

Trawl – Catch Composition Sampling



Sampling Priorities

1. Collect information on fishing effort
2. **Randomly sample for catch composition**
3. Record gear characteristics
4. Collect length-frequency data on target and non-target catch

Objectives

- List 4 things that can impact catch composition sampling
- Demonstrate ability to select & describe appropriate sampling method
- Demonstrate ability to complete the Catch Composition form

Effects on sampling

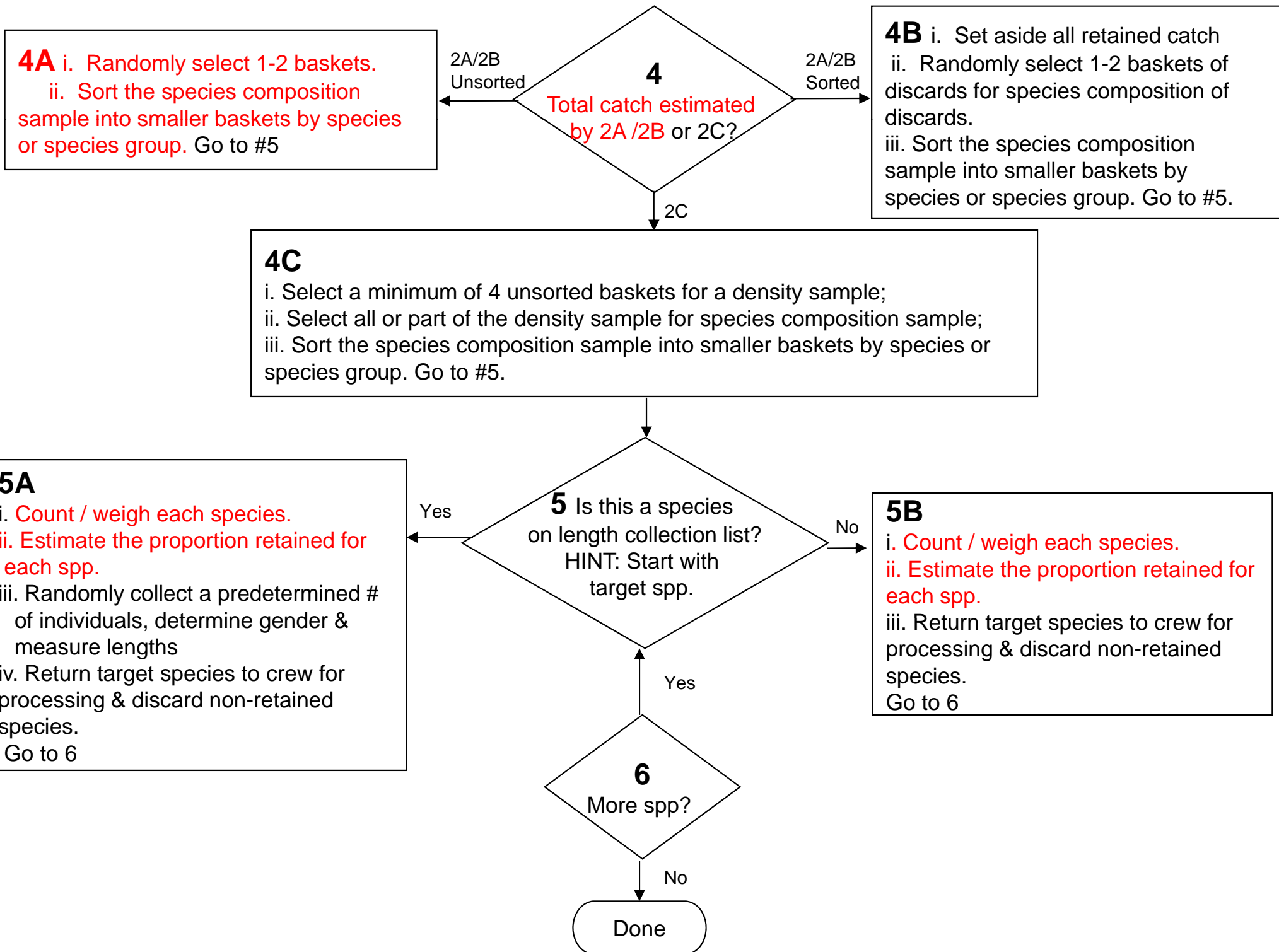
1. Vessel size / layout
2. Tow duration
3. Catch size
4. Catch composition - target
5. Sorting techniques



