A Handbook for the Identification of Yellowfin and Bigeye Tunas in Fresh, but *Less Than Ideal Condition* (v6)

Siosifa Fukofuka
Oceanic Fisheries Programme
Noumea
New Caledonia

David G Itano
Pelagic Fisheries Research Program
University of Hawaii, JIMAR
Honolulu, Hawaii
USA

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The MS Powerpoint version of this ID guide can be made available to fisheries observer programs and agencies for training purposes by contacting the authors directly.

Identification of Yellowfin and Bigeye Tuna by Visual Criteria

Identifying fresh tuna is a relatively easy matter compared to distinguishing frozen or iced fish. Even at small sizes, each species has distinct coloration, fin lengths and shape, body markings and morphologies that provide rapid visual keys to positive identification.

Frozen or damaged tuna are far more difficult to distinguish due to fin damage, discoloration, skin abrasion and distortion or crushing during the loading and storage process.

Nevertheless, these examples are easily distinguishable to the trained eye. Figure (a) shows a bigeye (top) and a yellowfin tuna (bottom). Figures (b) show two frozen bigeye and (c) is a fresh but discolored yellowfin tuna.

Identification of Yellowfin and Bigeye Tuna by Visual Criteria

Even though tuna are easiest to distinguish in fresh condition, misidentifications and grouping of both species commonly occurs in surface fisheries. The pictures in this handbook should serve as a guide to distinguish yellowfin from bigeye tuna in fresh, but less than ideal conditions that may be commonly encountered by shipboard observers, fishermen and port samplers. This Handbook compares the ideal versus the less than ideal condition - as noted at the top of each page. Additional handbooks have been prepared for tuna in fresh / ideal condition as well as for tuna frozen in brine.

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

➢ Internal characteristics

- liver appearance and morphology
- swim bladder morphology

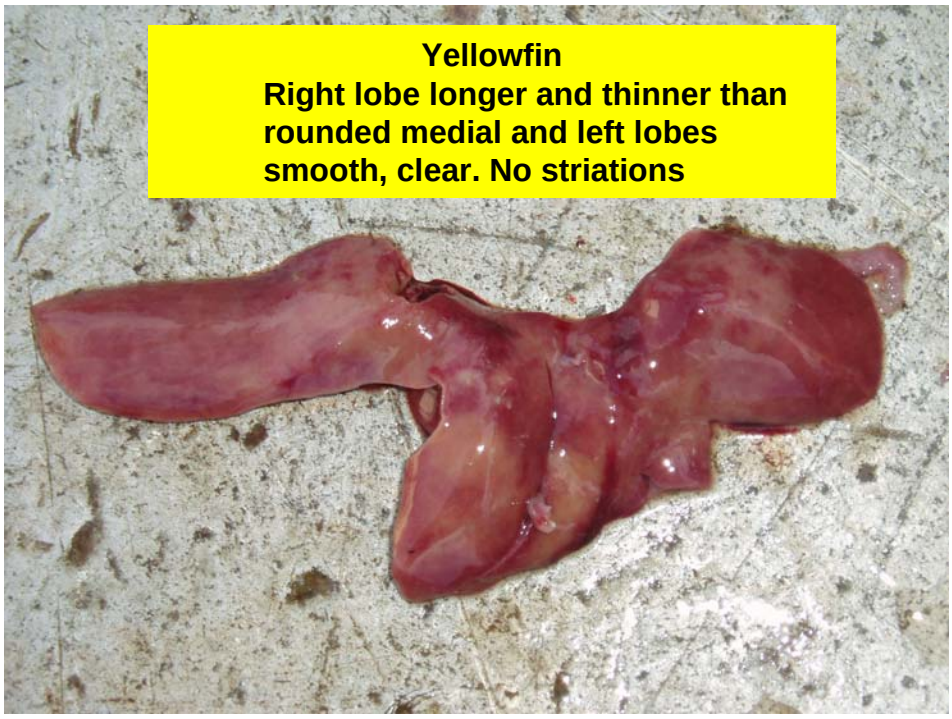
➢ External characteristics

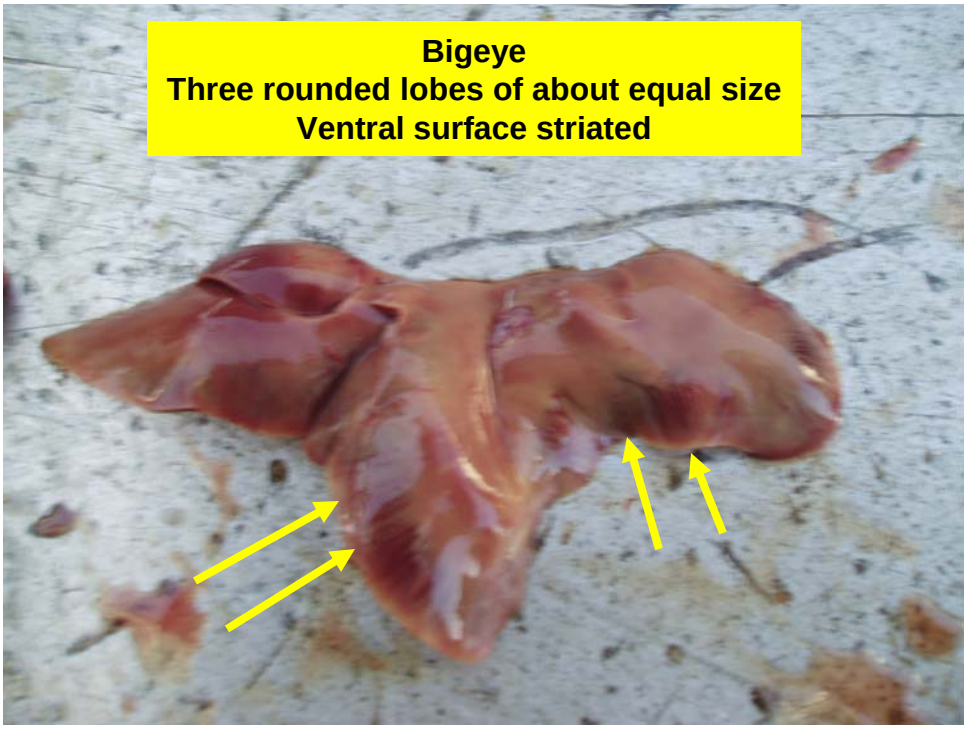
- body markings
- body morphology
- head and eye morphology
- pectoral fin characteristics
- caudal fin characteristics
- finlet coloration

