CHAPTER 5A -- GETTING THE DATA – STOCK DYNAMICS

1. INTRODUCTION – STOCK ASSESSMENT

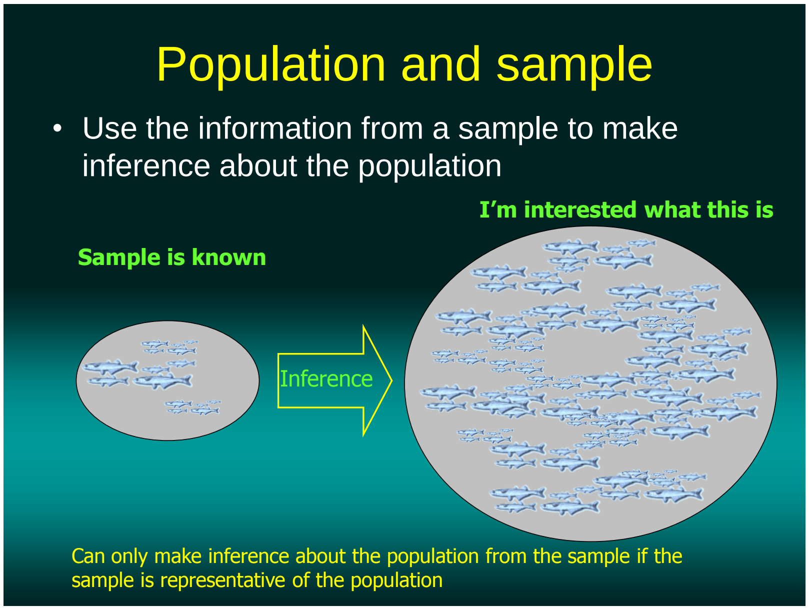
- As seen in previous lectures, the aims of stock assessment are to describe the population biology of fished species and to find ways of maximizing yields to fisheries while safeguarding the long-term viability of populations.
  - In other words, for a given level of fishing mortality to be sustainable, there must be a balance between the forces that reduce population biomasses (natural and fishing mortality) and those that increase it (reproduction and growth).
- The major task of fisheries biologists is to estimate various population **parameters** of given target species and integrate them into stock assessment "quantitative models" (holistic or analytic):
  - **Parameters** – quantitative descriptors of the stock [stock abundance, fishing effort, growth, recruitment, mortality (natural & fishing)]…
- For this, fisheries statistics must be collected.
  - Fisheries statistics are useful for assessment, monitoring, planning and management
- But how do we gather the statistical data necessary for stock assessment?
  - A proportion of a stock must be sampled to collect the biological data needed to apply the various models.

2. SAMPLING AND BIAS

- Considerable care is needed to ensure that samples are not biased.
- There are usually errors associated with parameter estimates because:
  - samples are not always representative of the stock or
  - because of measurement errors in the data or
  - the assumptions of an estimation method are not met
  - need to always "target" the same "stock" (biological population)
- Consequently, we should determine how input errors will affect the output of assessment models (quantify the degree of error).

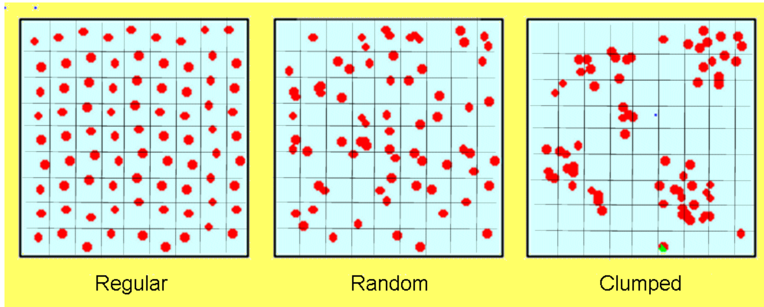
2.1 Sampling Strategies

- We need to have some knowledge on "sampling strategies" (sampling surveys)
  - How samples are taken is very important to get the BEST estimate of stock abundance (densities)
  - The abundance is usually estimated by counting numbers in small samples taken from total stock (after all, we cannot count all the individuals from a biological population)
- We use the information from a sample to make inference about the population



2.2 Spatial Distribution (Spacing of Individuals)

- **[Refer to King (2007), pp. 2-3]**
- Dispersion patterns are commonly described as **regular (uniform or even)**, **random**, or **clumped (aggregated/contagious/patchy)**.



- ***Random distributions*** -- are uncommon in nature since organisms tend to interact with both their environment and nearby organisms (con-specific or hetero-specific)

Variance to mean ratio: (s^2: x ~ 1.0)

- ***Regular distributions*** (**uniform/dispersed/even**) – Rarely occurs in nature, mainly because the environment is rarely uniform; but often seen in response to dispersed resources (tree plantations…) or through behavioral interactions (penguins in a rookery)

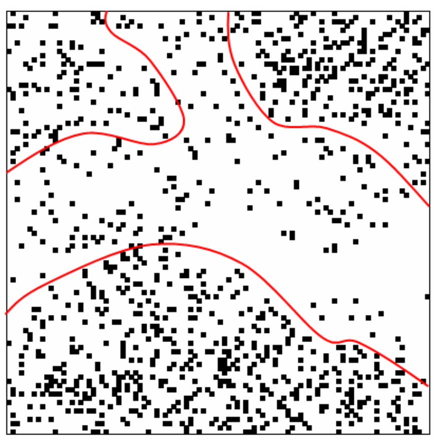
Variance to mean ratio: (s^2: x < 1.0)

- ***Clumped distributions*** (**aggregated/contagious/patchy**) -- most commonly seen in nature and may be due to social behavior or habitat structure

Variance to mean ratio: (s^2: x > 1.0)

Stratification (Gradient):

- Whatever the spacing, the overall distribution of individuals or clumps will be influenced by differences or **gradients** in the environment. **(Fig. 1.3, p.2 – King 2007; "gradient distribution")**
- In all marine organisms, a differential distribution with depth is to be expected and most species occur in maximum numbers over a relatively narrow optimal depth range.
  - If populations are clumped (contagious/heterogeneous/patchy), it would be better to sub-divide the sampling area into "**sub-unit section**" (**strata**) that reflect better homogenous dispersions
    - Sampling within each strata should be random
- By estimating the mean and the variance within each strata and then combining strata values to obtain overall values normally results in reduced variance estimate.



