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**A HANDBOOK FOR THE IDENTIFICATION OF  
YELLOWFIN AND BIGEYE TUNAS  
IN BRINE FROZEN CONDITION**

**David G. Itano**



Pelagic Fisheries Research Program  
JIMAR, University of Hawaii  
USA

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# **A Handbook for the Identification of Yellowfin and Bigeye Tunas in Brine Frozen Condition**



compiled by David G Itano  
for the  
Southwest Fisheries Science Center  
National Marine Fisheries Service  
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# Identification of Yellowfin and Bigeye Tuna by Visual Criteria



**Identifying fresh tuna is a relatively easy matter, even at small sizes, as coloration, body markings and body morphologies are distinct and easily separated**



**However, colors fade quickly after death and markings may fade or disappear, particularly when frozen.**



**Tuna stored in brine wells often sustain minor skin abrasion, fin damage and distortion during the freezing, loading and unloading process, making them harder to identify.**

# Identification of Yellowfin and Bigeye Tuna by Visual Criteria

Yellowfin and Bigeye tuna are more difficult to distinguish in the small to medium size classes that are commonly caught by tuna purse seine vessels. The proper identification and separation of bigeye from yellowfin in purse seine landings is of critical importance to regional stock assessment and management of the species.

Juvenile yellowfin and bigeye tuna in brine frozen condition can be reliably identified using a combination of the following features:



## ➤ Internal characteristics

- liver appearance and morphology
- swim bladder morphology

## ➤ External characteristics

- body morphology
- head and eye morphology
- body markings
- pectoral fin characteristics
- caudal fin characteristics
- finlet coloration

# Internal Characteristics

## Liver morphology

- Large, conspicuous organ along anterior, ventral portion of gut cavity

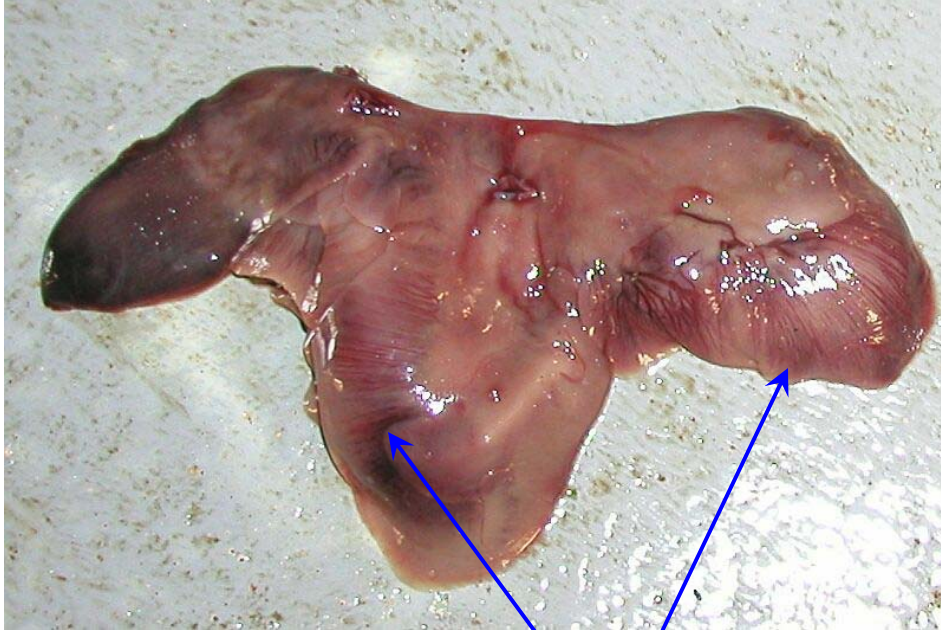


- **Bigeye**
  - three rounded lobes with medial lobe slightly larger
- **Yellowfin**
  - right lobe longer and thinner than rounded medial and left lobes



# Internal Characteristics

## Liver appearance



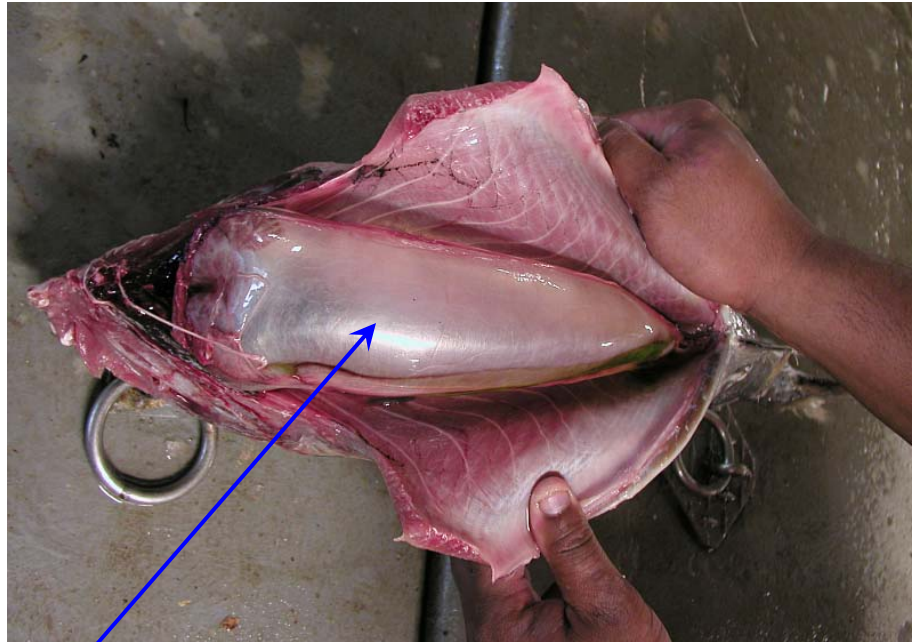
- **Bigeye**
  - ventral surface of liver **striated**