Internal Characteristics – *ideal*

- **Liver morphology and appearance**

➢ **Large, conspicuous organ along anterior, ventral portion of gut cavity**

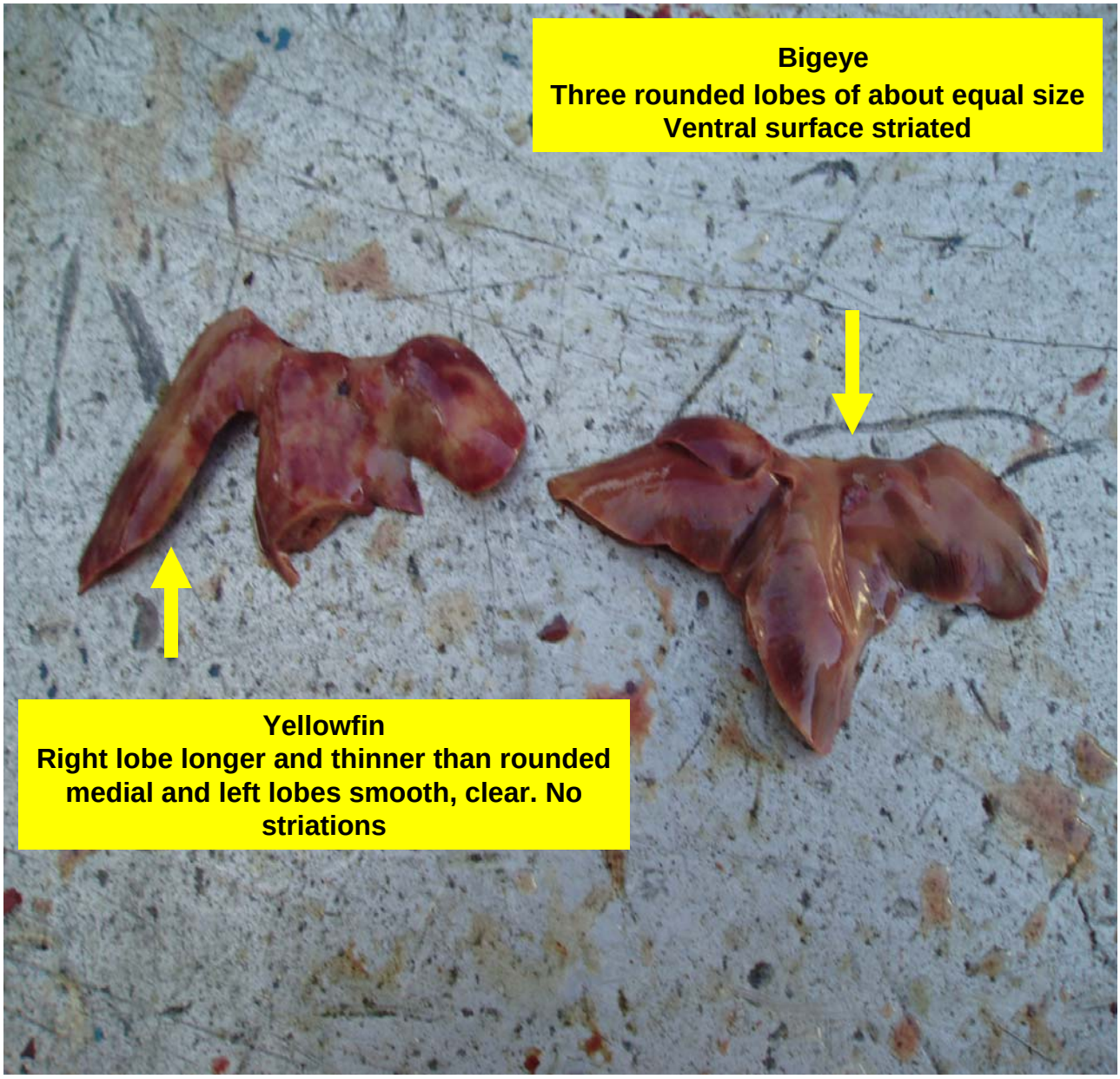




Internal Characteristics – *ideal*

- **Liver morphology and appearance**

➢ **Yellowfin and Bigeye (43 cm)**



Internal Characteristics – *ideal*

- **Swim bladder morphology**

➢ Bigeye

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

➢ Yellowfin

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

Internal Characteristics – *ideal for yellowfin, less than ideal for bigeye*

- **Swim bladder morphology**

  - **Yellowfin (43 cm)**
    - Inflated swim bladder

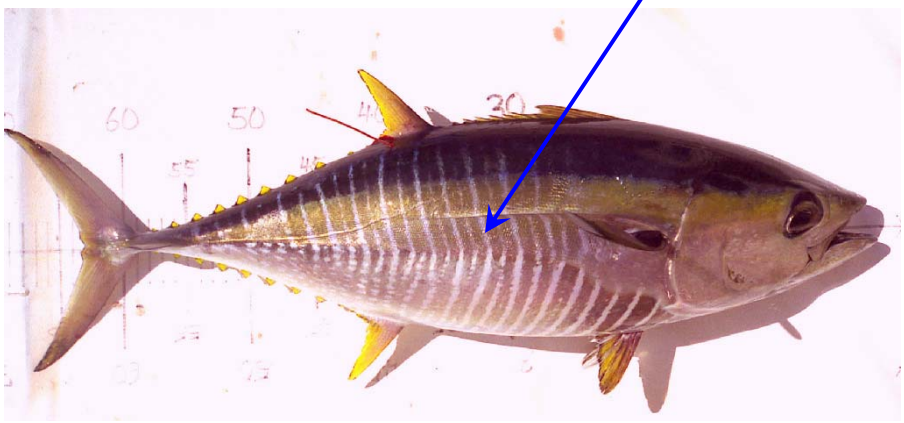
  - **Bigeye (43 cm)**
    - Deflated swim bladder

External Characteristics – *ideal*

▪ Body markings

➢ Yellowfin

- Vertical lines pattern of closely spaced
- Dotted lines alternate with rows of dots
- Line pattern extends from tail, forward to beneath pectoral fin and to above mid-lateral line



➢ Bigeye

- Irregular vertical, widely spaced white lines or marks
- Some rows of dots but few and irregular
- Line pattern irregular, broken, confined mostly to below mid-lateral line

External Characteristics – *less than ideal*

- **Body markings (fading)**

➢ **Yellowfin (~40 cm)**

- Lines slightly curved, are evenly spaced and separated by rows of spots
- Line pattern extends from tail, forward to beneath pectoral fin and to above mid-lateral line

External Characteristics – *less than ideal*

- **Body markings (faded and disappearing)**

➢ **Yellowfin (45 cm) and Bigeye (45 cm)**

- Lines slightly curved, are evenly spaced and separated by rows of spots extending to below pectoral fin, still obvious and easy to recognize
- Irregular vertical pale lines on bigeye have faded, but can still be recognized

External Characteristics – *less than ideal*

- **Body markings (faded, almost completely)**

➢ **Yellowfin (56 cm) and Bigeye (53 cm)**

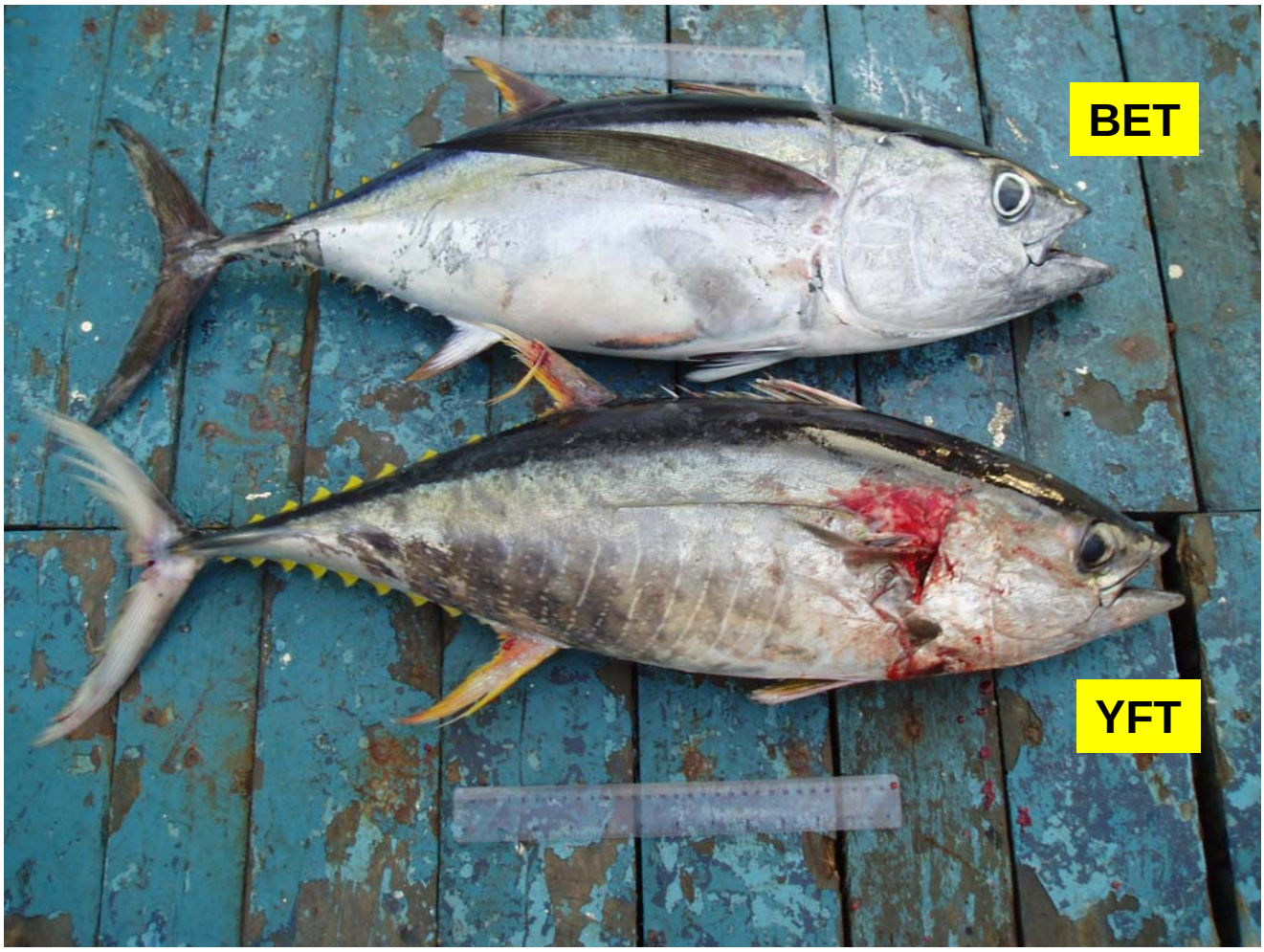
- Dotted, vertical lines and markings on yellowfin are still recognizable, mainly below the lateral line and pectoral fin
- Irregular vertical lines on bigeye have faded and practically gone

External Characteristics – *less than ideal*

- **Body markings *(*faded and disappeared)**

➢ **Yellowfin and Bigeye (70 cm)**

- Irregular vertical lines and body markings on the bigeye have disappeared completely
- Body markings on yellowfin are still visible, but mainly below the lateral line



External Characteristics – *less than ideal*

- **Body markings *(*faded and disappeared)**

➢ **Yellowfin and Bigeye (70 cm)**

- Body markings on the yellowfin have **disappeared completely**
- Irregular vertical lines on the bigeye body have also **disappeared completely**

