

No teeth on shaft of vomer, spots grey, yellow orange or red

Deeply forked tail, light spots
Double row of teeth in upper jaw (adults)

Gar Family
Lepisosteidae

Snout long and slender
1 row of large teeth
(inner row mostly small)
in upper jaw

Spots on head
Snout short and broad

No spots on head

Alligator Gar
*Lepisosteus spatula*

Longnose Gar
*Lepisosteus osseus*

Spotted Gar
*Lepisosteus oculatus*

Shortnose Gar
*Lepisosteus platostomus*
FISH ANATOMY

SPINY-RAYED FISH (Bluegill)
- Dorsal Fin
- Spiny Rays
- Opercle Tab
- Breast
- Pectoral Fin
- Pelvic Fin
- Belly
- Lateral Line
- Anal Fin
- Tail Fin

HEAD (Yellow perch)
- Nostrils (Nares)
- Opercular Spine
- Opercle
- Cheek
- Upper Jaw (Maxillary)
- Lower Jaw (Mandible)

SOFT-RAYED FISH (Channel catfish)
- Dorsal Fin Spine
- Dorsal Fin
- Adipose Fin
- Tail (Caudal) Fin
- Pectoral Fin Spine
- Pectoral Fin
- Pelvic Fin
- Anal Fin
- Barbels
<table>
<thead>
<tr>
<th>Scientific Name</th>
<th>Common Names</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acantharchus pomotis, 117</td>
<td></td>
</tr>
<tr>
<td>Acipenser brevirostrum, 40, 166</td>
<td></td>
</tr>
<tr>
<td>Acipenser fulvescens, 40, 41, 166</td>
<td></td>
</tr>
<tr>
<td>Acipenser medirostris, 40</td>
<td></td>
</tr>
<tr>
<td>Acipenser oxyrhyynchus, 40</td>
<td></td>
</tr>
<tr>
<td>Acipenser transmontanus, 40</td>
<td></td>
</tr>
<tr>
<td>Alewife, 17, 22, 52-55, 170</td>
<td></td>
</tr>
<tr>
<td>Alosa aestivalis, 52</td>
<td></td>
</tr>
<tr>
<td>Alosa alabamae, 52</td>
<td></td>
</tr>
<tr>
<td>Alosa chrysochloris, 52, 170</td>
<td></td>
</tr>
<tr>
<td>Alosa mediocris, 52</td>
<td></td>
</tr>
<tr>
<td>Alosa pseudoharengus, 52, 53, 170</td>
<td></td>
</tr>
<tr>
<td>Alosa sapidissima, 52, 54, 170</td>
<td></td>
</tr>
<tr>
<td>Amblolites ariornmus, 117</td>
<td></td>
</tr>
<tr>
<td>Amblolites constellatus, 117</td>
<td></td>
</tr>
<tr>
<td>Amblolites rupestris, 117, 119, 162</td>
<td></td>
</tr>
<tr>
<td>Ameiurus brunneus, 102</td>
<td></td>
</tr>
<tr>
<td>Ameiurus catus, 102, 103, 168</td>
<td></td>
</tr>
<tr>
<td>Ameiurus melas, 102, 104, 168</td>
<td></td>
</tr>
<tr>
<td>Ameiurus natalis, 102, 105, 168</td>
<td></td>
</tr>
<tr>
<td>Ameiurus nebulosus, 102, 106, 168</td>
<td></td>
</tr>
<tr>
<td>Ameiurus platyccephalus, 102</td>
<td></td>
</tr>
<tr>
<td>Ameiurus serracanthus, 102</td>
<td></td>
</tr>
<tr>
<td>Amia calva, 50, 51, 157</td>
<td></td>
</tr>
<tr>
<td>Aplodinotus grunniens, 132, 133, 157</td>
<td></td>
</tr>
<tr>
<td>Archoplites interruptus, 117</td>
<td></td>
</tr>
<tr>
<td>Bass, Guadalupe, 117</td>
<td></td>
</tr>
<tr>
<td>Bass, largemouth, 17, 19, 30, 117, 118, 125, 126, 154, 155, 160</td>
<td></td>
</tr>
<tr>
<td>Bass, Ozark, 117, 119</td>
<td></td>
</tr>
<tr>
<td>Bass, redeye, 117, 119</td>
<td></td>
</tr>
<tr>
<td>Bass, Roanoke, 117</td>
<td></td>
</tr>
<tr>
<td>Bass, rock, 17, 119, 162</td>
<td></td>
</tr>
<tr>
<td>Bass, shadow, 117</td>
<td></td>
</tr>
<tr>
<td>Bass, smallmouth, 17, 28, 31, 117, 124, 160</td>
<td></td>
</tr>
<tr>
<td>Bass, spotted, 117, 160</td>
<td></td>
</tr>
<tr>
<td>Bass, striped, 17, 18, 112, 114, 115, 134, 137, 159</td>
<td></td>
</tr>
<tr>
<td>Bass, Suwannee, 117</td>
<td></td>
</tr>
<tr>
<td>Bass, white, 17, 18, 32, 112-116, 134, 137, 154, 155, 159</td>
<td></td>
</tr>
<tr>
<td>Bass, yellow, 17, 18, 112, 116, 159</td>
<td></td>
</tr>
<tr>
<td>Bloater, 56</td>
<td></td>
</tr>
<tr>
<td>Bluegill, 17, 19, 117, 118, 120-123, 126, 161</td>
<td></td>
</tr>
<tr>
<td>Bowfin, 17, 25, 29, 37, 50, 51, 157</td>
<td></td>
</tr>
<tr>
<td>Buffalo, bigmouth, 93, 96, 171</td>