- **Yellowfin**
  - lobes smooth, clear, no striations

# Internal Characteristics

## Swim bladder



### ➤ **Bigeye**

- occupies almost entire body cavity
- large, conspicuous, often inflated

### ➤ **Yellowfin**

- only in anterior half of body cavity
- inconspicuous, usually deflated or slightly inflated





# External Characteristics

## Coloration

- Colors fade quickly after death
- Both species appear similar in coloration when frozen



- **NOT A USEFUL CHARACTERISTIC FOR  
BRINE FROZEN BIGEYE AND YELLOWFIN !!!**

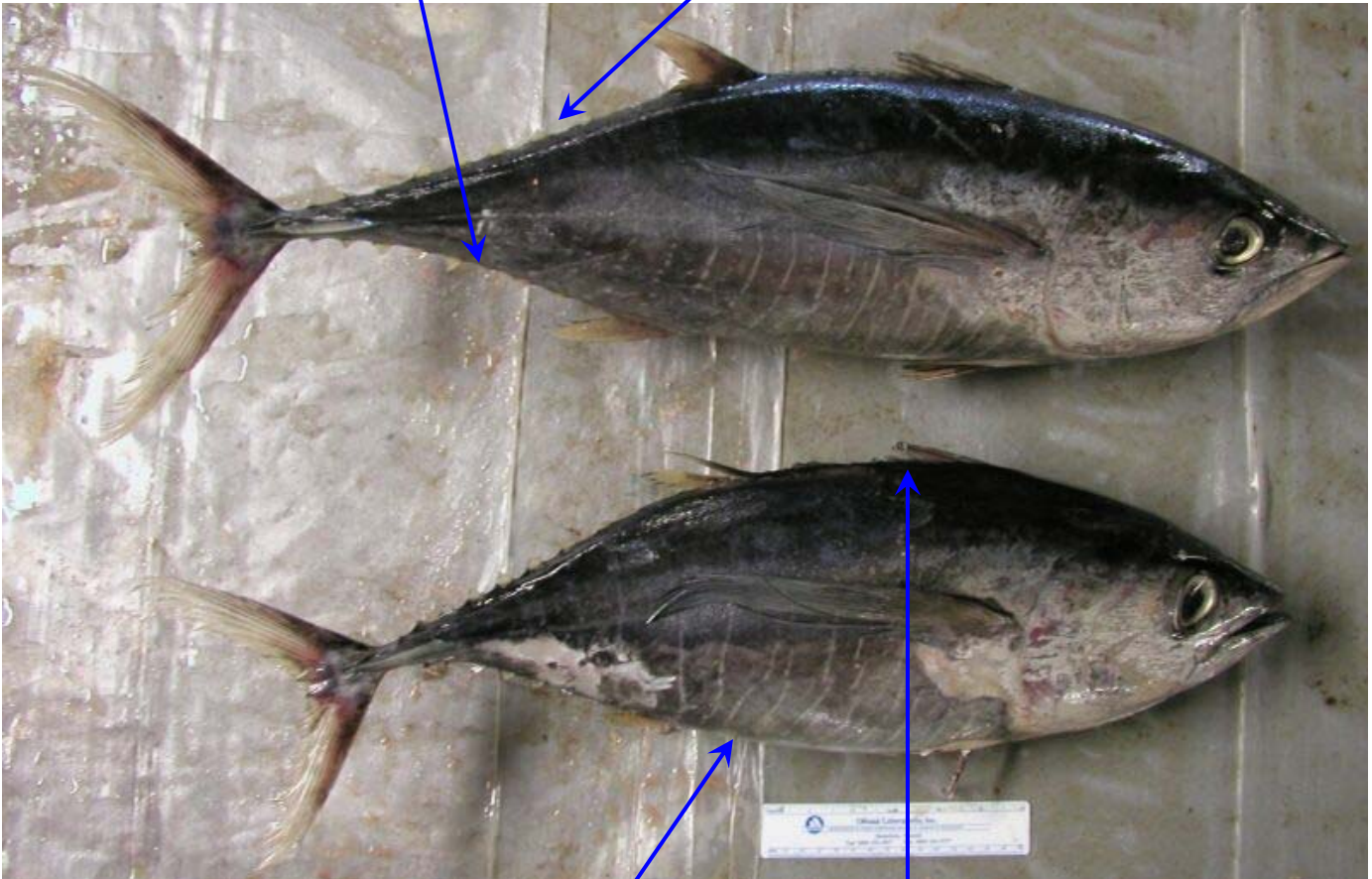


# External Characteristics

## Body morphology

### ➤ Yellowfin

- body elongate, long tail
- body outline flat between second dorsal and caudal fin and between anal and caudal fin