External Characteristics – *less than ideal*

- **Body markings (faded and disappeared)**

➢ **Yellowfin and Bigeye (90 cm)**

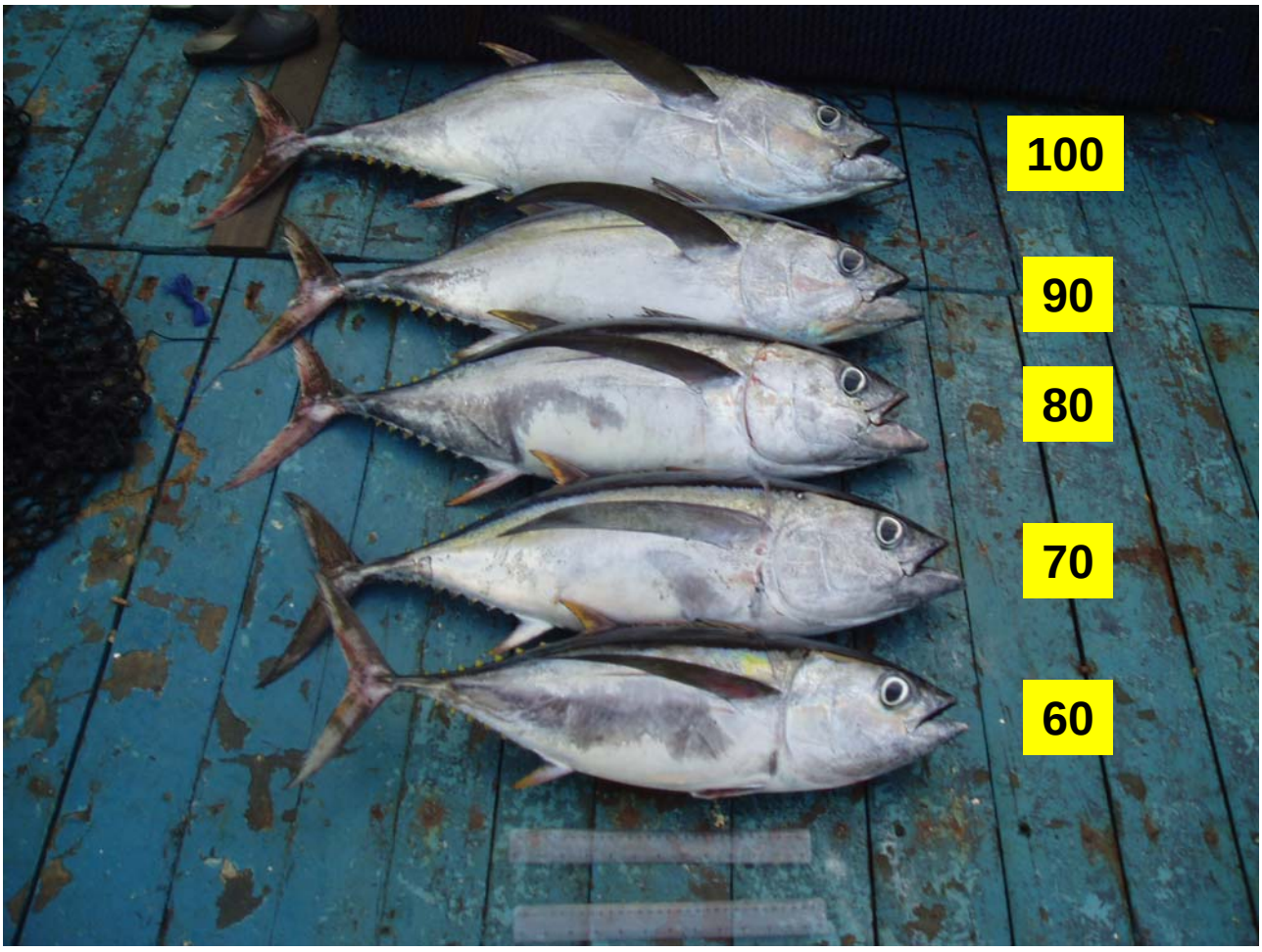
- Both markings on yellowfin and bigeye have completely disappeared

External Characteristics – *less than ideal*

- **Body markings (faded and disappeared)**

➢ **all Bigeye (60 - 100 cm)**

- No body markings on bigeye tuna are visible
- Silver white colour remains typical of dead, fresh fish



External Characteristics – *ideal*

Coloration

Yellowfin

- Fresh yellowfin show a bright yellow mid-lateral band
- Dark black back may be separated from the gold by a thin blue band
- Fins yellow to yellowish, anal fin sometimes tinged with silver
- Flanks and belly silvery white

Bigeye

- Golden to brassy mid-lateral band, less distinct
- Dark black back edged with bright metallic blue line
- Fins dusky yellowish with anal fin tinged with silver
- Caudal fin often dusky black
- Flanks and belly pearly white

External Characteristics – *less than ideal*

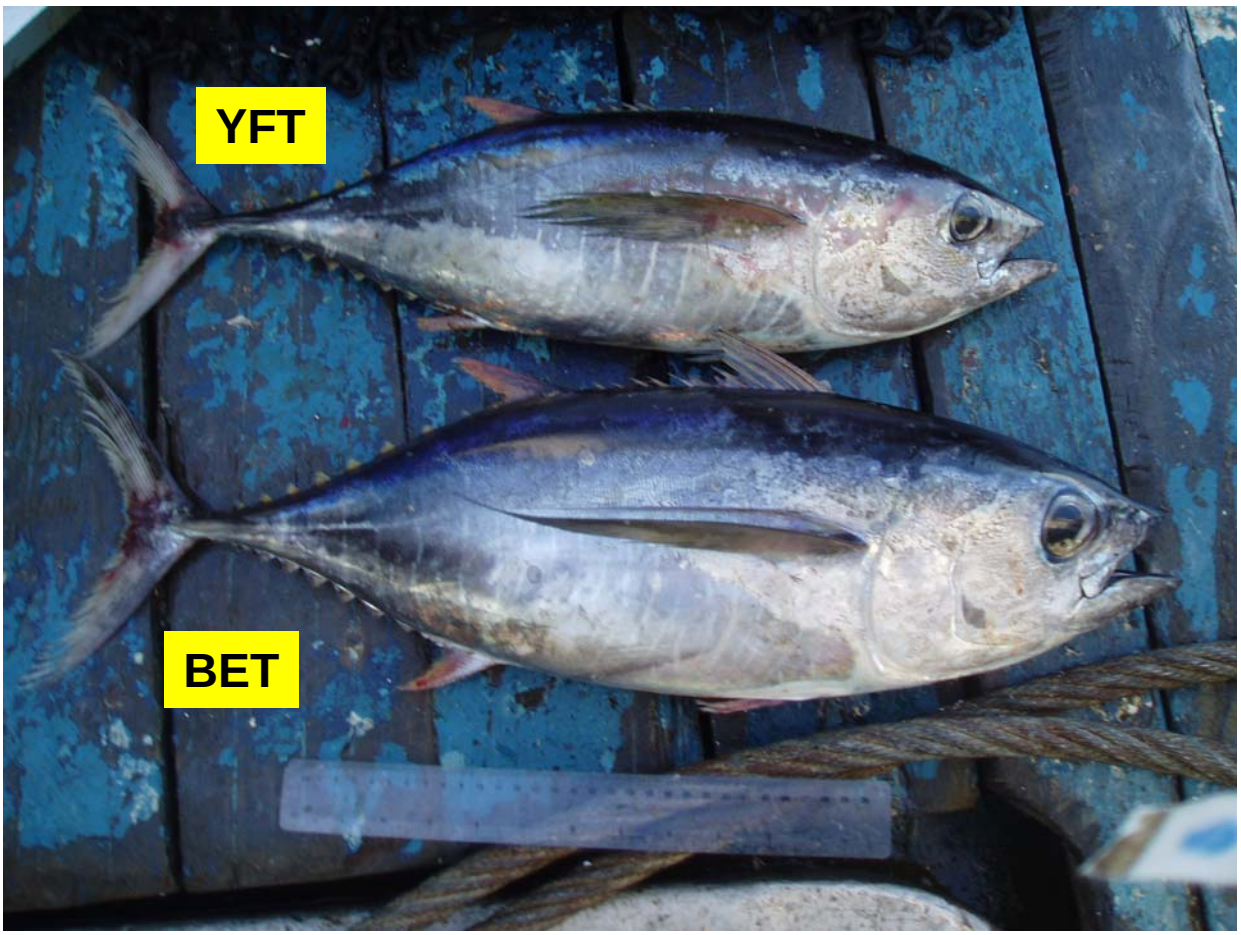
- **Coloration**

However, colors fade very quickly after death making both species appear similar in color.