*Shrimp trawl
(Madagascar)
<http://www.ird.fr>*

Catch composition

- Multiple sets/day – how to choose?
- **Observer logbook**
- **Sets/day** **Random sample table (RST)**
 - 1-2 None – Sample all sets
 - 3-4 RST#1
 - 5+ RST#2
- How much to sample?
 - Diversity of catch (size, # species)
 - Time before next retrieval



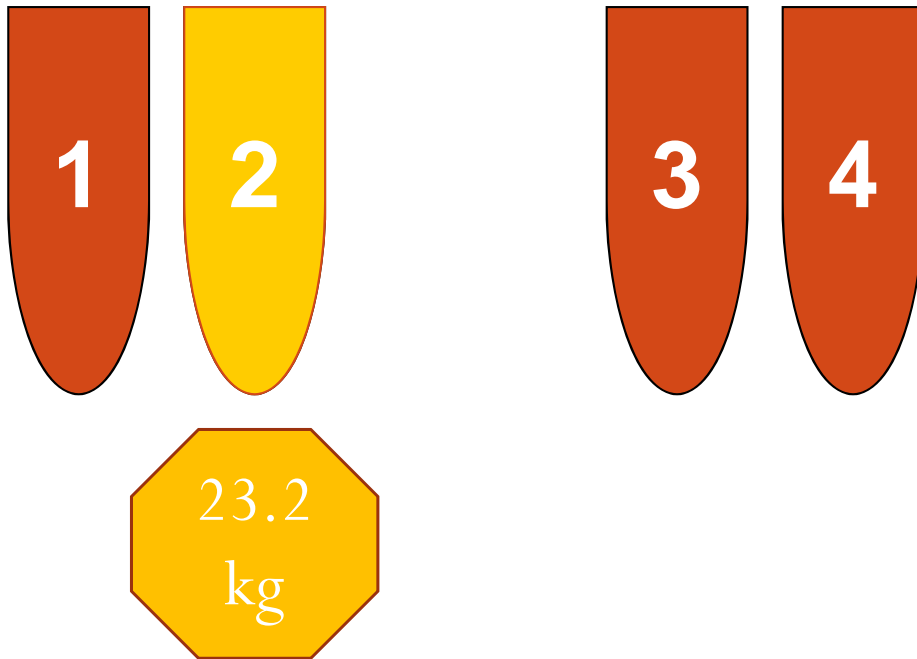
Catch Composition – Figure 6-18

Weigh all catch – no sorting



- Σ basket weights = 258.9 kg
- Randomly select 3 baskets for catch composition (ST=2) – sample weight = 71.1 kg

Sample 1 net – no sorting (ST=2)