<td></td>
</tr>
<tr>
<td>Buffalo, black, 17, 20, 93, 171</td>
<td></td>
</tr>
<tr>
<td>Buffalo, smallmouth, 17, 20, 93, 97, 171</td>
<td></td>
</tr>
<tr>
<td>Bullhead, black, 17, 20, 102, 104, 168</td>
<td></td>
</tr>
<tr>
<td>Bullhead, brown, 17, 20, 21, 102, 106, 168</td>
<td></td>
</tr>
<tr>
<td>Bullhead, flat, 102</td>
<td></td>
</tr>
<tr>
<td>Bullhead, snail, 102</td>
<td></td>
</tr>
<tr>
<td>Bullhead, spotted, 102</td>
<td></td>
</tr>
<tr>
<td>Bullhead, yellow, 17, 21, 102, 105, 168</td>
<td></td>
</tr>
<tr>
<td>Burbot, 29, 110, 111, 162</td>
<td></td>
</tr>
<tr>
<td>Carassius auratus, 86, 88</td>
<td></td>
</tr>
</tbody>
</table>
Carp, common, 17, 20, 29, 36, 86, 87
Carp, grass, 17, 21, 86, 89, 166
Carpiodes carpio, 91, 93, 171
Carpiodes cyprinus, 90, 93, 171
Carpiodes vellifer, 92, 93, 171
Carpsucker, highfin, 17, 20, 92, 93, 171
Carpsucker, river, 17, 20, 91, 93, 171
Catfish, blue, 22, 102, 108, 168
Catfish, channel, 17, 22, 102-107, 168
Catfish, flathead, 27, 102, 109, 168
Catfish, headwater, 102
Catfish, white, 102, 103, 168
Catfish, Yaqui, 102
Catostomus catostomus, 93
Catostomus commersoni, 93, 95, 165
Catostomus latipinnis, 93
Catostomus macrocheilus, 93
Centrarchus macropterus, 117, 160
Char, Angayukaksurak, 56
Char, Arctic, 17, 24, 25, 56, 67
Chasmistes brevirostris, 93
Chasmistes cujus, 93
Chasmistes liorus, 93
Cisco, Arctic, 56
Cisco, blackfin, 56
Cisco, Bonneville, 56
Cisco, least, 56
Cisco, shortjaw, 56
Coregonus artedi, 56, 70
Coregonus autumnalis, 56
Coregonus clupeaformis, 56, 71, 169
Coregonus hoyi, 56
Coregonus huntsmani, 56
Coregonus kiyi, 56
Coregonus nasus, 56, 72, 169
Coregonus nelsoni, 56
Coregonus nigripinnis, 56
Coregonus sardinella, 56
Coregonus zenithius, 56
Crappie, black, 17, 19, 117, 126, 127, 134, 135, 160
Crappie, white, 17, 19, 117, 118, 126, 127, 134, 135, 160
Ctenopharyngodon idella, 86, 89, 166
Cul-ul, 93
Cycleptus elongatus, 93, 94, 165
Cyprinus carpio, 86, 87, 158
Dolly Varden, 56, 173
Dorosoma cepedianum, 52, 55, 170
Dorosoma petenense, 52
Drum, freshwater, 17, 18, 30, 112, 132, 133, 157
Enneacanthus chaetodon, 117
Enneacanthus gloriusus, 117
Enneacanthus obesus, 117
Erinmyon oblongus, 93
Erinmyon sucetta, 93
Esox americanus, 81, 82, 163
Esox lucius, 81, 83, 163
Esox masquinongy, 81, 84, 163
Esox niger, 81, 85, 163
Flier, 117, 160
Gar, alligator, 17, 24, 45, 49, 174
Gar, Florida, 45
Gar, longnose, 17, 24, 25, 45-49, 174
Gar, shortnose, 17, 24, 45, 47, 174
Gar, spotted, 17, 24, 45, 48, 174
Goldeye, 15, 17, 23, 26, 30, 71, 73, 75, 78-80, 164
Goldfish, 17, 19, 86, 88, 158
Grayling, Arctic, 17, 24, 56, 76
Herring, blueback, 52
Herring, lake, 56, 70
Herring, skipjack, 52, 170
Hiodon alosoides, 78, 79, 164
Hiodon tergisus, 78, 80, 164
Hypentelium nigricans, 93
Ictalurus furcatus, 102, 108, 168
Ictalurus lupus, 102
Ictalurus pricei, 102
Ictalurus punctatus, 102, 107, 168
Ictiobus bubalus, 93, 97, 171
Ictiobus cyprinellus, 93, 96, 171
Ictiobus niger, 93, 171
Inconnu, 17, 24, 56, 75, 169
Kiyi, 56
Lepisosteus oculatus, 45, 48, 174
Lepisosteus osseus, 45, 46, 174
Lepisosteus platostomus, 45, 47, 174
Lepisosteus platyrhincus, 45
Lepisosteus spatula, 45, 49, 174
Lepomis auritus, 117, 161
Lepomis cyanellus, 117, 120, 162
Lepomis gibbosus, 117, 161
Lepomis gulosus, 117, 123, 162
Lepomis humilis, 117, 161
Lepomis macrochirus, 117, 121, 161
Lepomis marginatus, 117
Lepomis megalotis, 117, 161
Lepomis microlophus, 117, 122, 161
Lepomis punctatus, 117
Lepomis symmetricus, 117
Lota lota, 110, 111, 162
Microgadus tomcod, 110, 162
Micropterus coosae, 117
Micropterus dolomieu, 117, 124