<u>Therefore body colors are not a reliable key to species identification.</u>

➢ **Yellowfin (40 cm) and Bigeye (45 cm)**

- The yellow mid lateral band on the yellowfin is gone
- Blueish/black colour above the pectoral fin area on both species

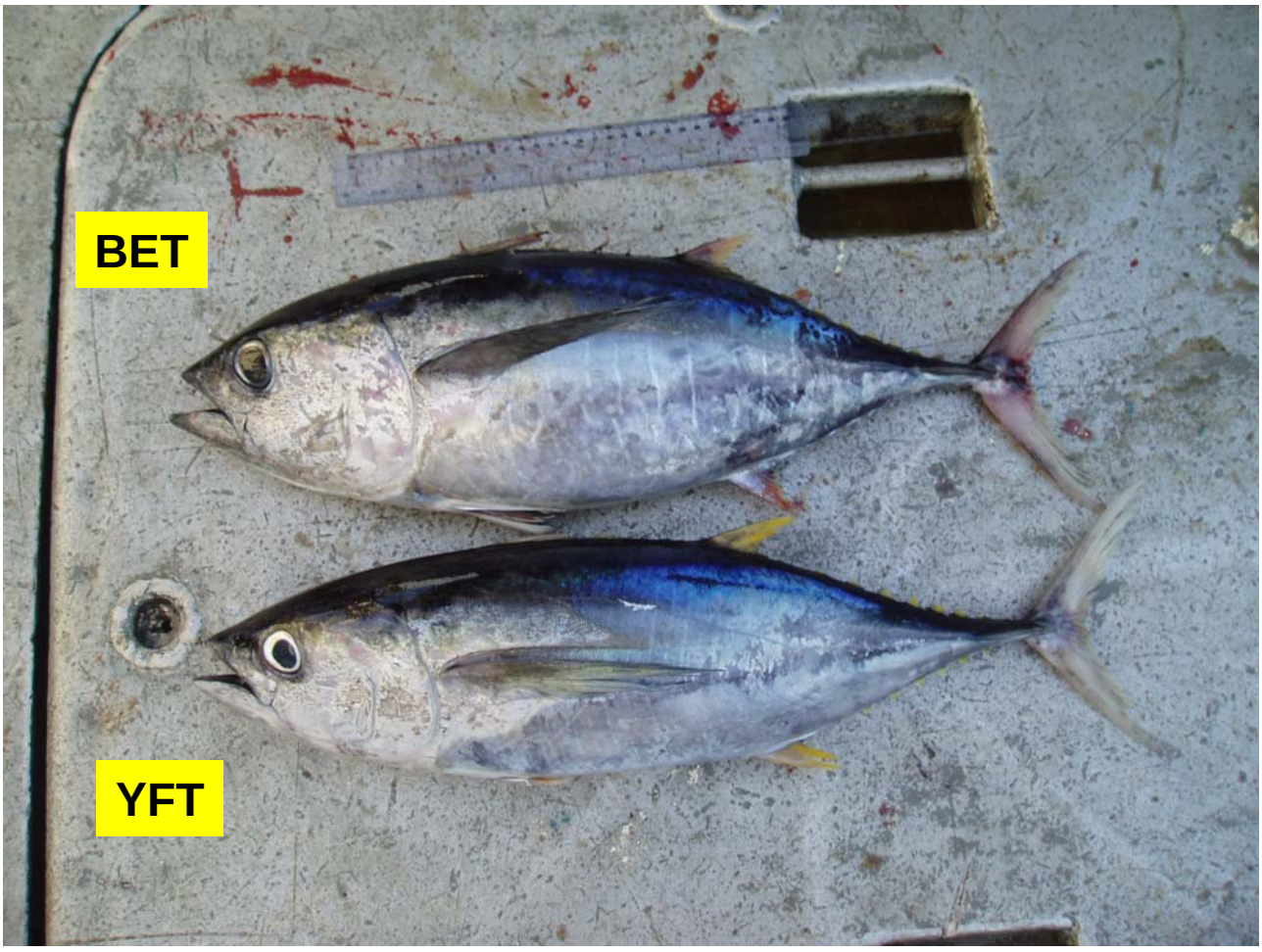


External Characteristics – *less than ideal*

- **Coloration**

➢ Yellowfin (59 cm) and Bigeye (57 cm)

- The yellow band on the yellowfin mid lateral has **disappeared**
- Blueish black colour above the pectoral fin is visible on both species
- Caudal fin colors have faded in both species



External Characteristics – *less than ideal*

- **Coloration**

➢ Yellowfin (68 cm) and Bigeye (65 cm)

- The yellow band on both species has **disappeared completely**
- Blueish colour above the pectoral fin on both species has faded to black

External Characteristics – *less than ideal*

- **Coloration**

➢ Yellowfin (68 cm)

- coloration has disappeared completely – both appear blue/black
- yellowfin still distinguishable by elongate body form

➢ Bigeye (65 cm)

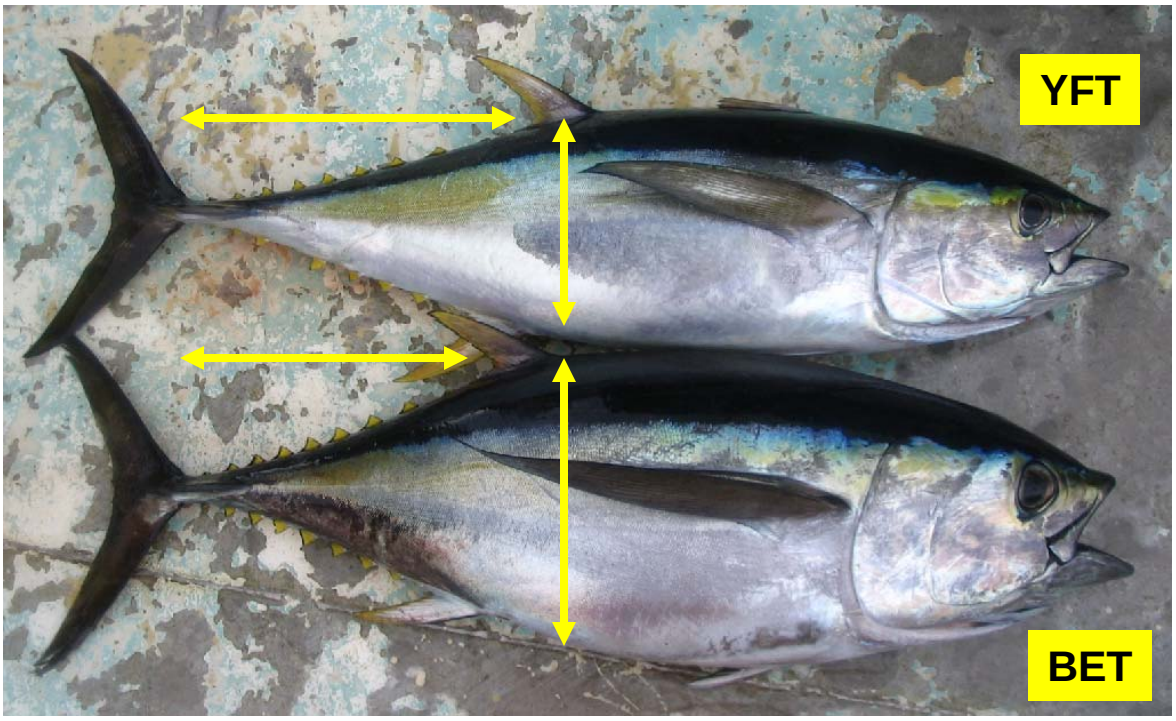
- color faded but distinguishable by deep, rounded body form

