TAXONOMY

DATA TYPE:
- Species identification
- Landings and discards species identification

SHARK PLAN OBJECTIVES:
9. Improve species-specific catch and landing data, improve catch monitoring
10. Improve reporting of species-specific biological and trade data

WHY WOULD YOU USE THIS TOOL?
Taxonomy is used to identify shark and ray species accurately. A clear understanding of the species of sharks and rays present in a country’s waters and captured in its fisheries provides important baseline and monitoring data for conservation and fisheries management.

WHERE WOULD YOU USE THIS TOOL?
This toolkit is aimed at coastal fisheries, so most of the sharks and rays identified are likely to be coastal species. Coastal waters are typically defined as being to a depth of up to 40m. However, in areas where the ocean floor drops steeply below 200m coastal fishers may catch deepwater species, so these may also need to be considered during identification.

WHAT IS TAXONOMY?
All living organisms are classified based on similarities in their structures and evolutionary paths. The system is arranged in levels: organisms are divided into major groups called kingdoms, which are then further subdivided into phylum, class, order, family, genus and species.

All sharks and rays belong to the class Chondrichthyes, meaning they have a flexible cartilaginous skeleton. Within this class, there are about 34 families of sharks and 26 families of rays.¹

All species are given two-part scientific names through an internationally accepted system. The first is the genus name to which the species belongs, and is capitalized. The second is the specific name and is not capitalized. Both names are written in italics, and the combination must be unique for each species.

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RARE SPECIES
Occasionally, rare species of sharks and rays – ones that are not commonly encountered in the region in question – are identified. If this occurs, please inform the IUCN Shark Specialist Group at iucnshark@gmail.com – they’ll pass the information to the relevant scientists and projects.
For identification purposes it’s best to use scientific species names, as common names can vary by region and may change over time.

Nevertheless, when taking samples for taxonomic purposes it’s also useful to record the standard English common name and the common name used in the local area, as it may be the only name with which locals are familiar.

Species are sometimes reclassified in terms of genus or family as taxonomists collect more information on them. The most accurate source for checking the currently accepted scientific name of a species is the Catalog of Fishes, available online at http://researcharchive.calacademy.org/research/ichthyology/catalog/fishcatmain.asp

**SUMMARY**

Taxonomy is the science of classification: in this toolkit, it means identifying shark and ray species by examining their visible physical characteristics, the most important of which are shape (morphology) and colour. This is best done by comparing the whole animal – or a good quality photo (see p21) – to an identification guide or field guide (see below) that shows the different species and their main distinguishing features. Photos can also be sent to regional experts to confirm the identity of a species.

Taxonomic classification is a simple method, but it may not always provide a conclusive result: some species look similar and are hard to tell apart. In these cases, it may be necessary to take a tissue sample for genetic testing to correctly identify the species.

**IDENTIFICATION GUIDES**

Using the right identification guide for the area where the sharks or rays are seen or captured makes taxonomic classification quicker and more reliable.

It’s best to use a regional identification guide if there’s one available, as it will only include the species present in that region, considerably cutting down the total number of possibilities that need to be considered. This also reduces the chances of incorrectly identifying a shark or ray as one that does not in fact occur in the region.

As the name suggests, field guides are designed for use in the field – in ports, at markets, on boats. They’re a concise version of the regional identification guides, and can be printed on waterproof paper with photos of local species.

Sharks and rays are used for their fins, gill plates, meat, cartilage, skin and liver, so sometimes the whole animal is not available for identification. Visual identification guides are available for the fins and gill plates of some sharks and rays that are used in trade or are listed as protected; although as with meat, cartilage and skin genetic tools may be required for accurate identification to species level.

Many regional shark and ray identification guides are available for free online. You can find a list of some of them at the end of this Taxonomy tool.

**HOW TO USE TAXONOMIC KEYS**

Most shark and ray identification guides use taxonomic keys. These are a series of steps focused on a specimen’s distinguishing features, usually with two choices: A or B. Most keys use illustrations, with arrows pointing to the features described in the A and B choices.

Making the correct choice at each step of the key gradually narrows down possible options and eventually leads to the correct identity of a specimen. (It’s worth noting, of course, that this method only works if the species you’re trying to identify is in the key in the first place.)
It’s always good practice to record as much information as possible about the shark or ray to be identified. If it has been taken in a fishery, try to record:

- Presumed species identification
- Date of identification
- Name of person who identified animal

If possible, take a photo of the animal even if it is identified, in case further verification is needed. If there are several animals to be identified, each animal should be given a unique sample identifier (USI): write this on a label and include it in the photo (see % Surveys, labels).

If there’s no time to identify the shark or ray in the field, take good photos of it with its USI. If possible keep them together for later laboratory identification, or if the animal can’t be kept then take a labelled genetic sample (see % Genetics).