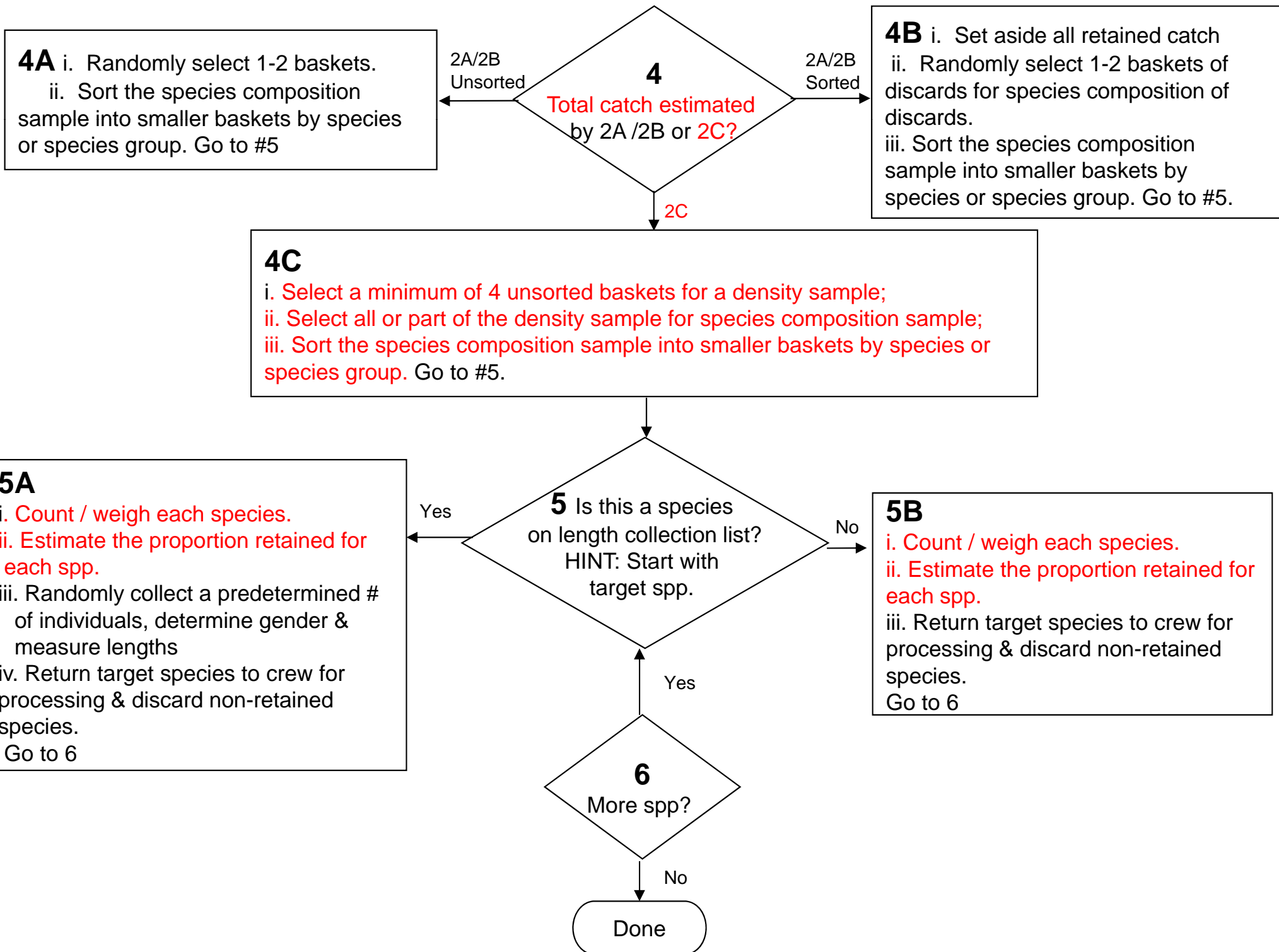


Catch Composition

- Select random # between 1 and total number of nets
- Collect 1 basket from selected net as it's opened
- Sort to species, count, weigh, determine discard percent

Total catch estimate

- $= \sum \text{retained} + \sum \text{discard}$
- Obtain retained from production counts
- Obtain discards from basket counts & ave. wt of discard baskets



4A i. Randomly select 1-2 baskets.
ii. Sort the species composition sample into smaller baskets by species or species group. Go to #5

4B i. Set aside all retained catch
ii. Randomly select 1-2 baskets of discards for species composition of discards.
iii. Sort the species composition sample into smaller baskets by species or species group. Go to #5.

4C
i. Select a minimum of 4 unsorted baskets for a density sample;
ii. Select all or part of the density sample for species composition sample;
iii. Sort the species composition sample into smaller baskets by species or species group. Go to #5.

5A
i. Count / weigh each species.
ii. Estimate the proportion retained for each spp.
iii. Randomly collect a predetermined # of individuals, determine gender & measure lengths
iv. Return target species to crew for processing & discard non-retained species.
Go to 6

5B
i. Count / weigh each species.
ii. Estimate the proportion retained for each spp.
iii. Return target species to crew for processing & discard non-retained species.
Go to 6

6
More spp?

Done

Catch Composition – Figure 6-18

Catch composition – sorted catch (ST=3)

- Weigh all retained
 - By species (sample type 3A)
 - Mixed bags / samples (sample type 3B)
- Subsample discards for composition
 - Weigh all baskets
 - Weigh subsample of baskets
 - Randomly select a few baskets for catch composition of discards (sample type 3C)