External Characteristics – *ideal*

- **Body morphology**

➢ Yellowfin

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



➢ Bigeye

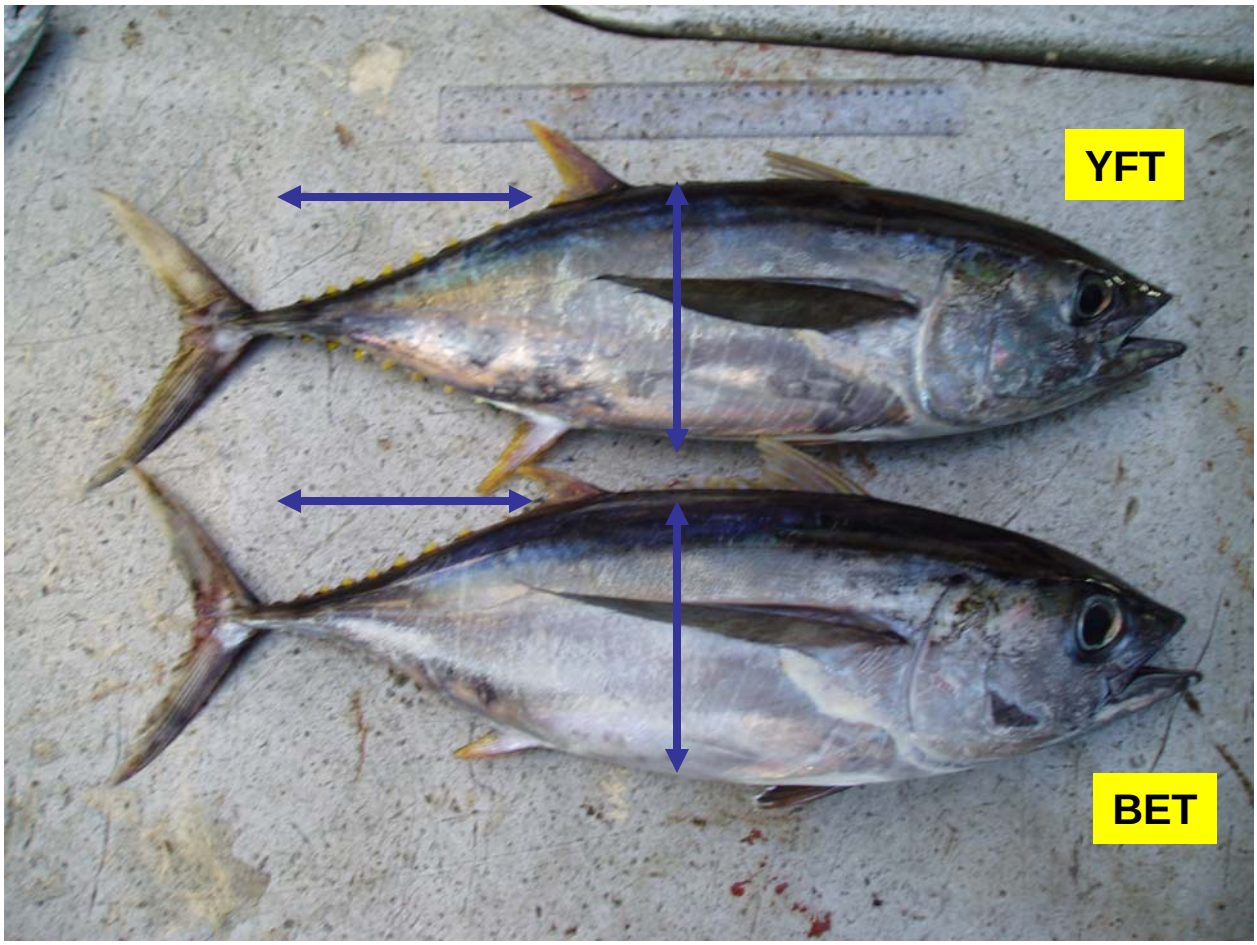
- body deep, thick, rounded
- body outline rounded, forming a smooth dorsal and ventral arc between snout and caudal peduncle

External Characteristics – *less than ideal*

- **Body morphology**

➢ Yellowfin (56 cm)

- body slightly flattened or squashed, artificially deepening body
- tail slightly distorted, looks short and rounded



➢ Bigeye (53 cm)

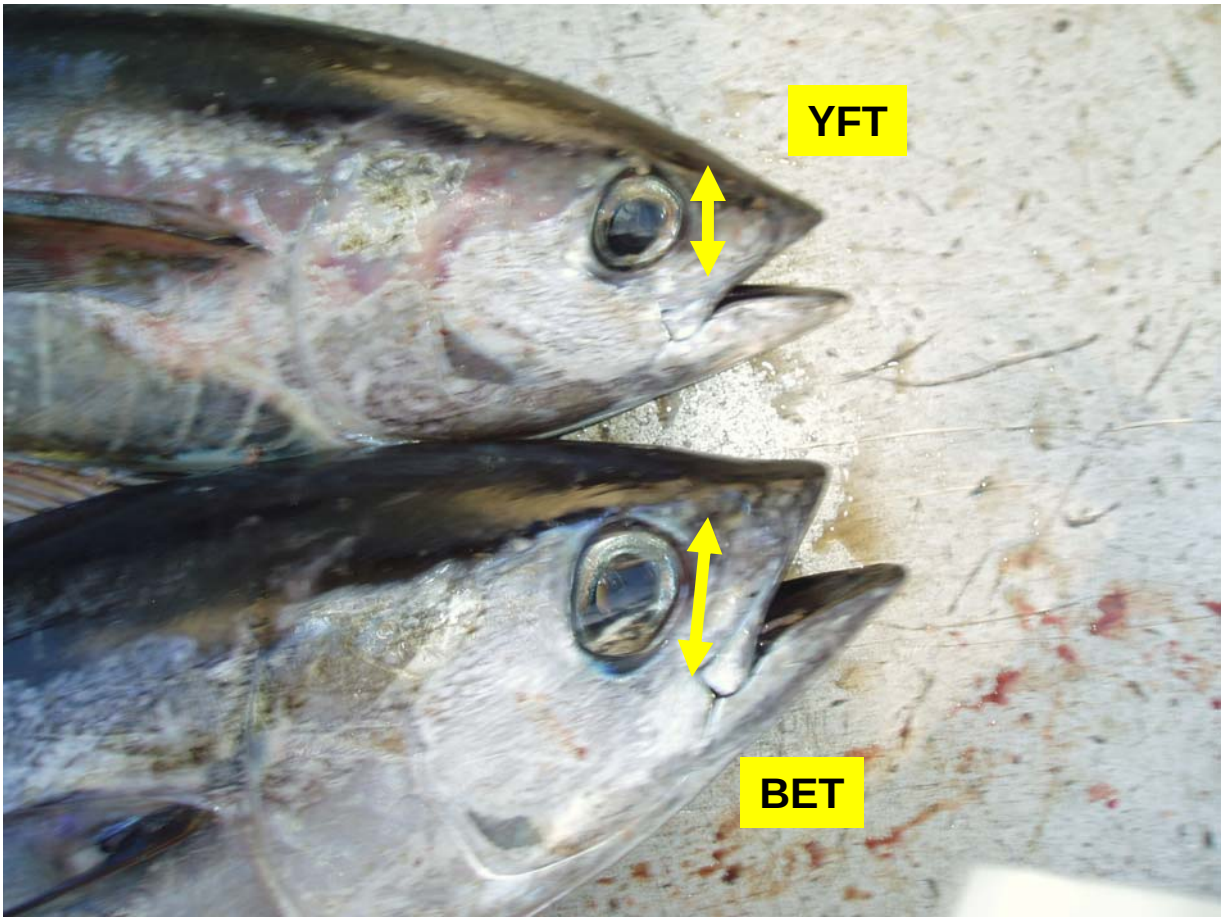
- body not that different in appearance from the yellowfin
- tail length intermediate

External Characteristics – *ideal*

- **Head and eye morphology (*eye diameter)***

➢ Yellowfin and Bigeye (~ 45 cm)

- Yellowfin eye is small, round and confined to upper half of mouth
- Bigeye eye is larger, extending more ventrally and posterior in an irregular oval shape



External Characteristics – *ideal*

- **Head, eye and body morphology**

➢ Yellowfin

- shorter head length and depth vs Fork Length than bigeye
- smaller eye diameter compared to bigeye of same Fork Length
- body and tail elongate, narrow

➢ Bigeye

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

External Characteristics – *less than ideal*

- **Head, eye and body morphology**
  - **Yellowfin (56 cm)**
    - head squashed, appears as long and deep as the bigeye
    - eye can become squashed and appear larger than normal
    - body appears deeper than normal due to compression

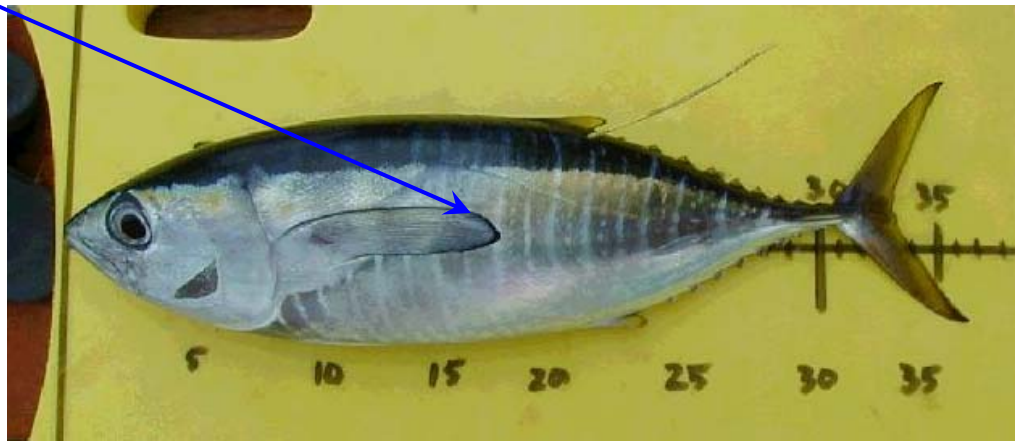
  - **Bigeye (53 cm)**
    - body rounded but not as deep as for typical bigeye

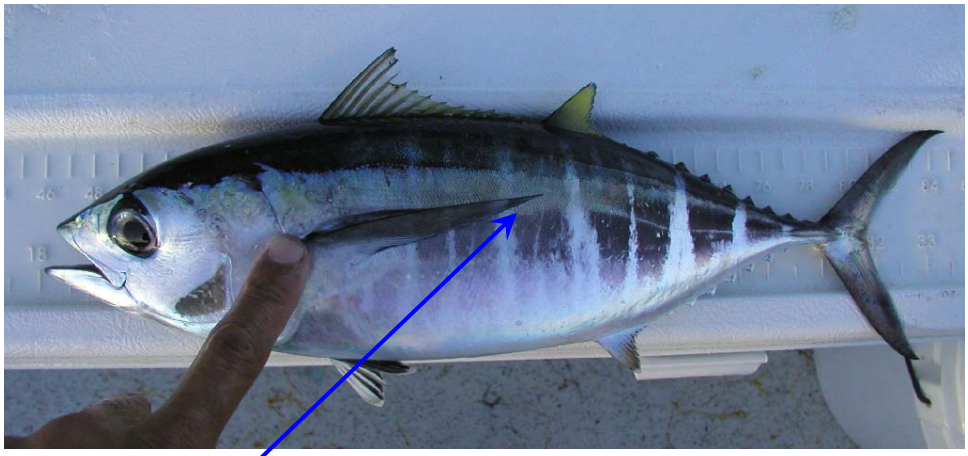
External Characteristics – *ideal*

- **Pectoral fin length and characteristics**

➢ Yellowfin (less than ~ 40 cm)