### ➤ Bigeye

- body deep, rounded
- body outline rounded, forming a smooth dorsal and ventral arc between snout and caudal peduncle

# External Characteristics

## Head and eye morphology

### ➤ Bigeye

- greater head length and depth vs Fork Length than yellowfin
- greater eye diameter compared to yellowfin of same Fork Length



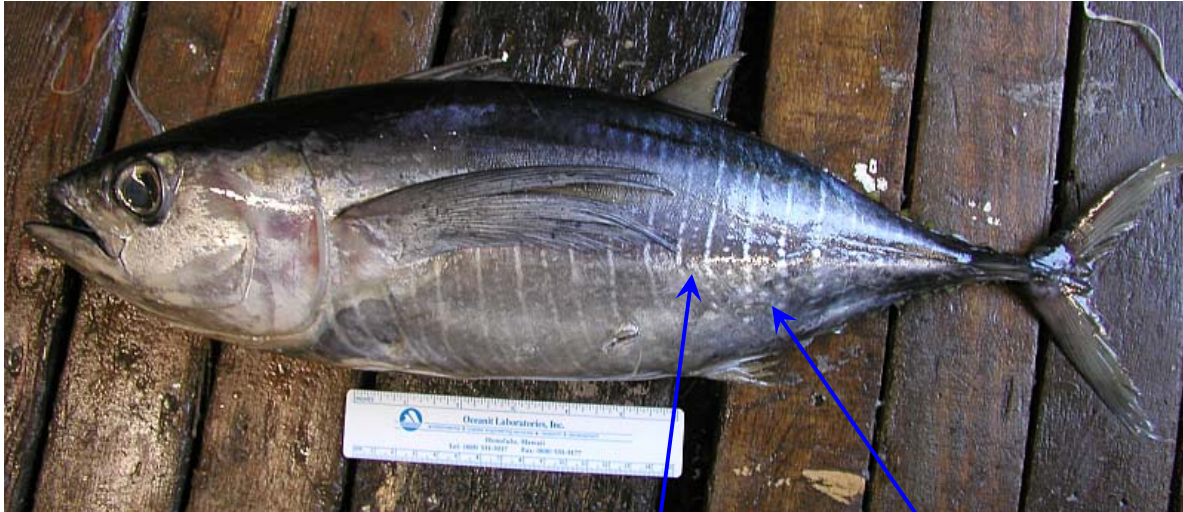
### ➤ Yellowfin

- shorter head length and depth vs Fork Length than bigeye
- smaller eye diameter compared to bigeye of same Fork Length



# External Characteristics

## Body markings



### ➤ Yellowfin

- conspicuous, chevron pattern of closely spaced silvery lines
- lines alternate between solid lines and rows of dots



### ➤ Bigeye

- irregular, vertical, widely spaced lines
- mostly straight white lines, fewer spots or dashes

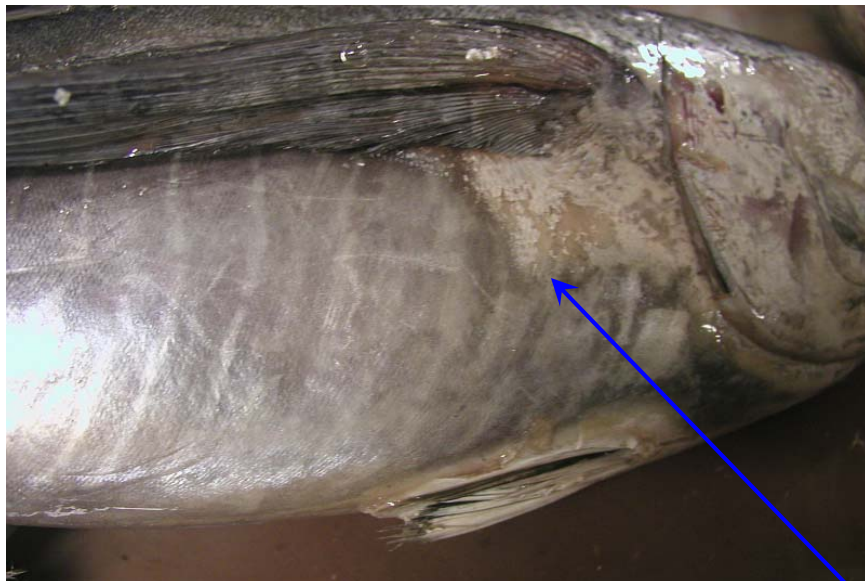
# External Characteristics

## Body markings – anterior under pectoral



### ➤ Yellowfin

- conspicuous alternating bands forward to below pectoral fin
- clear demarcation between marked and unmarked region