Weigh all catch – sorting

Retained – spp known

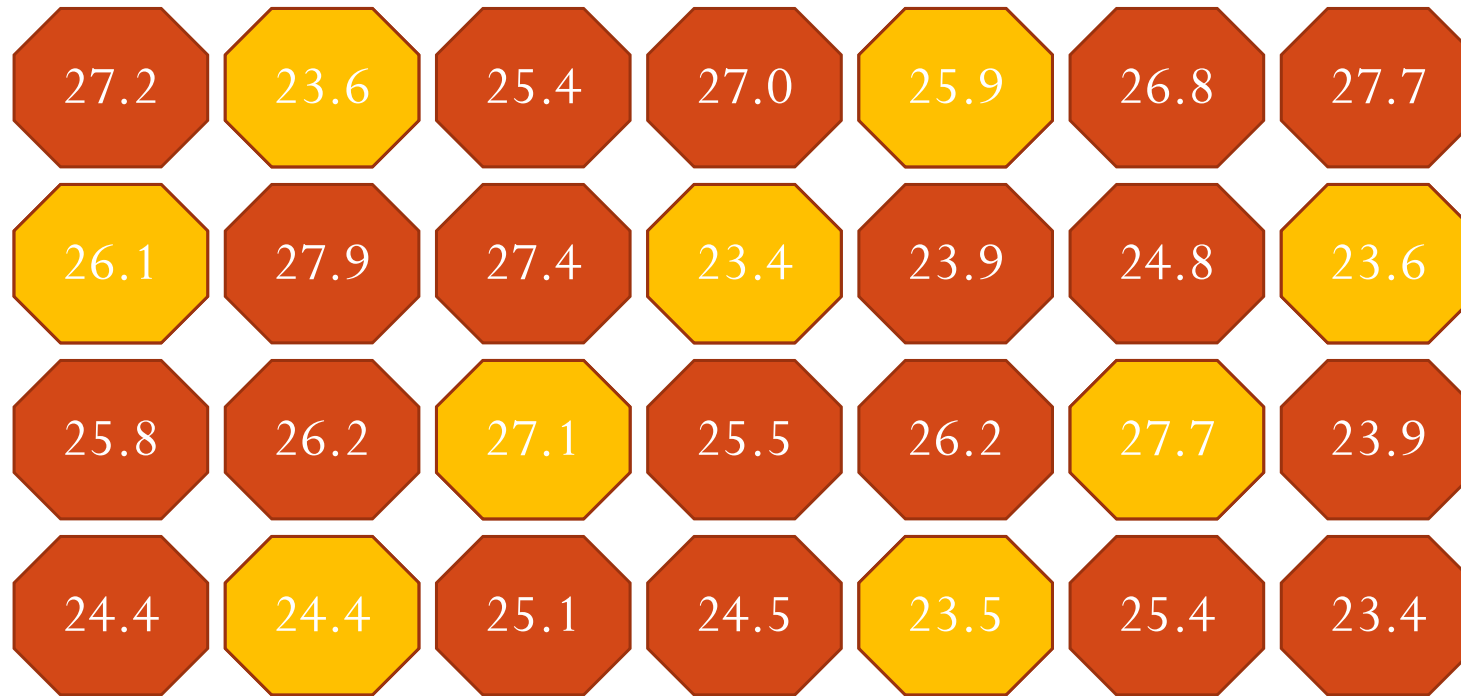
Retained – mixed

Discard

Spp A 59.3 kg	Spp E 7.6 kg	18.4	23.4	18.4	20.1
Spp B 45.5 kg	Spp F 6.8 kg	22.6		22.6	27.3
Spp C 25.2 kg	Spp G 4.3 kg	20.1		23.4	21.9
Spp D 20.3 kg	Spp H 1.5 kg	22.2		22.2	24.3