- pectoral fin short, just reaching insertion of second dorsal fin
- pectoral fin thicker, stiffer and rounded at tip





➢ Bigeye (less than ~ 40 cm)

- pectoral fin slightly longer reaching second dorsal fin
- pectoral fin thin, flexible and pointed at the tip

However, pectoral fin lengths are not that different in very small fish. Other features are more distinct such as body markings, coloration and morphology

External Characteristics – *ideal*

- **Pectoral fin characteristics**

➢ Yellowfin (45 cm)

- pectoral fin short, extending to base of second dorsal fin
- pectoral fin thicker, stiff, blade-like

➢ Bigeye (45 cm)

- pectoral fin long, extending beyond the second dorsal fin base
- pectoral tapers to thin, flexible point, “floppy”, or “feather-like”

Note: for large bigeye and yellowfin above 150 cm, the pectoral fins become similar in size and shape.

External Characteristics – *ideal*

▪ Pectoral fin characteristics

➢ Yellowfin (70 cm)

- pectoral fin short, extending to base of second dorsal fin
- pectoral fin thicker, stiff, blade-like

➢ Bigeye (70 cm)

- pectoral fin long, extending beyond the base of the second dorsal fin
- pectoral fin tapers to thin, flexible point, often curves ventrally at side

External Characteristics – *ideal*

▪ Pectoral fin characteristics

➢ Yellowfin (90 cm)

- pectoral fin short, extending to base of second dorsal fin
- pectoral fin thicker, stiff, blade-like

➢ Bigeye (90 cm)

- pectoral fin long, extending beyond the second dorsal fin base
- pectoral tapers to a thin, flexible point, often curves ventrally at side

External Characteristics – *ideal*

- **Pectoral fin characteristics**

➢ Bigeye (60 – 100 cm)

- pectoral fin tapers to thin, flexible point
- when raised from body, pectoral fin forms a smooth arc

Note: a positive ID for the first tuna is not possible as it is not fully erect and appears thicker and shorter than the four bigeye tuna that are shown behind it with long, curved pectoral fins with thin tips

External Characteristics – *less than ideal*

- **Pectoral fin characteristics (smashed fish)**

➢ Bigeye (77 cm)

- pectoral fin long with thin tip, extending beyond the second dorsal fin base, curved ventrally
- Pectoral fin can be used to identify bigeye although body is damaged

External Characteristics – *ideal*

▪ Pectoral fin characteristics (smashed fish)

➢ Yellowfin (70 cm)

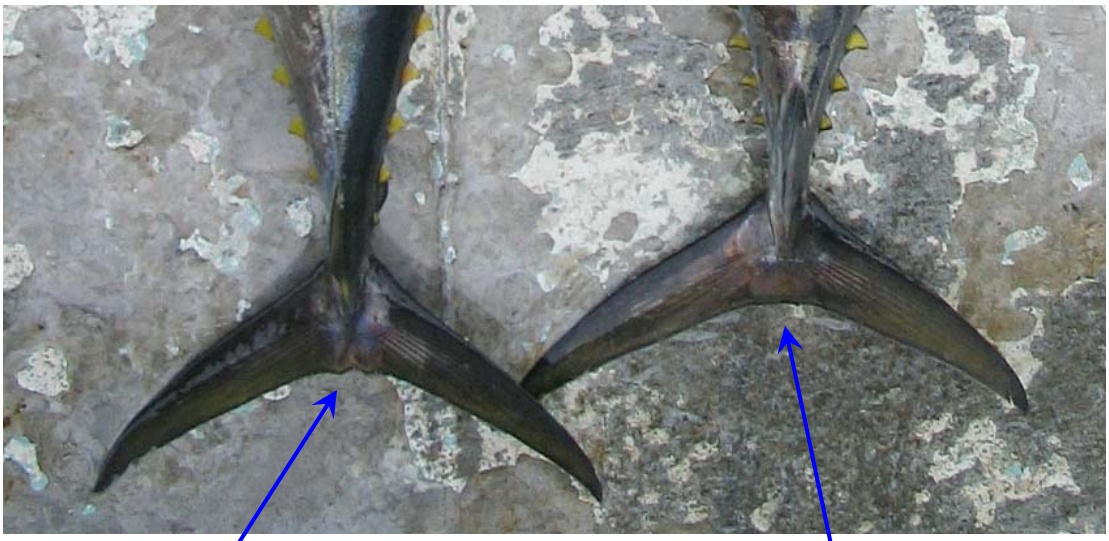
- pectoral fin of yellowfin is broken but other fins and body markings can be used to identify the yellowfin
- second dorsal and anal fins beginning to elongate, yellow color
- characteristic body markings of the yellowfin still visible

➢ Bigeye (70 cm)

- deep rounded body easily distinguishes bigeye
- very long, tapered pectoral fin reaches well past 2nd dorsal fin base
- no elongation of second dorsal and anal fins, colored silver with yellow edging

External Characteristics – *ideal*

- **Caudal fin characteristics**



➢ **Yellowfin**

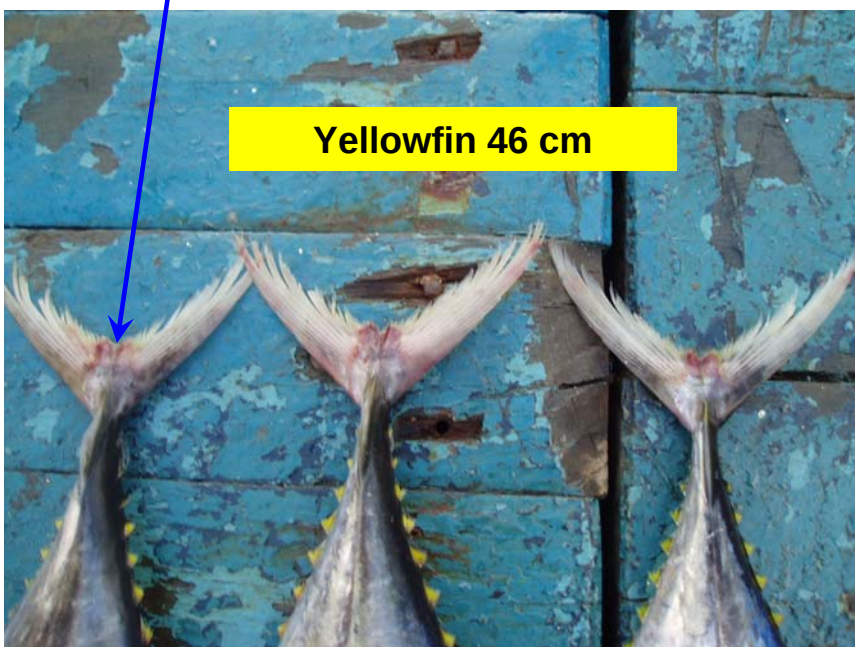
- Central portion of trailing edge forms a distinct notch
- Central area of caudal fin with two raised mounds

➢ **Bigeye**

- Central portion of trailing edge forms a flat or slightly crescent shaped area
- Central area of caudal fin flat

Caudal fin – *less than ideal*

Caudal fins shown below have lost all color but a central notch can still be seen