### ➤ Bigeye

- markings more common on posterior half of body, few spots
- demarcation between marked and unmarked region not as clear



# External Characteristics

Remember – there are always exceptions to the rule



## ➤ Yellowfin

- banding can become washed out, rubbed out or faded
- the eye may appear quite large, like that of a bigeye tuna
- the body may become squashed or deformed, giving a deeper appearance similar to a bigeye



## ➤ Bigeye

- body markings can be quite distinct, with rows of lines and dots
- however, rows are not as closely spaced or regular as with yellowfin

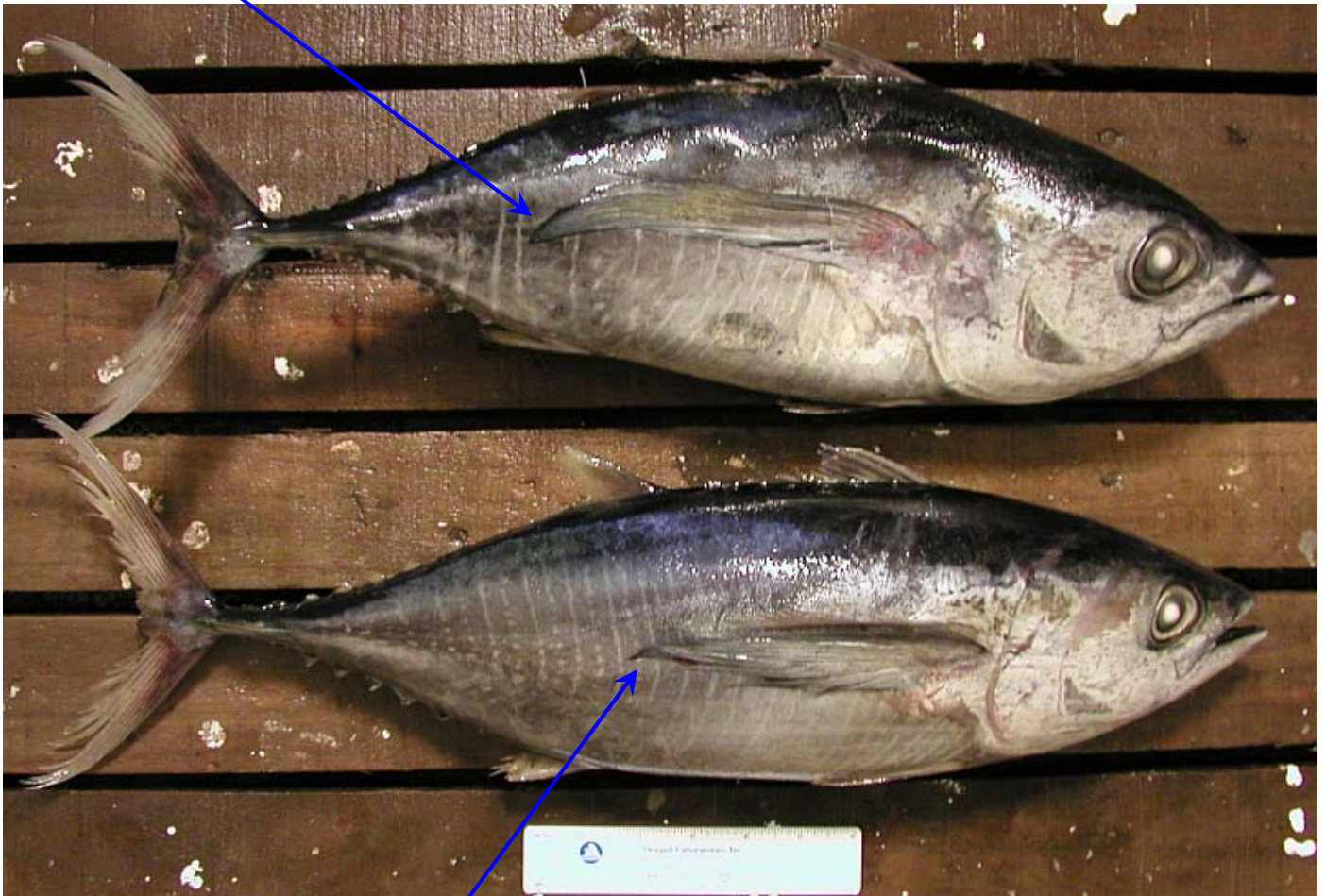
# External Characteristics

## Pectoral fin length and characteristics

(for fish ~46-110 cm)

### ➤ Bigeye

- pectoral fin reaching beyond base of second dorsal fin
- pectoral fin thin, pointed and flexible



### ➤ Yellowfin

- pectoral fin reaching no further than center of base of second dorsal fin
- pectoral fin thicker, stiffer compared to bigeye