3. GETTING THE DATA: ABUNDANCE, CATCH AND EFFORT

3.1 ABUNDANCE

- In fisheries studies, the **estimatation of stock abundance** is an important population parameter to calculate in order to evaluate:
  - the stock size of a fishable resource,
  - the fished stock recruitments,
  - the year-class strength,
  - the biomass per unit area,
  - the changes in the fishing effort,
  - the changes in the environment
  - and other population parameters (mortality…)

- It is never possible to census all the individuals in stock, so indirect methods have to be used to estimate stock sizes for management. Two ways of estimating the stock abundance:
  - **Relative abundance** (the value is presented in percentage; the number of individuals in one area in relation to the number present in another area, or in the same area at another time) (Ex: most commonly used index of relative abundance in fisheries studies is the catch per unit effort)
  - **Absolute abundance** (the total number of individuals – measures the "true value")
- The analyst must be aware of the constraints under which abundance data are collected and the biases that exist.

3.1.1 Survey design – Accuracy and precision

- The aim of surveys is usually to get the "best" (highest precision, highest accuracy or both) estimate of total stock abundance or the abundance of part of a stock such as an age group.

(Refer to King 2007, Box 4.4 – Accuracy, precision and bias, p.180)

  - **Precision** -- is the closeness of repeated measurements to each other (usually measured as the spread of values around their mean value i.e. variance; standard deviation)
  - **Accuracy** -- is nearness of measurement to actual value

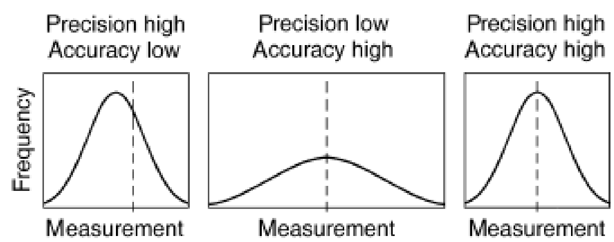


Fig. B4.4.1 The concept of accuracy and precision. The vertical broken lines represent the true mean.

- Surveys never record every individual in the stock, so we need to decide how the stock can best be sampled with available resources (manpower and budget…)

- Ways of estimating total stock size include in the present chapter are :
  - Sampling surveys
  - Mark-recapture studies
  - Depletion methods
  - Other methods equally are used : back-calculations from historical catch data in virtual population analysis… (but will be treated later on in the course)…

3.1.2. Fishery-dependent and fishery-independent data

- **[Refer to King, 2007 – Box 4.2 "Fishery-dependent and fishery-independent data", p.175]**
- **Fishery-dependent data –** The data is collected from fishing vessels (fishers logbooks…) and fish processors (i.e. commercial operations)
- **Fishery-independent data –** The data is collected from the activities of fisheries researchers (in some cases working from a fisheries research vessel) – in this case, can only collect small number of samples compared with commercial operations.

INDEPENDENT MEASURES OF FISH ABUNDANCE

3.1.3. Underwater Visual census methods (Visual surveys)

- In relatively clear and shallow waters divers can make direct records of size and abundances using underwater visual census. (This measures the absolute abundance.) **[King, 2007, Fig, 4.6, p.182)**
- During the census, target species are counted in set areas or over set time periods. (For example, this can be applied for many reef fishes, sea urchins, abalone, sea cucumbers…)
- A major advantage of visual census methods is that habitat data can be collected at the same time and that the divers gain an understanding of the fished ecosystems.

- In deeper water, visual census counts have been made from submersibles.
- The main visual census methods are: **transects**, **point counts**, and **timed point counts**

(Jennings et al. 2001, Fig. 10.4, p.208)

Transect methods (partial counts)

- The transect methods involve counting individuals along either side of a tape measure that is laid on the seabed.
- Most direct way of counting the number of individuals in small parts (or sampling unit) of the whole population.
- ***Stratified sampling*** – Stratified sampling involves conducting sampling effort by concentrating sampling in areas, or strata, of more homogenous abundance (high abundance vs low abundance; by depth gradient, etc.); -- this permits a greater degree of precision.
- ***Manta tows*** --- a snorkel diver is towed over fixed distances while holding onto a board towed behind a boat
  - This is favored for counting large visible species (like the giant clams or Crown of Thorns starfish) that are relatively scarce and found in shallow water
  - Large areas of seabed are best covered with manta tows.

Point Counts and Timed Point Counts

- Point counts involve counting individuals in circular areas, usually with a radius of 5-7.5 m.
- Fish within a set distance of the seabed are recorded.
- ***Instantaneous counts*** are used to estimate absolute abundance
- ***Timed counts*** measure relative abundance because counts will depend on the frequency of movement in and out of the count area.

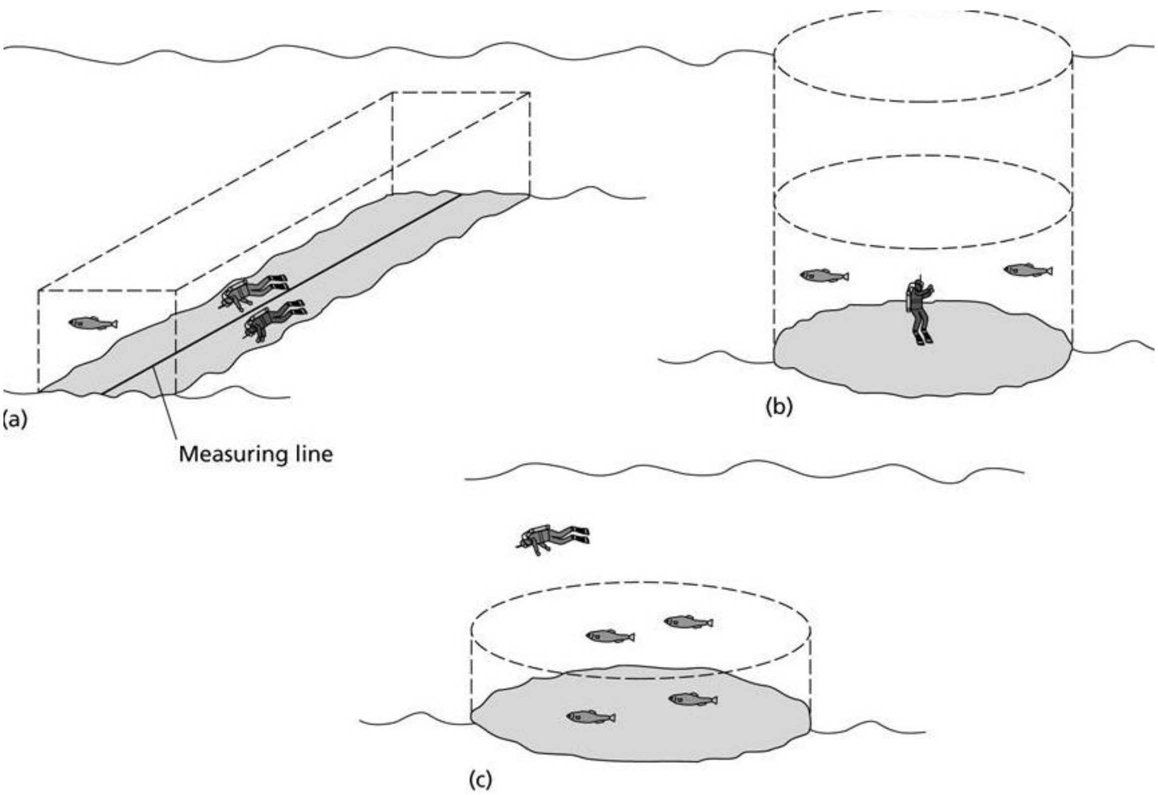


Fig. 10.4. *Visual census methods. (a) Transect; (b) timed point count; (c) "instantaneous" point count. The area covered by the census is indicated by the dotted lines.* **(in Jennings2001, p.208)**