External Characteristics – *ideal*

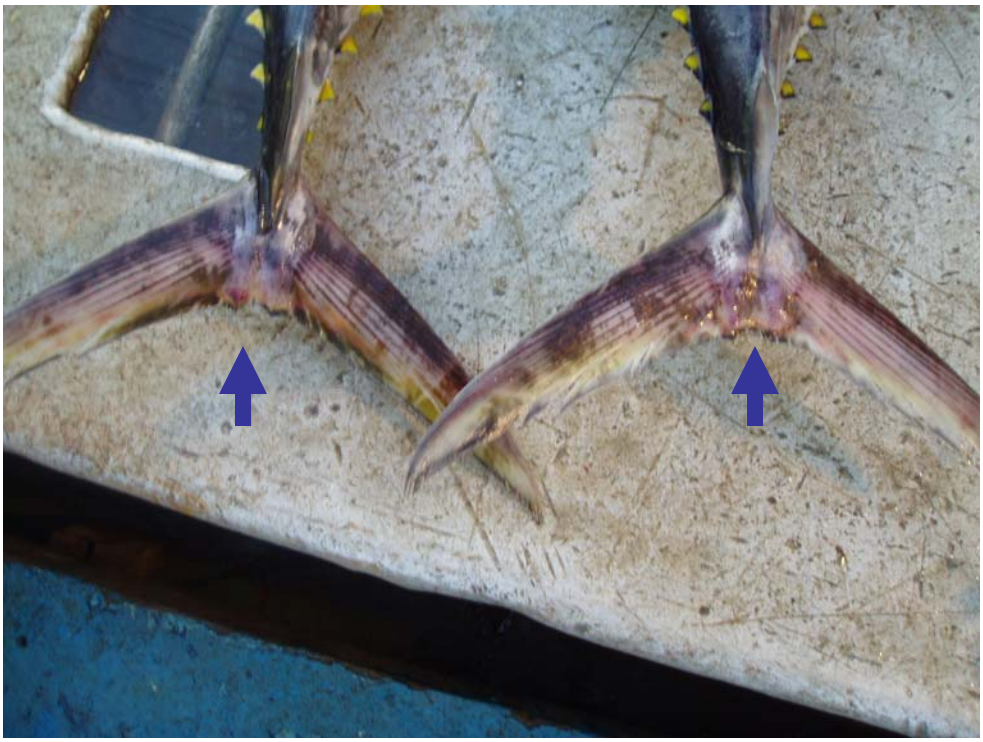
- **Caudal fin characteristics – center of trailing edge**

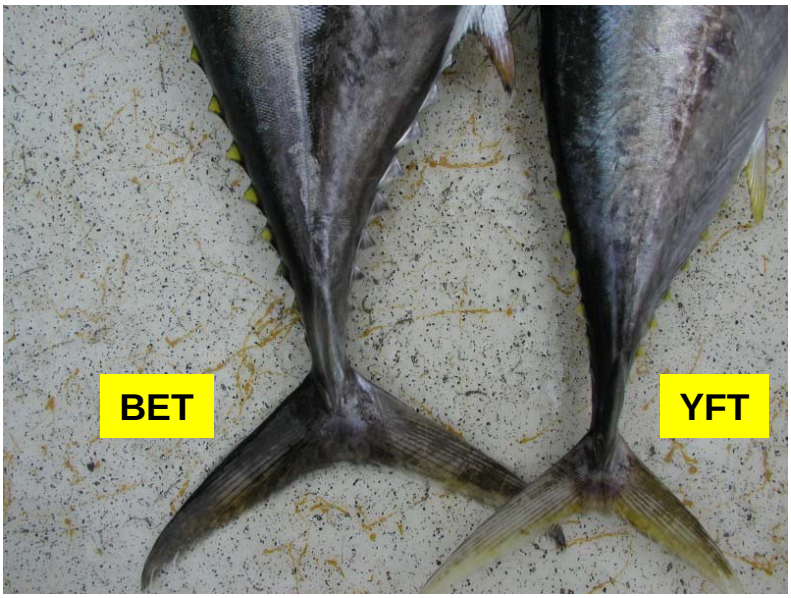
Yellowfin (70 cm)

Forms "V shaped notch

Bigeye (70 cm)

Forms flat or slightly rounded cup





External Characteristics – *ideal*

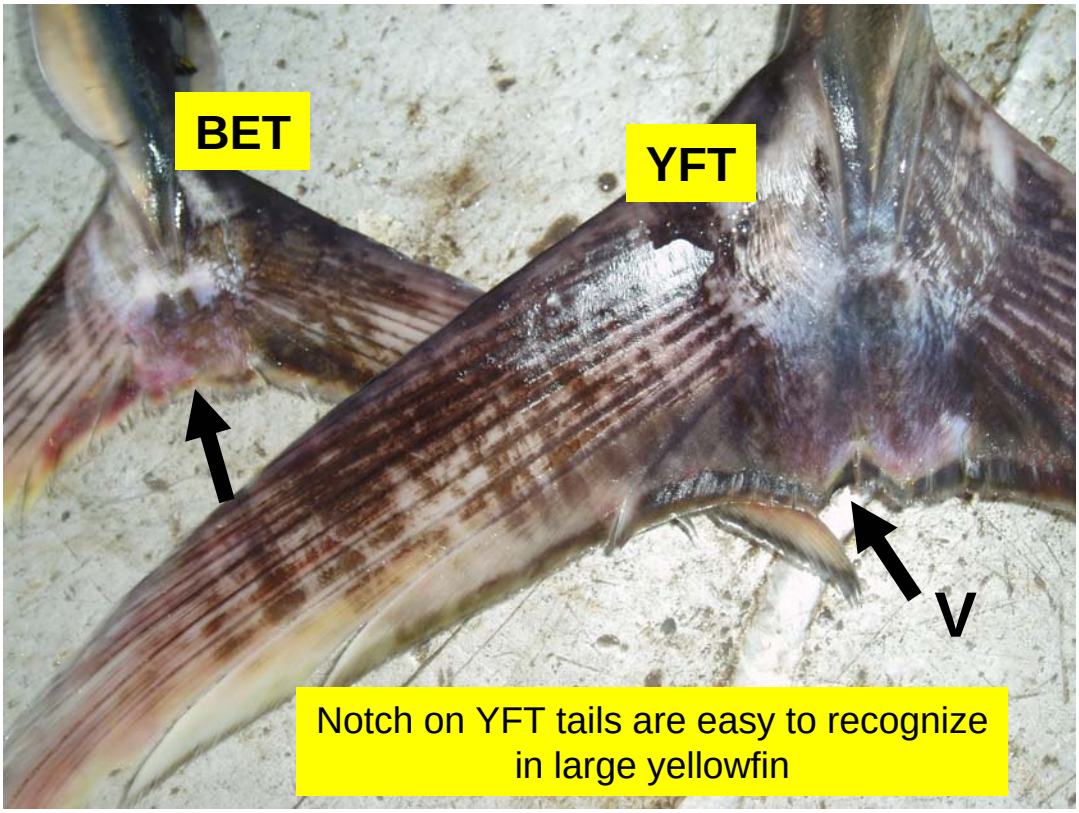
- **Caudal fin characteristics – center of trailing edge**