For all photos, record:
- Name of photographer
- Location
- Date

Start with an identification guide for the area where the shark or ray was caught. If none is available, use a global guide. Follow the guide’s taxonomic key, and use the key features to identify the animal (see Figs 4 & 5).

If only fins or gill plates are available, use a visual identification guide to fins and gill plates but ideally also take a tissue sample.

If visual identification guides don’t help to accurately identify the species in question, take photos and genetic samples (see % Genetics). Photos can be emailed to specialists for identification, and samples sent to laboratories.

A good photo can be used to identify a species, or verify an identification. Try to follow these simple steps for the best results:

- Take the photo from above looking directly down.
- Use a plain, non-coloured, light background so the shape and details of head, fins and tail can be clearly seen.
- Include a label in the photo to help distinguish different animals. If possible, use a unique sample identifier (see % Surveys, labels), or place, date and name of animal.

**SHARKS**

A lateral (side) view is the best to photograph a shark. * Lay the shark on its side and straighten the body and all the fins. These may need to be prepped up (e.g. with rocks, paper etc) so they are parallel to the camera. Ensure the head is not twisted (see Fig 6).

Secondary images are often also useful if the identification is not certain. These vary depending on the group, but may include:

- Underside of the head, including pectoral fins if possible
- Close-up of each dorsal and caudal fin
- Close-up of teeth

*Angel sharks, sawsharks and wobbegongs are the exception: use a dorsal (top) image for these. (See Fig 7)

**RAYS**

A dorsal (top) view is the best to photograph a ray. If the ray is dirty, rinse the body but be careful not to wash off any colour – this is the mucus layer. Lay the ray flat with all fins unfolded. For skates, shark-like rays and electric rays, align the dorsal and caudal fins. For those with long tails (e.g. stingrays, eagle rays, cow-nose rays), leave the tail straight until the spine then curve the rest of the tail upwards towards the snout, as close to the disc apex as possible – there should only be one curve in the tail, near the spine, then straight again. (See Fig 8)

Useful secondary images may include:

- Underside of disc
- Mouth and nostrils
- Lateral view of tail (when caudal fin or skin folds are present)
**EQUIPMENT**

Taxonomic identification doesn’t require much equipment. In the field it’s important to record as much data as possible, and it’s worth preparing data sheets and labels in advance.

**CHECKLIST**

- Measuring tape
- Gloves
- Identification guide(s)
- Regional field guide(s)
- Waterproof data sheets and clipboard
- Waterproof labels
- Pencil and eraser
- Waterproof marker for labels
- Camera with batteries, charger (adaptor if needed), memory cards or mobile phone for photos

**TECHNICAL LEVEL – EASY**

It’s useful to have some training in the use of taxonomic keys, and knowledge of the main features of sharks and rays. You should familiarize yourself with a region’s identification guides before trying to use them in the field.

Training in photography for identification purposes, and recording useful field and laboratory notes, would be helpful.

**COST – LOW**

Visual identification using taxonomic identification guides is the simplest and lowest cost option for shark and ray species identification. Many guides can be downloaded from websites for free.

Shark fin identification costs can be higher as training is needed. However, costs can be minimized by training the trainers – regional representatives travel to a central location for training, and then train more agents in their respective regions.

**TRAINING: SHARK FIN IDENTIFICATION**

Training is recommended for shark fin identification, particularly for agents (e.g. customs officers) who are required to enforce fin trade regulations. Specialist NGOs and the UN FAO can offer advice and assistance on training of this kind.

**SHARK FIN IDENTIFICATION GUIDES**

A number of guides have been developed to help identify shark species from their fins. These guides focus on species that are most common in the international fin trade, or that are of concern because of their conservation status. They use key features of the dorsal, pectoral and caudal fins, and include photos of fresh to partially dried fins. The fin guides have been collated and are available online for free download at [www.cites.org/prog/shark/resources.php](http://www.cites.org/prog/shark/resources.php)

**GILL PLATE IDENTIFICATION GUIDES**


**ONLINE RESOURCES**

**REGIONAL SHARK AND RAY IDENTIFICATION GUIDES**

There are numerous regional shark and ray identification guides. These websites offer free downloads:

- **CITES shark and ray portal:** [www.cites.org/prog/shark/resources.php](http://www.cites.org/prog/shark/resources.php)
  The CITES website organizes the guides by FAO geographical area, species and language.

  The FAO IPOA website organizes guides by publication date.

- **FAO Fishfinder Species Identification and Data Programme:** [www.fao.org/fishery/fishfinder/publications](http://www.fao.org/fishery/fishfinder/publications)
  The FAO Fishfinder website includes guides to many species, and organizes them by regional guides, field guides, pocket guides and on-board guides, species synopses and fact sheets.

- **Shark References:** [http://shark-references.com](http://shark-references.com)
  The Shark References site provides detailed species descriptions with links to relevant literature and identification guides.