3.1.3 Acoustic methods (Echo-sounders/Hydro-acoustic surveys)

- Acoustic methods allow fish to be detected throughout the water column and are particularly useful for estimating the abundance and distribution of pelagic fishes that could not otherwise be sampled across large depth ranges. **(Jennings et al., 2001, Fig. 10.6, p.209)**

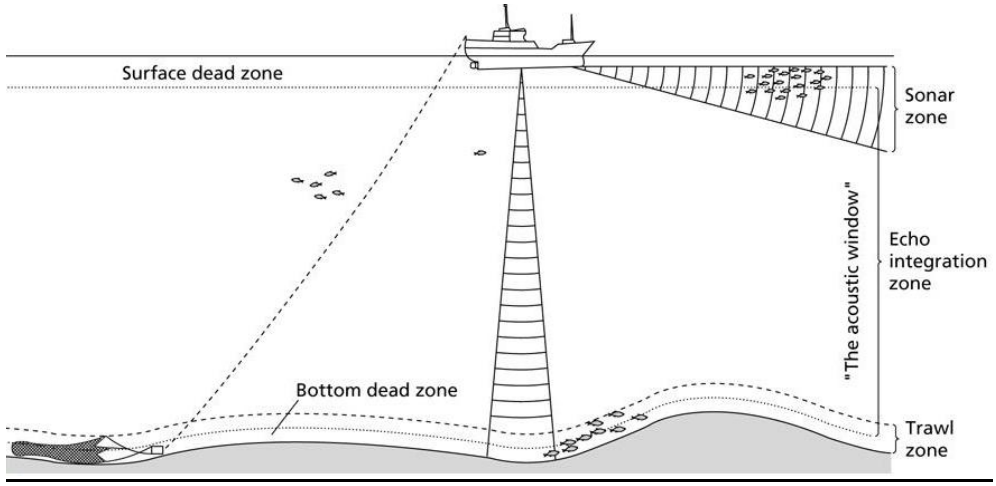


Fig. 10.6 Recording windows for sonar, echo-integration and bottom trawls during abundance surveys **(in Jennings et al 2001, p.209)**

3.1.4 Trawl surveys (Swept area method)

- Commercial <u>catch</u> and <u>effort</u> data (CPUE) are unlikely to provide good estimates of relative abundance because:
  - fishers target "hot spots" (highest abundance spots -- where abundance remains high regardless of changes in overall stock size)
  - improvements in fishing gear technology mean changes in fishing effort over time (technology creep). **(Refer to King 2007, Box 4.2, p.175)**
- To overcome this, fishery scientists obtain their own data using standard fishing techniques at standard locations.
  - Example: Annual bottom <u>trawl surveys</u> are widely used. The <u>aim</u> of a trawl survey is usually to get indices of abundance that are proportional to true abundance.
    - The entire area inhabited by a fish stock should therefore be surveyed and the *catchability* (*q*) of the gear needs to be known.
  - <u>Trawl surveys (**swept area method**) also permits to:</u>
    - Measure variation in the size of commercial important stocks
    - Measure rates of recruitment
    - to sample fish for biological studies
    - to gather information on the <u>abundance</u> and <u>biology of non-target species</u> as well (other organism fished by the trawl net).

<u>Swept Area method – Trawl Survey:</u>

- The trawl survey (**swept area method**) is a variation of the partial counts method, and is applicable to trawling.
- A towed trawl net in fact samples fish in an area which is equivalent to a long rectangle sampling unit with an area **"*a*"**, estimated as: **(King 2007; Fig. 4.7, p.183)**

$$\boldsymbol{a = W * TV * D}$$

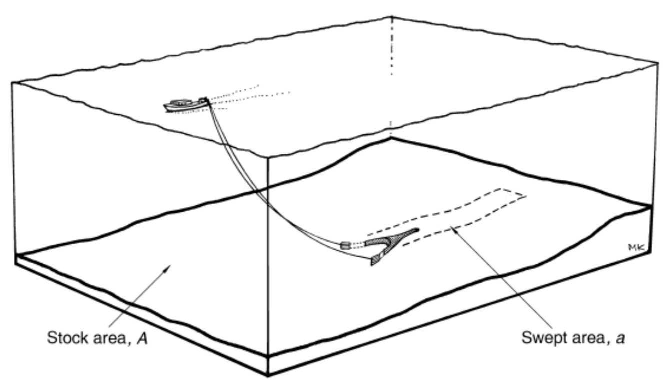


Fig. 4.7 The relationship between the swept area (*a*) of a trawl net and the total stock area (*A*).

W: is the effective width of the trawl (often the distance between the otter boards or wing spread and beam width for a beam trawl)

TV: towing velocity

***D**:* duration of the tow

- An estimate of the total stock *biomass* (*B*), is obtained by multiplying the *Catch* (*C*) of the fish in the path of the trawl by the ratio of the stock area to the trawled area:

$$B = C_W/v * (A/a)$$

B : Biomass of the stock

C_w : Catch weight per tow

v : Vulnerability of fish to the gear (the proportion of total weight of fish in the towed path that is caught: usually assume 50% of total weight caught (i.e. $v = 0.5$), (because difficult to evaluate) [depends on the *"catchability – q"*]

C_w/v : Relation between total weight of the fish in the path of the towed net and its vulnerability [depends on the catchability – q]

A/a : The relationship between *swept area* (*a*) of a trawl net and the *total stock area* (*A*)

Evaluating the biomass with the CPUE

- Another way of evaluating the biomass is with the CPUE:

$$B = \text{CPUE} * (A/a)$$

3.1.5 Depletion methods

Leslie and Davis Method --- **(From Jennings et al. 2001; and Data from King 2007)**

- In the short term, the rate of reduction in abundance of a fished population is determined by catch rate and population size.
- Conditions, to apply the depletion method:
  - Fished population is closed (no recruitment, no migration and no natural mortality --- all these parameters are considered nil) --- i.e. "*only the fishing mortality intervenes*"
  - Period of fishing is short relative to the time for population growth
  - Catchability is proportional to abundance (the CPUE is "proportional" to the stock size)

(Refer to Jennings et al. 2001. Fig. 10.10, p.213; and King 2007; Fig.4.9, p.188)

- We proceed by deliberately overfishing an isolated population of fish

$$N_t = N_\infty - \Sigma C_t$$

N_t : **Population Number present at time t**

N_∞ : **Original stock size (initial population Number at time t=0; sometimes denoted by N_o)**

ΣC_t : **Accumulated catch up to time t**

(The number present at time t, will be equal to the original stock size less the accumulated catch up to time t.)