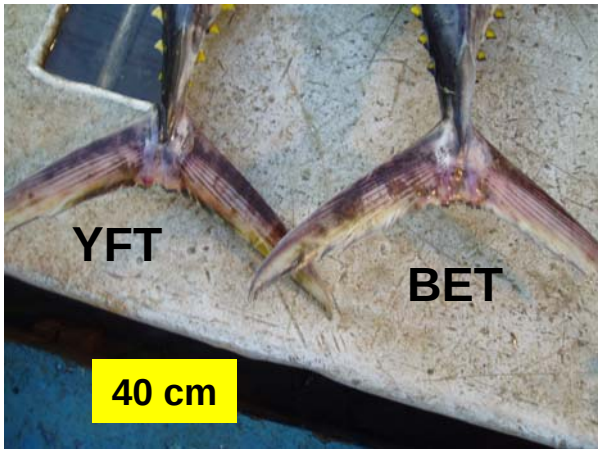
Bigeye

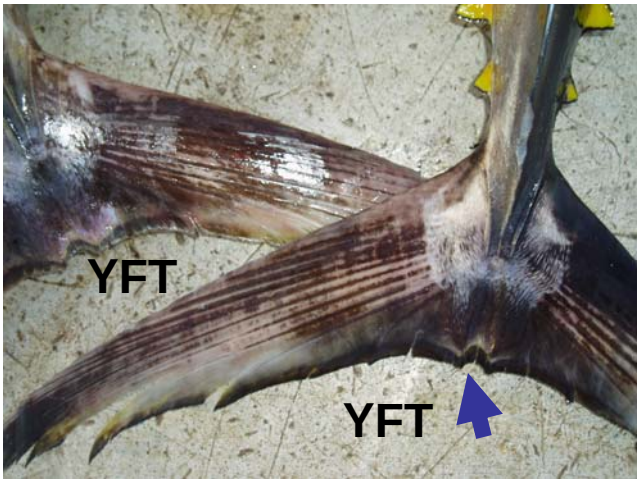
Forms flat or slightly rounded cup

Yellowfin

Forms "V shaped notch







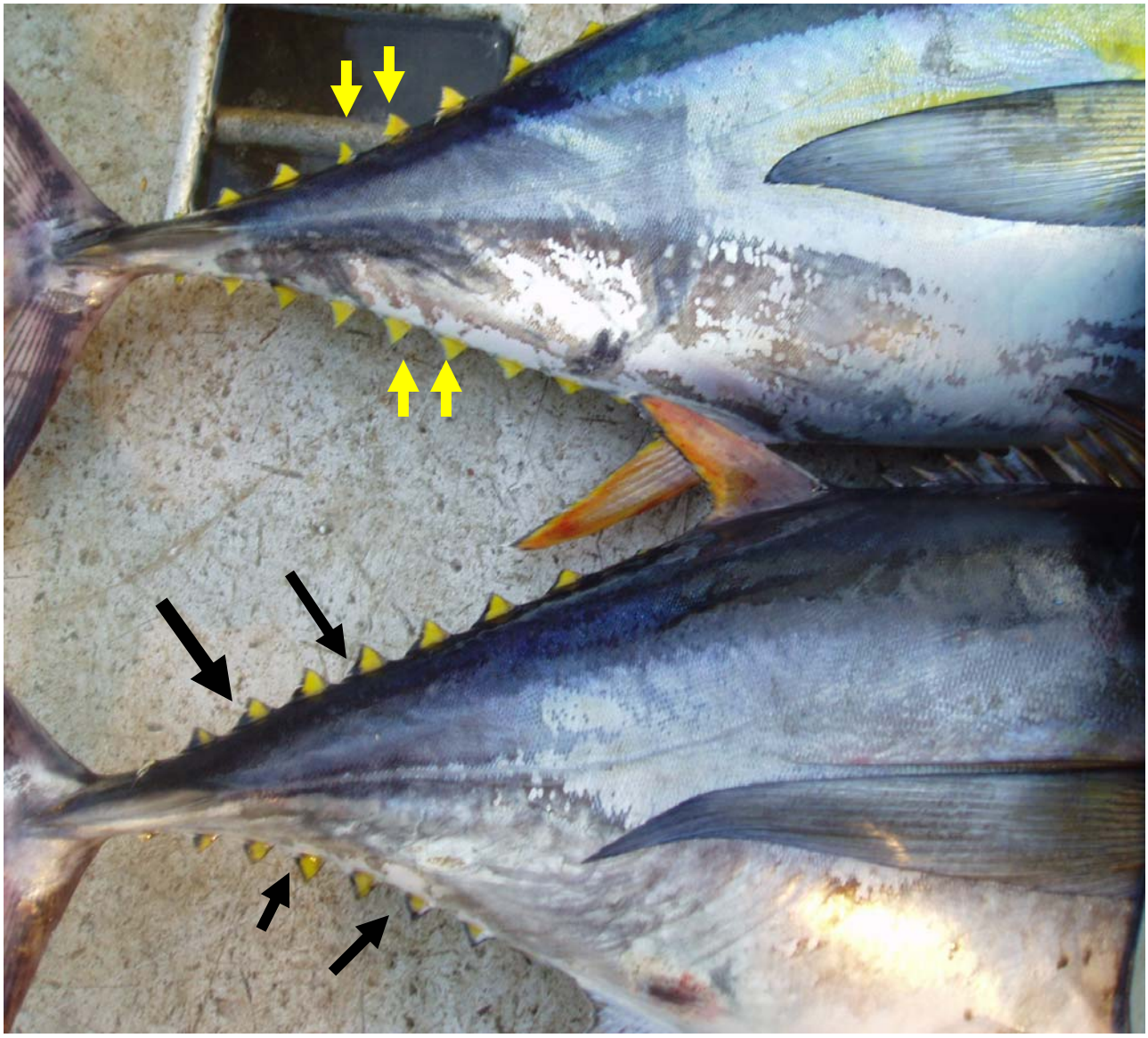
External Characteristics – *ideal*

- **Finlet coloration**
  - **Yellowfin**
    - bright yellow with no black edging

  - **Bigeye**
    - yellowish color edged with black

External Characteristics – *ideal*

- **Finlet coloration**
  - **Yellowfin**
    - bright yellow with no black edging



  - **Bigeye**
    - yellowish color edged with fine black line

External Characteristics – *ideal*

- **Finlet coloration**
  - **Yellowfin**
    - bright yellow with no black edging

  - **Bigeye**
    - yellowish colour edged with fine black line

Note: dark margins are sometimes visible in yellowfin finlets, so finlet coloration should be checked against other characteristics for positive ID

External Characteristics – *ideal*

Comparisons by size and features

➢ Yellowfin (~ 33 cm)

- Short, blunt pectoral fin
- Closely spaced markings of lines and rows of dots in chevron pattern extending to insertion of pectoral fin
- Shorter, smaller head, small, round eye
- Yellowish tail

➢ Bigeye (~ 34 cm)

- Longer, pointed pectoral fin
- Irregular, white lines across body with dusky markings
- Large head, deep body, large eye
- Dusky colored tail

External Characteristics – *less than ideal*

Comparisons by size and features

➢ Yellowfin (~ 45 cm)

- Long, narrow body, small head, small, round eye
- Closely spaced, chevron pattern of alternating lines and rows of spots, faded but visible

➢ Bigeye (~ 45 cm)

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

External Characteristics – *less than ideal*

Comparisons by size and features

➢ Bigeye (~ 51cm)

- Large, deep head, large eye, deeply rounded body
- Long pectoral fin past the second dorsal attachment with thin, pointed tip
- Body markings no longer visible

➢ Yellowfin (~ 56 cm)

- Long, narrow body, small head, small eye
- Closely spaced, chevron pattern of alternating lines and rows of spots **almost gone**

External Characteristics – *less than ideal*

Comparisons by size and features

➢ Bigeye (~ 65 cm)

- Large, deep head, large eye, deeply rounded body
- Long pectoral fin with thin, pointed tip
- Vertical, widely spaced irregular white lines **disappeared**
- Damage to the skin around the lower pectoral fin attachment

➢ Yellowfin (~ 68 cm)

- Long, narrow body, small head, small eye
- Closely spaced, chevron pattern of alternating lines and rows of spots can barely be recognized
- Skin below the dorsal finlets and around the pectoral fin base has been scraped and discolored

External Characteristics – *less than ideal*

Comparisons by size and features

➢ Yellowfin (~ 70 cm)

- Long, narrow body, small head, small eye
- Closely spaced, chevron pattern of alternating lines and rows of spots has **disappeared**
- Yellow and blue bands above the pectoral fin are still visible

➢ Bigeye (~ 70 cm)

- Large, deep head, large eye, body deeply rounded body
- Long pectoral fin with thin, pointed tip
- Body markings have **disappeared**
- A healed cookie cutter shark bite visible above anal fin, typical of bigeye tuna but also seen in some yellowfin

External Characteristics – *less than ideal*

Comparisons by size and features

➢ Bigeye (~ 77cm)

- Large, deep head, large eye, deeply rounded body
- Long pectoral fin with thin, pointed tip
- Body markings have **disappeared**

➢ Yellowfin (~ 77 cm)

- Long, narrow body, small head, small eye
- Closely spaced, chevron pattern of alternating lines and rows of spots mainly below the lateral, faded above the lateral line
- Second dorsal and anal fins beginning to elongate

External Characteristics – *less than ideal*

Comparisons by size and features

- **Yellowfin (~ 90 cm)**
  - Long, narrow body, small head, small eye
  - Closely spaced, chevron pattern of alternating lines and rows of spots have **disappeared**

- **Bigeye (~ 90cm)**
  - Large, deep head, large eye, deeply rounded body
  - Long pectoral fin with thin, pointed tip
  - Vertical, widely spaced irregular white lines **disappeared**

External Characteristics – *less than ideal*

Comparisons by size and features

➢ Bigeye (99 cm)

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

➢ Yellowfin (104 cm)

- Long, narrow body, straight behind 2nd dorsal, small head and eye
- Evenly spaced lines and rows of uniform dots
- Noticeable “V” notch in caudal fin with two raised areas
- 2nd dorsal and anal fins beginning to elongate

➢ Note:

- the bigeye has lost all body markings and yellow coloration

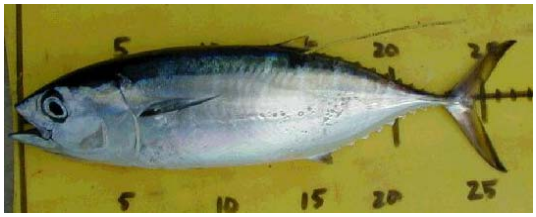
Examples of extremely small yellowfin tuna

These yellowfin tuna are of a size that you are unlikely to see in capture fisheries but are commonly found inside the stomachs of other tuna and predatory fish. They were collected on an anchored FAD in Hawaiian waters on 15 August 1997 and measured 12.6, 14.3, 14.5 and 15.9 cm FL. Despite their tiny size, the pattern of lines separated by a row of spots is apparent even in fish of this size.

Examples of small yellowfin and bigeye in ideal condition

Yellowfin 17 cm

Bigeye 32.5 cm



Yellowfin 25 cm

Bigeye 34 cm

Yellowfin 32 cm

Bigeye 36 cm

Yellowfin 37 cm

Yellowfin 41 cm

Bigeye 44 cm

Mixed fish on deck

Observers and port samplers must be alert to changes in size and species compositions during the brailing process, when moving tuna from the net to fish wells and during unloading, 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.

Using the criteria outlined in this handbook, positive identifications should be possible using only external characteristics. If in doubt, cut the fish and check the liver.

Mixed fish on deck: purse seine – *self test*

Mixed fish on deck: troll or handline – *self test*

Mixed fish on deck: purse seine brine frozen – *self test*

Mixed fish on deck: ringnet vessel – *self test*

photo: A.D. Lewis

Dinner fish – s*elf test*

photo: A.D. Lewis

Mixed fish on deck: all different species – *self test*

Note:

The tuna samples illustrated in this guide are in fair to excellent condition making identifications fairly straight forward. With practice, port samplers and observers should be able to make positive identifications from fish in a wide range of condition using external characteristics alone.

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