Micropterus notius, 117
Micropterus punctulatus, 117, 160
Micropterus salmoides, 117, 125, 160
Micropterus treculi, 117
Minytrema melanops, 93, 100
Mooneye, 17, 23, 37, 78-80, 164
Morone americana, 112, 113, 159
Morone chrysops, 112, 114, 159
Morone mississippiensis, 112, 116, 159
Morone saxatilis, 112, 115, 159
Moxostoma anisurum, 93, 98
Moxostoma carinatum, 93
Moxostoma congestum, 93
Moxostoma duquesnei, 93
Moxostoma erythrum, 93, 99
Moxostoma hubbsi, 93
Moxostoma macrolepidotum, 93, 101, 165
Moxostoma pappillosum, 93
Moxostoma valenciennesi, 93
Muskellunge, 17, 25, 81, 83, 84, 85, 134, 138, 139, 163
Noturus flavus, 102, 168
Oncorhynchus aguabonita, 56
Oncorhynchus Apache, 56
Oncorhynchus clarki, 56, 63, 173
Oncorhynchus gilae, 56
Oncorhynchus gorbuscha, 56, 58
Oncorhynchus keta, 56, 59, 172
Oncorhynchus kisutch, 56, 60, 172
Oncorhynchus mykiss, 56, 64, 173
Oncorhynchus nerka, 56, 61, 172
Oncorhynchus tshawytscha, 56, 62, 172
Osmerus mordax, 77, 167
Paddlefish, 12, 17, 23, 33, 37, 43, 44, 156
Perca flavescens, 128, 129, 158
Perch, Sacramento, 117, 162
Perch, white, 17, 18, 112, 113, 127, 133, 159
Perch, yellow, 17, 20, 32, 116, 126, 129, 130, 131, 154, 155, 158
Pickerel, chain, 17, 23, 81, 85, 163
Pickerel, grass, 17, 22, 82, 163
Pickerel, redfin, 81
Pike, northern, 10, 15, 17, 22, 25-27, 30, 81-85, 134, 138, 139, 154, 155, 158
Polyodon spathula, 43, 44, 156
Pomoxis annularis, 117, 126, 160
Pomoxis nigromaculatus, 117, 127, 160
Prosopium abyssicola, 56
Prosopium coulteri, 56
Prosopium cylindraceum, 56, 73, 169
Prosopium glemmerum, 56
Prosopium spilonotus, 56
Prosopium williamsoni, 56, 74, 169
Pumpkinsead, 17, 117, 118, 121, 161
Pylodictis olivaris, 102, 109, 168
Quillback, 17, 20, 90, 93, 97, 171
Redhorse, black, 21, 93
Redhorse, copper, 21, 93
Redhorse, golden, 93, 99
Redhorse, gray, 21, 93
Redhorse, greater, 21, 93
Redhorse, river, 21, 93
Redhorse, shorthead, 93, 98-101, 165
Redhorse, silver, 21, 93, 98
Redhorse, suckermouth, 93
Salmo salar, 56, 65, 173
Salmo trutta, 56, 66, 173
Salmon, Atlantic, 17, 24, 56, 65, 173
Salmon, Chinook, 17, 24, 62, 172
Salmon, chum, 17, 24, 56, 59, 172
Salmon, coho, 17, 24, 60, 172
Salmon, kokanee, 17
Salmon, pink, 17, 24, 56, 58, 172
Salmon, sockeye, 24, 57-62, 65
Salvelinus alpinus, 56, 67
Salvelinus anaktuvukensis, 56
Salvelinus confluentus, 56
Salvelinus fontinalis, 56, 88, 173
Salvelinus malma, 56, 173
Salvelinus namaycush, 56, 69, 173
Sauger, 17, 20, 21, 31, 128-131, 134, 136, 158
Saugeye, 17, 21, 134
Scaphirhynchus albus, 40, 166
Scaphirhynchus platorynchus, 40, 42, 166
Shad, Alabama, 52
Shad, American, 17, 24, 52-55, 170
Shad, gizzard, 17, 22, 52-55, 170
Shad, hickory, 52
Shad, threadfin, 52
Smelt, rainbow, 17, 24, 25, 77, 167
Stenodus leucichthys, 56, 75, 169
Stizostedion canadense, 128, 130, 158
Stizostedion vitreum, 128, 131, 158
Stonecat, 102, 168
Sturgeon, Atlantic, 40
Sturgeon, green, 40
Sturgeon, lake, 17, 25, 40, 41, 166
Sturgeon, pallid, 40, 166
Sturgeon, shortnose, 40, 166
Sturgeon, shovelnose, 17, 23, 40-42, 166
Sturgeon, white, 40
Sucker, blue, 17, 22, 93, 94, 165
Sucker, flannelmouth, 93
Sucker, June, 93
Sucker, largescale, 17, 22, 93
Sucker, longnose, 17, 22, 93
Sucker, northern hog, 17, 93
Sucker, razorback, 93
Sucker, shorthorn, 93
Sucker, spotted, 17, 20, 93, 100
Sucker, white, 17, 22, 93-95, 165
Sunfish, banded, 117
Sunfish, bantam, 117
Sunfish, blackbanded, 117
Sunfish, bluespotted, 117, 120
Sunfish, dollar, 117
Sunfish, green, 117, 120, 162
Sunfish, longear, 117, 161
Sunfish, mud, 117
Sunfish, orangespotted, 117, 161
Sunfish, redbreast, 117, 161