- By definition, catchability coefficient "q", is the proportion of the total stock caught by one unit of effort , so that, at time t:

$$\mathbf{CPUE_t = qN_t}$$

$$\mathbf{N_t = CPUE_t / q}$$

- Substituting:

$$\mathbf{N_t = N_\infty - \Sigma C_t}$$
$$\mathbf{CPUE_t / q = N_\infty - \Sigma C_t}$$
$$\mathbf{CPUE_t = q\,[N_\infty - \Sigma C_t\,]}$$
$$\mathbf{CPUE_t = q\,N_\infty - q\,\Sigma C_t}$$
$$y \quad = \quad a \quad - \quad b$$

(linear equation)

y: $CPUE_t$ -- Catch Per Unit Effort at a given time t (y-axis)

a: $q\,N_\infty$ --- intercept to the y-axis

b: - q --- coefficient of catchability (« slope »)

x: ΣC_t --- Cumulative catch at time t (x-axis)

- This suggests that if a fish stock is fished heavily, the CPUE may be graphed against cumulative catch as a straight line. **(King 2007; Fig. 4.9, p.188)**

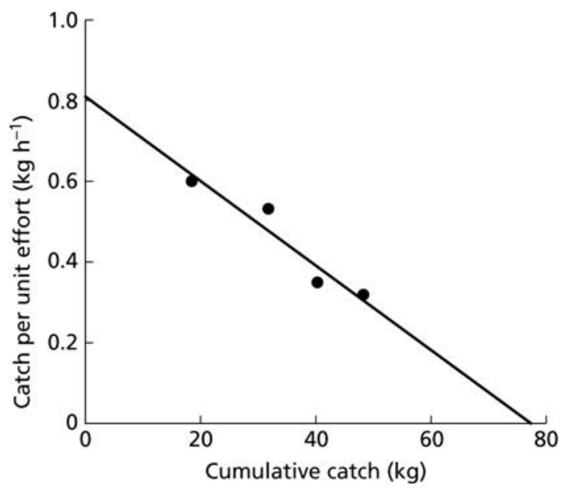


Fig. 10.10. *Depletion plot for surgeonfishes caught by spear fisnig at Wolea Atoll. Data from smith and Dalzell (1993).* **(in Jennings et al. 2001. p. 213)**

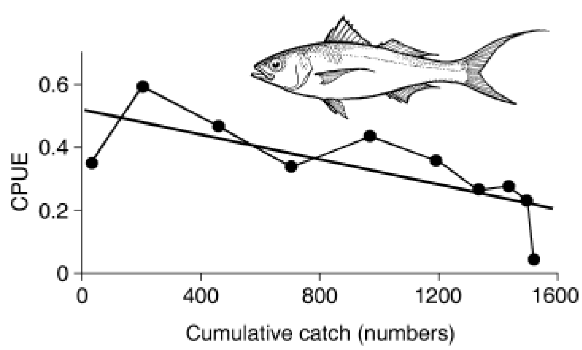


Fig. 4.9 The relationship of CPUE (numbers per line-hour) to adjusted cumulative catch (numbers) for the deep-water snapper, *Etelis coruscans*, off Samoa.

3.1.6 Mark-Recapture methods

- Since tags are used to mark the target species, it is possible to obtain information on additional aspects of their biology such as growth and movement.
- The accuracy of the method depends on meeting several assumptions:
  - tagged individuals must be distributed randomly over the population
  - after tagging, there is no recruitment, migration or tag-induced mortality before sampling the stock
  - presence of the tag must not alter survival or alter chances of being caught by fishing gear
- A known number of marked or tagged fish is released into a fish stock, and the proportion of recaptured tagged fish in subsequent catches is used to estimate the stock size.
- In this case, the proportion of tagged fish (T) in a population of size N is equivalent to the proportion of tagged fish recaptured (R) in a catch (C) : **(King 2007; Fig.4.8, p.186)**

$$\mathbf{T/N = R/C}$$

So that the abundance is estimated by:

$$\mathbf{N = TC/R}$$

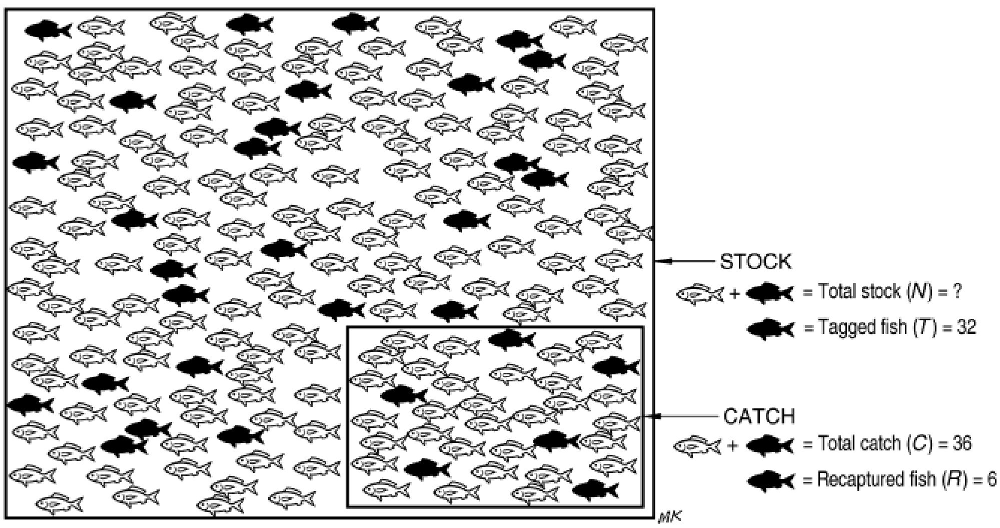


Fig. 4.8 The large rectangle represents a stock of fish which includes 32 tagged fish (solid shapes). The small rectangle at the lower right represents a catch of 36 fish of which 6 have tags.