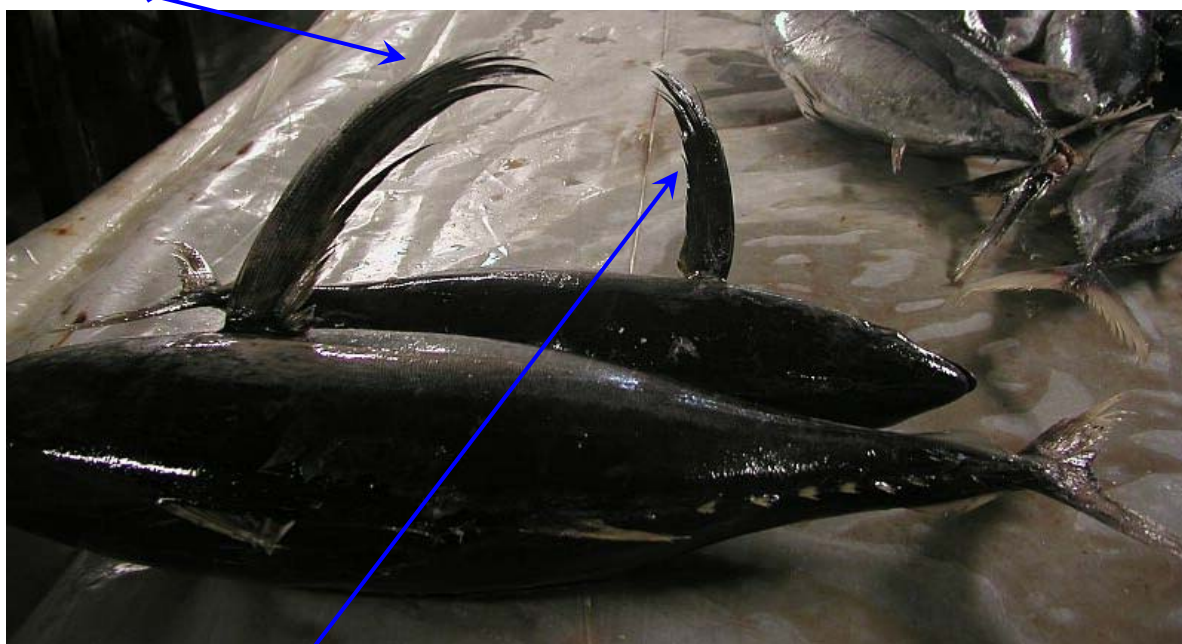
# External Characteristics

## Pectoral fin characteristics



### ➤ Bigeye

- pectoral fin tip often points ventrally when folded
- pectoral fin tip thin, pointed, “floppy”, often split
- forms a smooth arc when erected, fine tip easily split



### ➤ Yellowfin

- pectoral fin shorter, thicker, “blade-like” compared to bigeye

# External Characteristics

## Caudal fin



### ➤ Yellowfin

- Central portion of trailing edge forms distinct “V” notch
- Two distinctly raised ridges present that form the “V” notch

### ➤ Bigeye

- Central portion of trailing edge forms a flat or slightly crescent shaped area
- Central area of caudal fin flat with two inconspicuous low mounds present.





## External Characteristics

### Caudal fin

**Yellowfin**



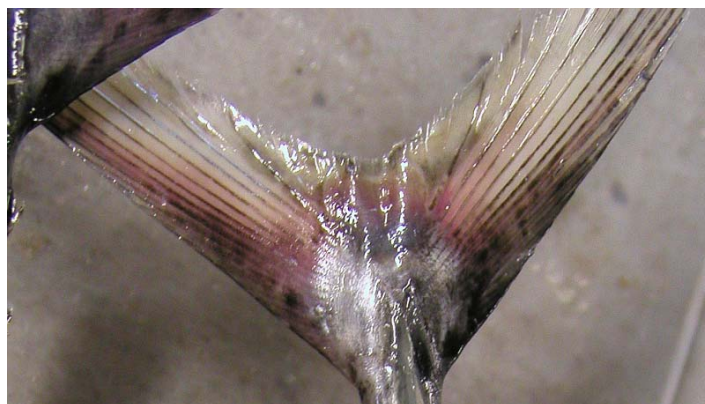
**Bigeye**



**Yellowfin**



**Bigeye**



**Yellowfin**

**Bigeye**



# External Characteristics

## Finlets

### ➤ Bigeye

- yellowish color edged with black



### ➤ Yellowfin

- bright yellow with no black edging



# External Characteristics

## Comparisons by size and features

### ➤ Yellowfin (~44.5 cm)

- Shorter, “blade-like” pectoral fin
- Closely spaced chevron markings of lines and rows of dots
- Shorter, smaller head, smaller eye



### ➤ Bigeye (~46 cm)

- Long, pointed pectoral fin, pointing ventrally at tip
- Large head, deep body, large eye

### ➤ **Note: specific to these examples**

- caudal fins damaged, here not useful for identifications
- bigeye markings absent, but this is often the case with bigeye
- bigeye body form distorted, smashed and not as useful for ID

# External Characteristics

## Comparisons by size and features

### ➤ Bigeye (~49 cm)

- Large, deep head, large eye, deeply rounded body
- Long pectoral fin with thin, pointed tip
- Vertical, widely spaced white lines