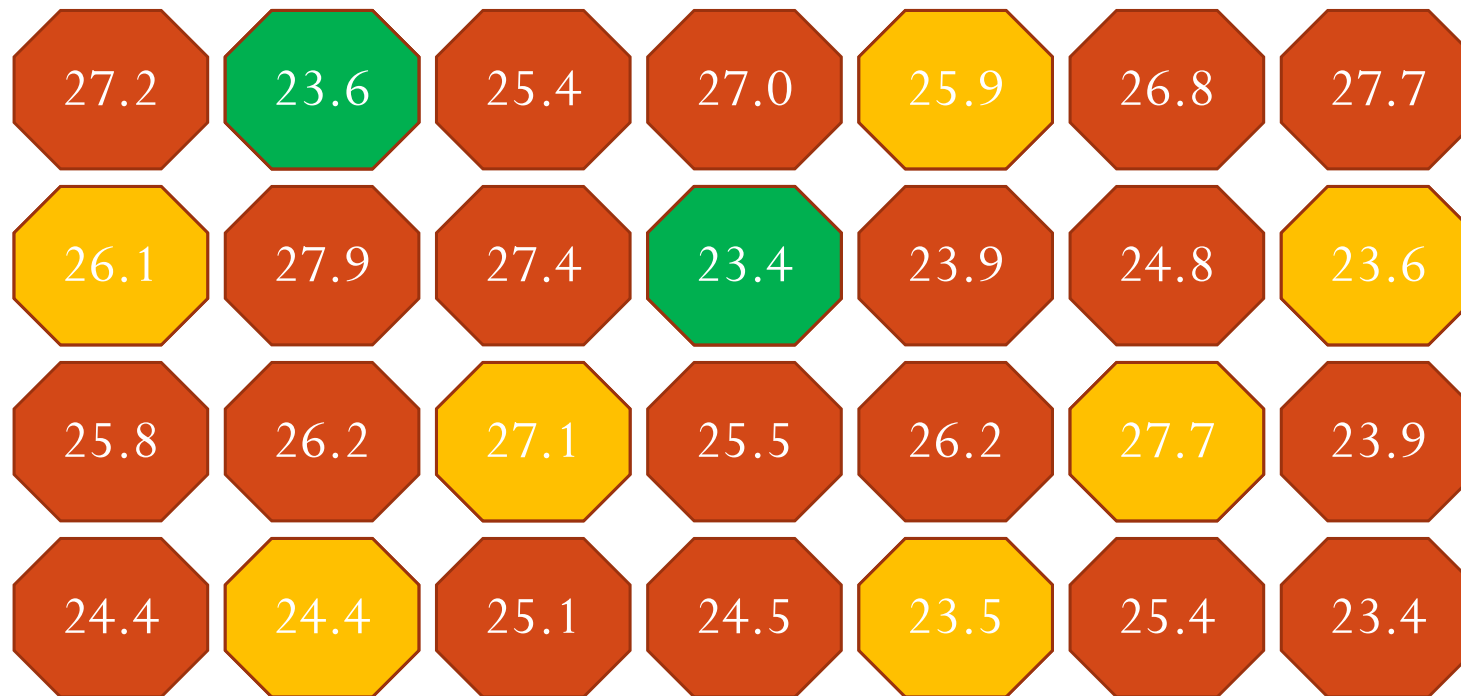
- Sample Type (ST) **3A** =
 $59.3+45.5+25.2+20.3+7.6+6.8+4.3+1.5=$ **170.5 kg**
- ST **3B** = **20.1** (of 106.7 in the mixed baskets)
- ST **3C** = **24.3** (of 180.2 in discard baskets)
- **Total catch**= Σ retained + Σ discard= $277.2 + 180.2=$ **457.4 kg**

Discards – 28 total baskets



- Fill evenly – randomly select 9 for average weight sample & 3 for catch composition
- Σ basket weights / # baskets weighed = $225.3 / 9 = 25.0333$
- Total count * average = $28 * 25.0333 = 700.93$ kg
- Actual = 713.7 kg