3.1.7 Egg Production methods (Egg and larval surveys)

- The abundance of eggs and larvae (done by plankton surveys) may be used to estimate the abundance of spawners.
- Egg production methods provide fishery-independent estimates of biomass and can be used for fishes which spawn pelagically or demersally on defined spawning grounds.

DEPENDENT MEASURES OF FISH ABUNDANCE

3.2 THE FISHERY ITSELF – CATCH AND EFFORT

- So far we have looked at methods of abundance estimation that do not rely on fishery data.
- However, the commonest method is based on catch statistics obtained from the fishery itself. The fishery can provide catch or landings and effort data from larger areas and over longer time scales than research surveys.
- Most commonly used index of relative abundance (based on catch statistics) is the **Catch per unit effort (CPUE or C/f)**
  - Based on the fact that if the target population is dense, a fishery is likely to catch more individuals per time unit, than if the number of individuals is sparse. (CPUE = qN)
- The **catch (C)** and the **fishing effort (f)** are usually collected in all managed fisheries and in fishery surveys
  - **Catch (C) –** the fish and invertebrates that fishers bring ashore are often called "catches" (*quantities brought on the vessel*) or "landings" (*quantities brought ashore*). Strictly speaking, these terms are not synonymous, since much of the catch is discarded at sea and never landed. We should distinguish **Landings Per Unit Effort (LPUE)** from **Catch Per Unit Effort (CPUE).**
  - **Fishing effort (f)** (or simply "effort") – how much fishing is or has been going on during a specified period of time
    - is expressed in type-of-unit/time i.e. trap/day; trawlers/weeks; hooks/days etc.

Catch per unit effort (CPUE or C/f) -- is calculated by dividing the total catch data for a given place and time by the corresponding total fishing effort data

$$\text{CPUE} = \sum \text{catch obtained} \,/\, \sum \text{effort used}$$

- CPUE may be recorded in many ways:
  - number or weight of fish caught per hook per hour; lobsters caught per trap per day; demersal fish caught per hour of trawling; tonnes of fish caught by trawler-days…

(Ref: Barnes & Hughes, 2000, p.157)
Hake catches of South Africa – CPUE plotted against time

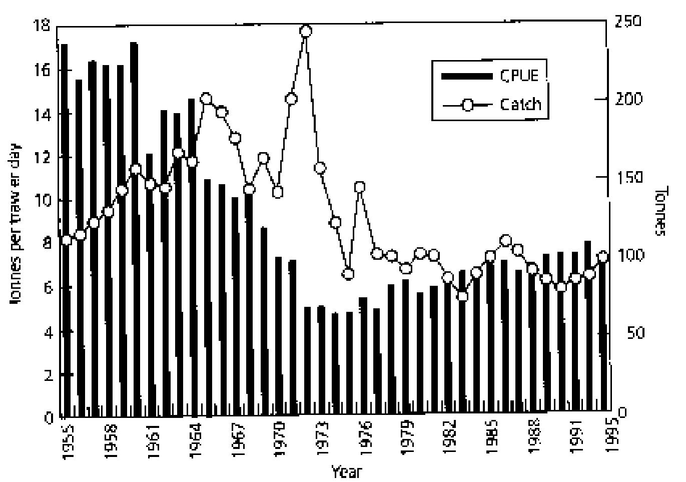


Fig. 8.11 Hake catches -- graph of catch per unit effort plotted against time for Cape hakes on the west coast of South Africa from 1955 to 1995.
(In Barnes & Hughes. 2000. Fig. 8.11, p.157)

Relationship of CPUE to the total stock abundance (N or B):

- Changes in abundance in a population that is subject to a fishery are reflected in changes in catch per unit effort
  - The basic principle of using CPUE data is that changes in CPUE accurately reflect changes in the abundance of fish in the stock. But CPUE alone as an indication of abundance can be misleading (See above example – Barnes & Hughes, 2000, Fig. 8.11, p.157).
- There is a linear relationship between the CPUE and N or B (Biomass)

$$\mathbf{CPUE_t = qN_t}$$

q = catchability coefficient (is the slope of the relationship)

- **availability (q_a): proportion of the stock in the survey area**
- **catching efficiency (q_e): the ratio of the number of fish caught and retained by the net to the number of fish in the trawl path also called "density" (D)**
- **B = DA (Biomass = Density (in weight) X Area used by stock)**

N = abundance (number of individuals) —"Biomass" (B) (total weight of all the individuals)

CPUE = Catch per unit effort

t ➔ **time of sampling**

<u>There are four main problems with measuring CPUE:</u> (in Barns & Hughes, 2000, p.157)

i) It is only a <u>relative index</u> of abundance and does not measure the actual biomass of fish

ii) The catch may vary according to the availability of the target species, even if the stock does not change in size. Several factors may affect the availability of fish:

- availability of fish (a factor that influences the catch rate –CPUE)
- bad weather (gear works less efficiently);
- vertical distribution of fish in the water column and horizontal distribution (migration and fluctuating environmental conditions) and are they "randomly distributed"
- gear selectivity ["<u>catchability coefficient</u>" (q = F/f == number of fish caught/fishing intensity)]
- are all the fish, all, equally vulnerable to the fishing gear
- gear saturation
- behavior of fish (effect of the moon, season, daytime vs. nighttime…)
- skill of the fisher

iii) Is it the same type of gear (same mesh size; same material; same construction…)

iv) How the fishing effort is defined --- will influence the "precision" of the data gathered

- **<u>apparent effort</u>** -- the way the effort is measured (by definition—the apparent impact on the stock)
- **<u>effective effort</u>** (Effective time) --- how the effort "actually changes the effectiveness" (the actual impact on the stock)

<u>Example 1:</u>

In the gillnet fisheries, the effort can be defined in different manners with increasing refinement:

- number of fishers using gillnets (CPUE = Kg/fisher)
- If take into account the number of days; (CPUE = Kg/day)
- If the length of the gillnets were known; (CPUE = Kg/100m of net/day)

In other words, the more "refined" is the CPUE defined to reflect the "effective effort", the more "precise" will be the data.

<u>Example2:</u>

The case of large, medium, and small trawlers is a good illustration. The problem can be solved by selecting one unit and relating the others to it. (*Standardizing the fishing effort*)

<u>Example 3:</u>

- "Effective effort or effective time" --- When a trawler goes out at sea, it takes him time to reach the fishing grounds and come back to the dock. All this time, the fisher is not actively fishing (no direct contact with the fish stock). The fishing time is in fact the moment the trawl has been placed in the water and reached its fishing depth and is actually gathering the fish, up until the time the trawl is pulled out of the water. This is the time that the fishing gear has an impact on the "stock itself".
- When deciding on a unit to use, in this case, it would be better to measure the fishing effort by registration of the time the trawl was in the water, rather than the time the fisher spent at sea. (But this type of "precision" in the data is not always possible to gather.)