### ➤ Yellowfin (~49 cm)

- Long, narrow body, small head, small eye
- Closely spaced, chevron pattern of alternating lines and rows of spots clearly visible to below pectoral fin

### ➤ Note:

- pectoral fins are not that different in length on these samples
- however, bigeye pectoral does extend to beyond second dorsal



# External Characteristics

## Comparisons by size and features

### ➤ Yellowfin (~61 cm)

- Long, narrow body, straight outline behind 2<sup>nd</sup> dorsal fin
- Closely spaced, chevron pattern of lines and rows of dots
- Thick, relatively short, “blade-like” pectoral fin
- “V” notch in tail



### ➤ Bigeye (~54 cm)

- Rounded, deep body outline, large, deep head, large eye
- Long pectoral fin, thin tip pointing ventrally
- Irregular white lines

### ➤ Note:

- the bigeye is fairly well marked with white, broken lines and some spots to below the pectoral fin, but they are not as closely spaced or regularly alternating as with the yellowfin

# External Characteristics

## Comparisons by size and features

### ➤ Yellowfin (~85 cm)

- Long, narrow body, straight outline behind 2<sup>nd</sup> dorsal
- Thick, “blade-like” pectoral to center of 2<sup>nd</sup> dorsal fin base
- Evenly spaced lines and rows of uniform dots
- Noticeable “V” notch in caudal fin with two raised areas
- 2<sup>nd</sup> dorsal and anal fins beginning to elongate



### ➤ Bigeye (~80 cm)

- Deep, rounded body outline, large, deep head, large eye
- Long pectoral fin, split and wavy at tip
- Trailing edge of caudal fin flat

### ➤ Note:

- lateral markings on the bigeye are no longer visible



# External Characteristics

## Comparisons by size and features

### ➤ Bigeye (~95 cm)

- Deep, rounded body outline, large, deep head, large eye
- Very long pectoral fin with thin, pointed tip
- Stomach inverted and protruding from mouth



### ➤ Yellowfin (~105 cm)

- Elongate body and tail, straight outline behind 2<sup>nd</sup> dorsal fin
- Short, thick, blade-like pectoral fin
- 2<sup>nd</sup> dorsal and anal fins noticeably elongated
- Closely spaced lines and rows of dots visible but fading

### ➤ Note:

- lateral markings on the bigeye are no longer visible
- yellowfin stomachs will not inflate and protrude like bigeye due to smaller swim bladder

# External Characteristics

## Comparisons

### ➤ Bigeye

- Larger head, large eye, deeper body, vertical white body markings, long pectoral fin



### ➤ Yellowfin

- Small head, smaller eye, chevron pattern of closely spaced body markings, short pectoral fin