Sunfish, redear, 117, 122, 161
Sunfish, spotted, 117
Thymallus arcticus, 56, 76, 167
Tiger muskie, 17, 25, 84, 163
Tomcod, Atlantic, 110
Trout, Apache, 56
Trout, brook, 17, 24, 56, 68, 173
Trout, brown, 17, 23, 56, 66, 173
Trout, bull, 56
Trout, cutthroat, 17, 56, 63, 173
Trout, Gila, 56
Trout, golden, 56
Trout, lake, 17, 25, 56, 69, 173
Trout, rainbow, 17, 25, 56, 57, 63, 67, 69, 173
Trout, steelhead, 64
Walleye, 15, 17, 20, 21, 26-28, 32, 128-131, 134, 136, 154, 155, 158
Warmouth, 17, 117, 123, 162
Whitefish, Alaska, 56
Whitefish, Atlantic, 56
Whitefish, Bear Lake, 56
Whitefish, Bonneville, 56
Whitefish, broad, 56, 72, 169
Whitefish, humpback, 56
Whitefish, lake, 17, 23, 56, 71, 73, 75
Whitefish, mountain, 17, 23, 56, 74, 169
Whitefish, pygmy, 56
Whitefish, round, 17, 24, 56, 74, 169
Wiper, 17, 18, 134, 137, 159
Xyrauchen texanus, 93
# How to Measure That Fish