Box 10.1 (In Jennings et al. 2001, p.220)
Measurement of fishing effort

Estimates of fishing effort are needed to examine spatial and temporal changes in fishing patterns and to calculate landings-per-unit-effort (LPUE) or catch-per-unit-effort (CPUE) for assessment purposes. Simple units of fishing effort such as days at sea by vessel type are recorded in many fisheries because more detailed data are too difficult or too expensive to collect. Since the efficiency of fishers will almost always improve with time, simple units of fishing effort do not represent the same catching power from year to year. In modern trawl fisheries, for example, catch efficiency per hour will often increase by 5% or more each year.

Table B10.1.1 Alternative measures of fishing effort
in a beam trawl fishery

Measure	**Requirements**
Number of vessels	Occasional port monitoring
Days at sea	Regular port monitoring
Hours fishing	Logbooks/observers
Area swept by trawl	Satellite monitoring/observers

Table B10.1.1 gives examples of different measures of fishing effort that may be used in a beam trawl fishery. As the complexity of the effort measures increases they become more useful for calculating CPUE or LPUE. However, as complexity increases, the effort data will also cost more to collect. In practice, the data collected reflect a compromise between information content and cost. Thus days at sea may be collected for the whole fleet while swept area data may be collected for a few ‘representative’ vessels and extrapolated to estimate swept area for the fleet.

<u>How is the CPUE collected:</u>

- *Fishery-independent CPUE (Abundance)*
  - Collected during surveys by fisheries research vessels
  - Such as Echo-sounder (hydro-acoustic surveys); trawl surveys; egg and larval surveys; mark-recapture experiments; visual surveys (see previous section of this chapter)
  - Expensive to acquire
  - Permits to overcome “bias” created by normal fishing practices
- *Fishery-dependant CPUE*
  - Collected from commercial fishing operations **(See Box 4.3, p.176 – Logbooks)**
    - cheaper to gather data
    - can get large samples of data --- less variability (because of high number of samples)
    - may be collected by requiring fishers to enter this information in a **log book** (fishing logs) (often a legal requirement in the fishery --- for fishers to get their fishing license)

King (2007) – Box 4.3 (p.176) -- Logbooks

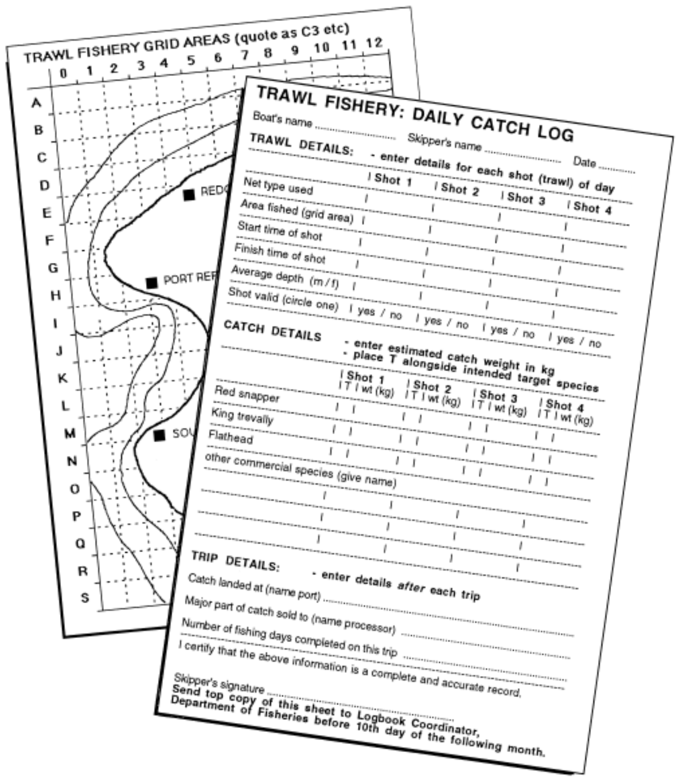


Fig. B4.3.1 A daily page from a simple trawl fishing log, which includes a chart of the fishing area (with grid references).

“The design of a fishing log is often a compromise between the desire of scientists to obtain as much information as possible, and the desire of fishers to spend as little time filling in logbooks as they can.”
“Often daily fishing logs are issued in the form of a logbook containing a chart of the fishing area (with grid references), and many duplicated daily log pages. Fishers enter the date, the fisher’s name (and vessel name), fishing depths and locations, fishing gear used, catch composition, and fishing effort data for each day’s fishing. Each daily log page is forwarded to the fisheries authorities, and the duplicate page is retained by the fisher as a personal record.

- Catch, landings and effort data can be recorded by **observers** working with the fishers (observers on board), in fisher’s log books or data input systems, and by port samplings.
- Satellite tracking devices are also used on an increasing number of large vessels to monitor their movements.
- Port sampling is still used to collect landings and effort data. Landings are easy to monitor if there are a few key ports, but monitoring becomes increasingly difficult when large fleets land in many small harbors.

Example of the compilation of the distribution of the total effort within a given commercial fishing area.

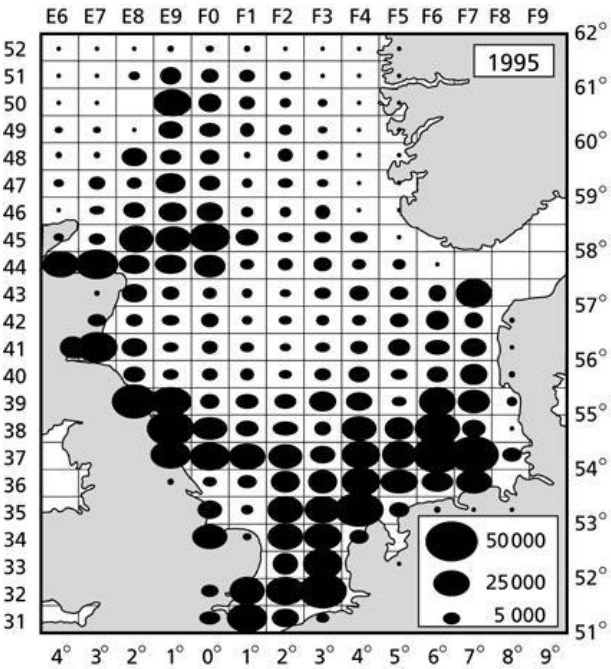


Fig. 10.15. The spatial distribution of otter and beam trawling (Kg/hrs/year) in the North Sea during 1995. Fishing effort (as hours fished) is declared at the port of landing, and assigned as ICES statistical rectangles of 0.5° Latitude and 1° Longitude shown by grid lines. After Jennings et al (1999). **(*In* Jennings et al. 2001, Fig. 10.15, p.220)**

CONCLUSION

- Many methods of fishery assessment rely on the idea that catch rates are proportional to stock abundance. Unfortunately, the analysis of data from commercial fisheries and independent surveys shows that LPUE from commercial fisheries is rarely proportional to abundance.
- In real fisheries, gears are rarely standardized, the efficiency of fishers and gears increases with time and fishers never fish randomly.