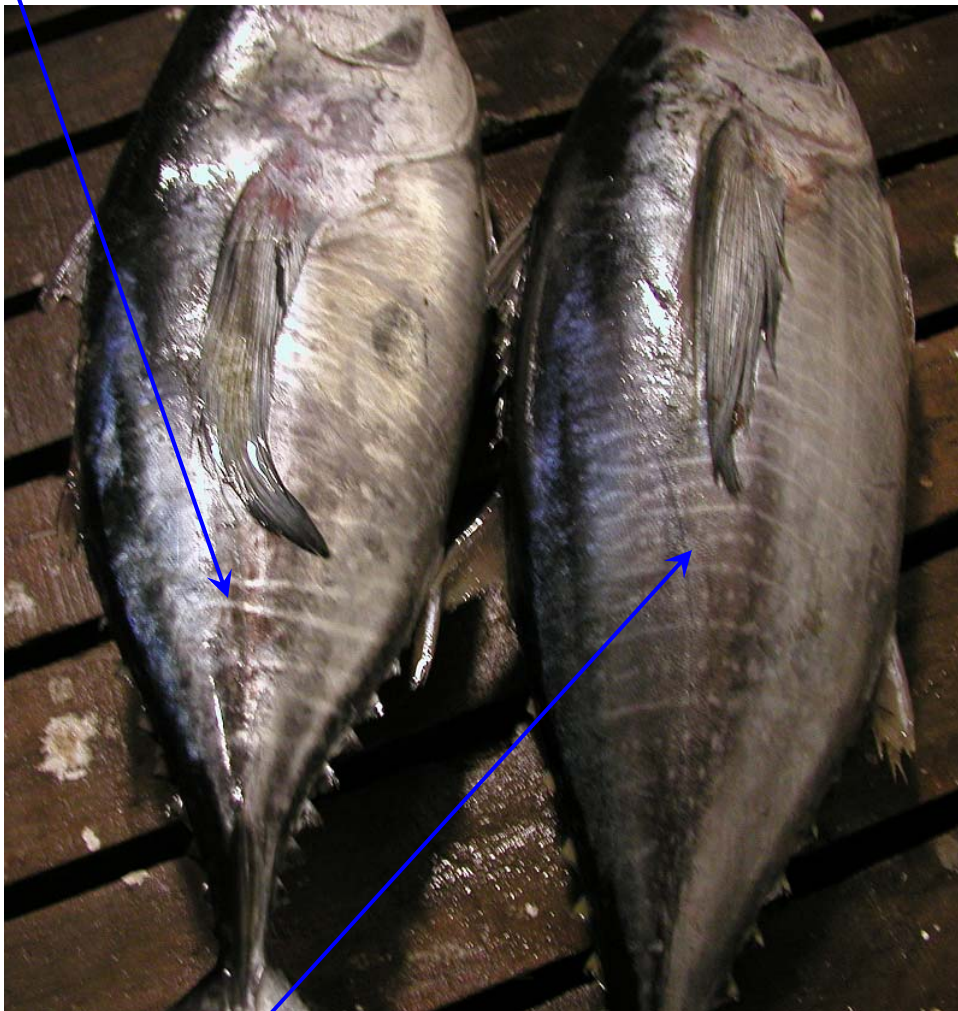


# External Characteristics

## Comparisons

### ➤ Bigeye

- Large, deep head, long, downwardly pointing pectoral fin
- Vertical, irregular white bars on a short, rounded body



### ➤ Yellowfin

- Small, narrow head, thick, blade-like pectoral fin
- Well marked with regular, close lines alternating with rows of dots in a chevron pattern on an elongate body

# External Characteristics

## Mixed fish in the well

The sampler must be alert to changes in size and species compositions during the unloading process, and record these changes as they occur. In order to do so, the ability to quickly determine tuna species under a variety of conditions is necessary.



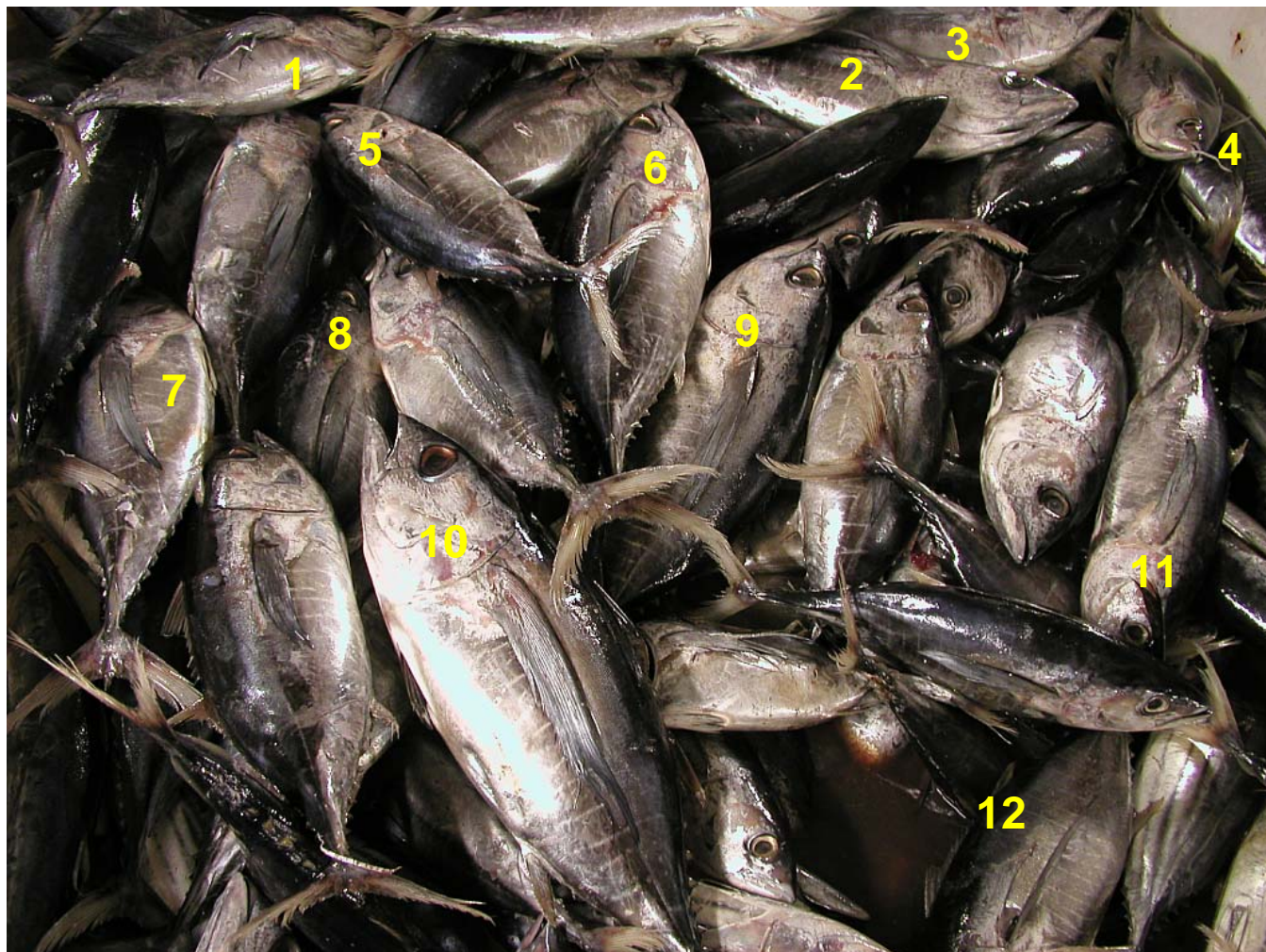
The following examples provide tips on how to rapidly assess and tentatively identify yellowfin and bigeye mixed in a well using the external features outlined in this guide.