*Measure fish flat on ruler, not following the contours of the fish. (approximate weights shown)*

<table>
<thead>
<tr>
<th>Fish Type</th>
<th>Length (inches)</th>
<th>Weight (lbs.)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Black Crappie</strong></td>
<td>6 9 12 13 14 15</td>
<td>0.1 0.4 1.1 1.4 1.8 2.3 2.8 3.5 4.2</td>
</tr>
<tr>
<td><strong>Bluegill</strong></td>
<td>6 7 8 9 10 11 12 13 14 15</td>
<td>0.2 0.3 0.4 0.6 0.9 1.2 1.6 2.1 2.7 3.4</td>
</tr>
<tr>
<td><strong>Channel Catfish</strong></td>
<td>12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30</td>
<td>0.6 0.7 0.9 1.2 1.4 1.7 2.1 2.5 3.0 3.5 4.0 4.6 5.3 6.0 6.9 7.8 8.8 9.9 11.0</td>
</tr>
<tr>
<td><strong>Largemouth Bass</strong></td>
<td>12 13 14 15 16 17 18 19 20</td>
<td>0.9 1.1 1.5 1.8 2.3 2.8 3.3 4.0 4.7 5.5 6.4 7.4 8.5</td>
</tr>
<tr>
<td><strong>Northern Pike</strong></td>
<td>12 18 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39</td>
<td>0.4 1.3 3.1 3.5 4.0 4.5 5.0 5.6 6.2 6.8 7.5 8.3 9.1 9.9 10.8 11.8 12.8 13.5</td>
</tr>
<tr>
<td><strong>Rainbow Trout</strong></td>
<td>06 09 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27</td>
<td>0.1 0.3 0.7 0.9 1.1 1.4 1.7 2.1 2.5 2.9 3.4 4.0 4.6 5.2 6.0 6.8 7.7 8.6</td>
</tr>
<tr>
<td><strong>Walleye</strong></td>
<td>12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30</td>
<td>0.6 0.8 1.0 1.3 1.5 1.9 2.2 2.7 3.1 3.7 4.2 4.9 5.6 6.4 7.2 8.1 9.1 10.2 11.4</td>
</tr>
<tr>
<td><strong>White Bass</strong></td>
<td>06 09 12 13 14 15 16 17 18 19 20</td>
<td>0.1 0.4 0.9 1.1 1.4 1.7 2.1 2.5 3.0 3.5 4.1</td>
</tr>
</tbody>
</table>