- Except perhaps in the cases of large-scale foreign and domestic fisheries, even basic data requirements for many fisheries may be difficult to meet in the Pacific since:
  - A large number of different species are caught
  - A wide variety of fishing techniques are used, often including several different techniques for the same species
  - The subsistence and artisanal catching sectors are extremely important and in some cases commercial fishing is almost negligible
  - Fishing is usually done by a large number of small fishing units.
  - The requirements for trained manpower to collect statistics from remote atolls, islands and villages are often prohibitive.
  - Small-scale fishing methods may vary considerably with time of day, phase of moon, season, food and money needs of the people involved…

"All the above are issues faced by the "small-scale fisheries" (the inshore fisheries – i.e the reef fisheries) throughout the Pacific Island Nations (PIN) "

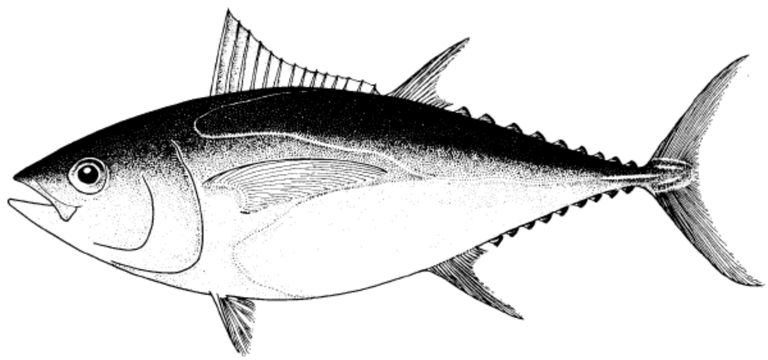
NOTE:
For more information and examples of the various logsheets used for the Central Pacific Tuna Fisheries which is being managed by SPC and the FFA – please refer the website below.
https://www.spc.int/oceanfish/en/data-collection/241-data-collection-forms#logsheet

You will find in this website, the report given below which furnishes all the details of each of the logsheet being used in the Central Pacific tuna Fisheries.

[Tuna fishery data collections forms are presented in appendices of the Data Collection Committee 7 meeting report (1.54 MB)]

REPORT OF THE SEVENTH MEETING OF THE TUNA FISHERY DATA COLLECTION COMMITTEE

12–16 November 2007
Brisbane, Queensland
Australia



FFA

Oceanic Fisheries Programme
Secretariat of the Pacific Community
Noumea, New Caledonia

Forum Fisheries Agency
Honiara
Solomon Islands

May 2008

EXAMPLE OF LOGSHEET:

SPC / FFA Regional Longline Logbook - Daily Form

REVISED: NOV 2007

TODAY's DETAILS	Vessel Name						Trip Number / Year	
MID-DAY TIME and POSITION	SHIP'S TIME	SHIP'S DATE (DD/ MM/ YY)	LATITUDE (DD . MM)	N S	LONGITUDE (DDD . MM)	E W	UTC TIME (00.00 hrs)	UTC DATE (DD/ MM/ YY)
	12.00 hrs	/ /	°		°			/ /
CIRCLE TODAY's ACTIVITY	1. Fishing	2. Not Fishing & not in Transit (specify)	3. Transit	4. Breakown	5. Bad Weather	6. Other pls specify_______		

For days with "1. Fishing" please fill in all the fishing details below.

FISHING DETAILS	SHIP'S TIME (00.00 hrs)	SHIP'S DATE DD / MM / YY	LATITUDE (DD ° MM)	N S	LONGITUDE (DDD ° MM)	E W
START OF SET		/ /	°		°	
END OF SET		/ /	°		°	
START OF HAUL		/ /	°		°	
END OF HAUL		/ /	°		°	

TICK PRIMARY TARGET SPECIES →		TUNA ◯	SWORDFISH ◯	SHARK ◯	IF ALIVE CIRCLE A
NO. OF HOOKS BETWEEN FLOATS		VESSEL SETTING SPEED (knts)		1. BAIT SPECIES	A
TOTAL NUMBER OF HOOKS SET		LINE SETTING SPEED (m/s)		2. BAIT SPECIES	A
TOTAL NO. OF LIGHTSTICKS SET		DIST. BETWEEN BRANCHLINES (m)		3. BAIT SPECIES	A

SPECIES		Number Retained	Kg. Ret.	No. Disc.	Reason Disc.	No. Rel Alive	SPECIES		Number Retained	Kg. Ret.	No. Disc	Reason Disc.	No. Rel Alive
Yellowfin ≤ 20kg	YFT						Mahi Mahi	DOL					
Yellowfin >20kg	YFT						Escolar	LEC					
Bigeye ≤ 20kg	BET						Wahoo	WAH					
Bigeye >20kg	BET						Opah (moonfish)	LAG					
Albacore	ALB						Sunfishes	MOP					
Skipjack	SKJ						Pelagic Stingray	PLS					
Striped Marlin	MLS						Snake Mackerel	GES					
Blue Marlin	BUM						Barracudas	BAR					
Black Marlin	BLM						Breams	BRZ					
Swordfish	SWO						Lancetfishes	ALI					
Bluefin tunas	TPZ												
Sailfish	SAI												
Shortbilled spearfish	SBS						TURTLES Unidentified	TTX					
Silky Shark	FAL						Green	TUG					
Blue Shark	BSH						Hawksbill	TTH					
Oceanic Whitetip Shark	OCS						Loggerhead	TTL					
Hammerhead sharks	SPN						Leatherback	DKK					
Mako sharks	MAK						Olive Ridley	LKV					
Thresher Sharks	THR						Marine Mammals ( )						
							Bird ( )						

Comments: Tag numbers / whale interactions or sightings / number of catch taken by whales / weather conditions.

Captain's Signature

SPC / FFA Regional Longline Logbook – Daily Form Instructions

Today's Details

Vessel Name: The full name of the vessel as written on the country registration certificate.

Trip number / year Number your fishing trips throughout the year. For instance, the second trip made during 2007 will be recorded as "02 / 2007.

Mid-day time and Position By completing this area will help convert the time you normally use on the boat to a more universal time i.e. UTC.