However, positive identifications should be based on a careful examination of each individual fish using all appropriate criteria.



# External Characteristics

## Mixed fish in the well



- 1) Bigeye – long, arcing pectoral fin with pointed tip, flat trailing caudal
- 2) Bigeye – large head, irregular banding (not positive, needs closer ID)
- 3) Bigeye – large eye, long pectoral, large-deep head
- 4) Yellowfin – close, well marked bands and rows of spots
- 5) Bigeye – vertical, widely spaced bars, floppy pectoral tip, flat caudal
- 6) Bigeye – vertical, irregularly spaced bars, long pectoral, large eye
- 7) Bigeye – long pectoral fin points ventrally, vertical white lines
- 8) Yellowfin – short, thick pectoral, close, regular alternating marks
- 9) Bigeye – large head, large eye, long pectoral, vertical irregular marks
- 10) Bigeye – long pectoral, large eye, large head, body shape, marks
- 11) Yellowfin – short, blade like pectoral, close, regular alternating marks
- 12) Yellowfin – close, regular alternating marks



# External Characteristics

## Mixed fish in the well



- 1) Yellowfin – chevron pattern of close lines, long body, caudal notch
- 2) Bigeye – large head, large eye, irregular banding with few spots
- 3) Yellowfin – thick, bladelike pectoral, close regular markings, (needs closer look to confirm as obscured by brine scum)
- 4) Bigeye – long pectoral, vertical white bands, crescent caudal notch
- 5) Bigeye – long pectoral, deep body, flat caudal notch, vertical bar
- 6) Yellowfin – chevron pattern of close lines, short pectoral, small eye
- 7) Bigeye – long pectoral, vertical white lines, large head, large eye
- 8) Yellowfin – chevron pattern of lines, V notch in caudal, short pectoral
- 9) Yellowfin – short head, chevron pattern of lines (needs closer look)
- 10) Bigeye – long pectoral pointing down, vertical white lines, deep body
- 11) Yellowfin – chevron pattern of close lines and rows of spots
- 12) Bigeye – long pectoral with thin tip, widely spaced vertical white lines



# External Characteristics

## Mixed fish in the well



- 1) Bigeye – vertical, irregular white bands, flat caudal notch
- 2) Yellowfin – short pectoral, close, regular markings, small eye
- 3) Yellowfin – close, regular markings with spots to below pectoral
- 4) Bigeye – long pectoral with floppy tip, large head, large eye, deep
- 5) Bigeye – long pectoral with thin tip, irregular, indistinct markings
- 6) Yellowfin – short, thick pectoral, chevron pattern of close, regular lines, V notch in caudal fin with two, raised bumps
- 7) Bigeye – widely spaced vertical white lines, deep body, dark finlets
- 8) Yellowfin – chevron pattern of regular lines with dots, short pectoral
- 9) Bigeye – long, pointy pectoral, large head, large eye
- 10) Bigeye – irregular white lines, no spots, large head, large eye
- 11) Yellowfin – close, regular alternating lines and rows of spots



# External Characteristics

## Mixed fish in the well



- 1) Bigeye - long, arcing pectoral fin with pointed, split tip
- 2) Bigeye - long, pointed, floppy pectoral. Flat to crescent shaped caudal notch
- 3) Bigeye - vertical, widely spaced white bars, long pectoral fin
- 4) Yellowfin - close, well marked bands and rows of spots, shorter, thicker pectoral (not positive, needs closer look)
- 5) Yellowfin - short, blade-like pectoral (not positive, needs closer look)
- 6) Bigeye – caudal notch shape, black edged finlets
- 7) Yellowfin – close, even body markings, caudal V notch, yellow finlets
- 8) Bigeye – flat tail notch, vertical with body markings
- 9) Bigeye – long arcing pectoral fin, vertical white lines



# External Characteristics

Mixed fish in the well – fill in the blanks



- 1) \_\_\_\_\_
- 2) \_\_\_\_\_
- 3) \_\_\_\_\_
- 4) \_\_\_\_\_
- 5) \_\_\_\_\_
- 6) \_\_\_\_\_
- 7) \_\_\_\_\_
- 8) \_\_\_\_\_
- 9) \_\_\_\_\_
- 10) \_\_\_\_\_
- 11) \_\_\_\_\_
- 12) \_\_\_\_\_

**Note:**

**The yellowfin and bigeye samples illustrated in this guide are in good condition, making identifications relatively easy and straight forward. However, using a combination of the features illustrated here, port samplers and observers should be able to make positive identifications from fish in a wide range of condition using external characteristics.**



**Remember:**

**Identifications should be based on a combination of features appropriate to the particular sample being examined – and not just a single feature. If doubt remains, the fish should be set aside and examined for internal characteristics.**

**END**