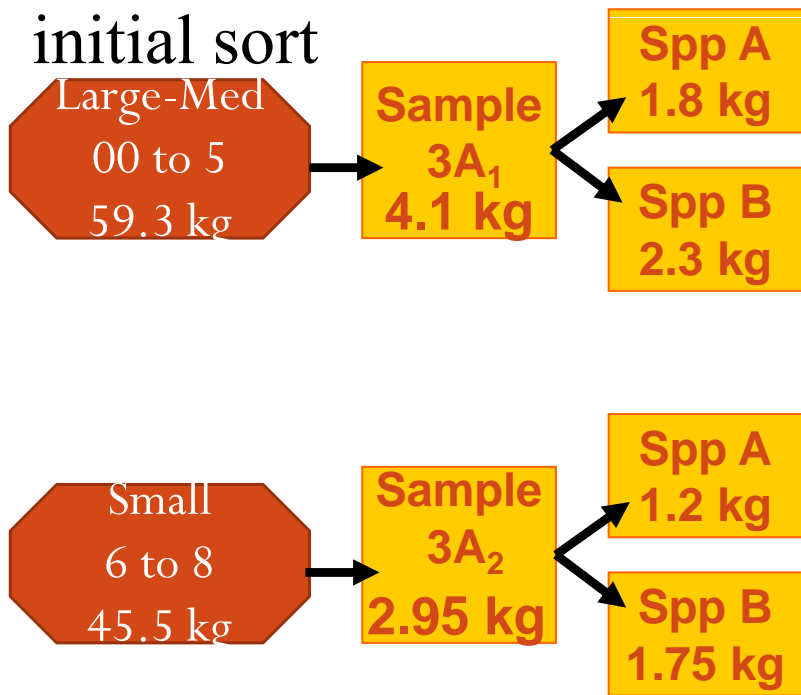
Discards



- Select 2 baskets for discard composition
- $ST\ 3C = 23.6 + 23.4 = 47.0\text{ kg}$

Weigh all catch – sorting

Retained
shrimp –
initial sort



Retained fish –
Spp known
ST 3A₃



Retained
Fish –mixed



Discard



- Sample size of ST 3A₁ = 4.1 kg of 59.3 kg
- ST 3A₂ = 2.95 kg of 45.5 kg
- ST 3A₃ = 53.1 kg
- ST 3B = 23.4 of 69.1 kg in the mixed baskets
- ST 3C = 23.6 of 90.4 kg in discard baskets
- Total catch = Σ retained + Σ discard = 227.0 + 90.4 = 317.4 kg = 0.32 mt

Catch composition – helpful hints

- Remember to include any items or specimen removed prior to taking the catch composition sample on the catch composition form as sample type 1 or 8
- If the vessel is changing nets throughout a trip, it may be helpful to mark nets for easy identification

Sampling description

- Most trawl samples require extensive subsampling
 1. Systematic spatial with a random start
 2. Random spatial
 3. Systematic temporal with a random start and
 4. Random temporal

Sampling description

- Most trawl samples require extensive subsampling
 1. Systematic spatial with a random start
 2. Random spatial
- Observer logbook - p 12
 - Define population
 - Describe sample frame type & units
 - Describe how random numbers were generated
 - Describe the sample method
- Multiple levels

Sampling description

2. Within Haul Composition Sampling:

Population: individuals in a haul (all codends combined)

Sampling Frame Type and Units: Spatial sample frame – baskets; divide all mix or all discards into equal size baskets and select one or more baskets for comp. sample.

Expected number (range) of sampling units in population: sorted retained – all weights verified, counts from crew; mixed species retained catch (small fish) – 3-10 baskets; discard catch – 12-30 baskets

Random numbers generated by: Random number table

Sampling Method: All of the larger fish & shrimp were sorted/weighed by species and their weights were verified/recorded. Smaller fish and discards were subsampled for composition. For mixed fish retained sample, randomly select 1 bag/basket of 4-6 total for species specific assessment; for discard sample, randomly select 1 basket of 8-20 baskets for composition sample.

Describe any factors that affected your random sample: 1-crew sometimes forgot to keep all discards and threw some things overboard as they were sorting; 2-shovels were small so sometimes the larger discards got pushed around before they were eventually lifted into the discard baskets;

Catch Composition Form

- Weights
 - Actual
 - Average weight $>$ estimated individuals or wt
 - Remember your algebra - $A/B = C$
 - Cartoon count * average cartoon weight
 - Estimate

Summary

- What are four things that can affect a sample?
- How can a sample be biased?

Activity #1

- Spit into groups
- Create a sampling plan of unsorted catch
- Estimate volume of the bin or codend. Scale measurements by 10X (1cm = 10cm)
- Sample according to your plan (above)
- Each of you will complete the catch composition form, sampling description (ONLY #2) & total catch estimation

Activity #2

- Spit into groups. Sort the catch according to the retained/discard on the handout.
- Set the “retained” catch aside. You are provided with the average weights and carton counts for the retained portion of the sample.
- Take a sample (50% or less) of the ‘discard’ portion for catch composition. Sort the discard sample by species and use the weights provided to estimate the average basket weight. Multiply the average basket weight by the total number of discarded baskets.
- Each of you will complete the catch composition form, sampling description template & total catch estimation calculation on the handout provided.

References

- Pauly, D. 1984. Some simple methods for the assessment of tropical fish stocks. FAO Fish. Tech. Paper 234, FAO, Rome.