Ship's time - 12.00 hrs.	Fill in this box at mid-day every day.
Ship's date	State today's date. The date used and recognised by the crew and captain onboard.
Latitude	Mark the latitude position of the vessel every day at mid-day.
Longitude	Mark the longitude position of the vessel every day at mid-day.
UTC time	Record the UTC time every day at mid-day. The UTC time is available on the GPS.
UTC date	Record the UTC date, every day at mid-day. It is available on the GPS.

Circle today's activity *Circle the main activity the vessel will do, or is doing for the day. If you have circled "1. Fishing", please continue to fill in all of the fishing details on the rest of the page.*

Fishing Details

Fill in the following details for the start and the end of each set and haul.

Ship's time The ship's time at the start of each activity.

Ship's date The ship's date at the time of the activity.

Latitude The ship's latitude at the time of the activity.

Longitude The ship's longitude at the time of the activity.

No. of hooks between floats : The standard number of hooks between two floats.

Total number of hooks set : The total number of hooks set.

Total no. of lightsticks set : The total number of lightsticks set.

Vessel setting speed (knts) : The average speed of the vessel during setting.

Line setting speed (m/s) : If a line shooter is used record the speed the line was set at in meters per second. Knots per second divided by 2 is approximately give meters per second.

Dist. Between Branchlines (m): Calculate the distance between the branchlines by multiplying your line setting speed by the branchline set interval (or number of seconds between the branchline attachments) or give an estimate of this distance.

Bait Species :The name of all bait species used. Circle 'A' if any of the bait used was live.

Species

Number Retained. Fill in the total number of each species retained.

Kg Retained. Record the total weight of fish in weight (kilograms).

No Disc. Fill in the total number of each species that was discarded.

Reason Disc Using the supplied codes, note the reasons any species were discarded.

No. rel alive Fill in the total number of any species released alive.

Comments Use this area to mark down any comments about what happened during the day and which may be useful to the vessel here.

Print Captain's name clearly Print the Captain's full name.

Captain's Signature Signature of the Captain

SPC / FFA Regional Longline Logbook - Vessel Characteristics

Revised Nov 2007

VESSEL NAME	COUNTRY REGISTRATION NUMBER	FLAG	IRCS
YEAR BUILT	COUNTRY/ SHIPYARD WHERE BUILT		
VESSEL OWNER	OWNER'S CONTACT ADDRESS		

ALC INSTALLED ? Y N	IMMARSAT NUMBER	VESSEL LENGTH (m) / (ft)	Circle to indicate if the length is: Overall / Registered
FISHING PERMIT OR LICENCES NUMBERS: LIST ALL			

Tick ? to indicate the Hull Material.

STEEL ◯ ALUMINIUM ◯ WOOD ◯ FIBREGLASS ◯

OTHER - PLEASE SPECIFY: ....

ENGINE MODEL	TOTAL ENGINE POWER - HP / KW	VESSEL CRUSING SPEED in KNTS
TOTAL FUEL CARRYING CAPACITY - KL / GAL	FISH STORAGE CAPACITY - MT / M^3	

Tick ? to indicate the Storage Method. You may tick more than one.

ICE ◯ REFRIDGERATED SEAWATER ◯ BRINE ◯ AIR (Coils) ◯

CIRCLE Y IF ONBOARD or CIRCLE N IF NOT ONBOARD

GPS BEACON	Y	N	**MAINLINE**	
DOPPLER CURRENT METER	Y	N	MATERIAL	
SEA SURFACE TEMP GAUGE	Y	N	LENGTH (NM)	
SATELLITE SEA SURFACE IMAGES	Y	N		
TORI POLE MITIGATION DEVICE	Y	N	**FLOATLINE**	
LINE SHOOTER	Y	N	LENGTH (m)	
AUTOMATIC BRANCHLINE THROWER	Y	N	**BRANCHLINE**	
AUTOMATIC BRANCHLINE ATTACHER	Y	N	LENGTH (m)	
BAIT CHUTE	Y	N	WIRE TRACE	**Y** **N**

COMMENTS

PRINT CAPTAIN'S FULL NAME CLEARLY

CAPTAIN'S SIGNATURE

PRINT ISSUING OFFICER'S FULL NAME CLEARLY

ISSUING OFFICER SIGNATURE
(Only sign when page is complete)

Regional Longline Logbook – Vessel Characteristics

You will not be issued with your logbook until you have filled in and signed this form.

VESSEL NAME: The full name of the vessel as marked on the country registration certificate.
COUNTRY REGISTRATION NUMBER: The number marked on your country registration certificate.
FLAG : The vessel's nationality or country of registration (sometimes a flag of convenience).
IRCS : Fill in your International Radio Call Sign.
YEAR BUILT : State the year the vessel was first built in.
COUNTRY / SHIPYARD WAS BUILT: State the country and the name of the shipyard in that country where the vessel was originally built.
VESSEL OWNER: The full name of the vessel's owner.
OWNER'S CONTACT ADDRESS: The postal address for the vessel owner.
ALC INSTALLED: Circle Y(yes) if an automatic locator communicator has been installed.
IMMARSAT NUMBER: Give the Immarsat contact number.
VESSEL LENGTH: Fill in the vessel's length and then circle to indicate if the length is in meters (m) or feet (ft) . Also circle to indicate if the vessel's length is the overall length or the registered length.
FISHING PERMIT OR LICENCES NUMBERS: List all fishing permit numbers and their expiry dates.

HULL MATERIAL: Tick one of the four give options to state the main type of material used in the hull.
ENGINE MODEL: State the engine make and model number.
TOTAL ENGINE POWER: State the engine power in horse-power (HP) or kilowatts (KW)
VESSEL CRUSING SPEED: State the vessel's top cruising speed in knots.
TOTAL FUEL CARRYING CAPACITY: State the vessel's total fuel carrying capacity in kiloliters (KL) or gallons (GAL).
FISH STORAGE CAPACITY: State the total storage available to store the catch in metric tonnes or cubic meters.
STORAGE METHOD: Tick one or more of the four options to indicate all storage methods used for the landed catch.

ELECTRONICS AND FISHING GEAR
Circle Y(yes) for every piece of equipment that is onboard the vessel.
Circle N (no) if the indicated piece of equipment is not onboard the vessel.
Please do not leave any line blank
MAINLINE
Indicate the type of material used in the mainline.
Indicate the total length of the mainline in nautical miles (nm)
FLOATLINE
Indicate the average length of the floatlines in meters (m).
BRANCHLINE
Indicate the average length of the branchline in meters (m).
Indicate if wire trace is being used in the branchline, before the hook.
COMMENTS: Use this area to fill any extra comments you have about the vessel, or other information required by your local Fisheries Department.
Captain's Name and Signature: Print the Captain's name clearly, and then the Captain must sign this form before the logbook can be issued.