**Activity: One Fish Two Fish Few Fish Dead Fish**\*

\*with acknowledgements to Dr Seuss.

This is Roger Waddell’s modification of the Barry Law/Bert McConnell *Possum Picnic* experiential game and, like the latter, is based on ‘add-on tag’.

**Introduction:**

This activity is designed to introduce or recap the impact of introduced species – in this case Man to the marine ecosystem, but can be used to elucidate ecological concepts including:

* the difference between biotic (living) and abiotic (non-living) factors.
* the influence of biotic and abiotic factors on a community.
* the interconnectedness of living things within a community, particularly with respect to feeding relationships, energy flows and nutrient cycles.

**Aim:**

To reach a level of sustainable fisheries.

**Resources:**

* gym/tennis court/playing field.
* 4+ area markers (cones) or a long rope.
* 10+ ice-cream container lids.
* 2+ nerf/sponge balls.
* picture of a trawler and an albatross.
* hula hoops or loops of rope (for simulated marine reserves).
* arm bands.
* pegs.

**Description:**

**EXPERIENTIAL LEVEL 4 - 8 WHAT TO DO:**

* Define the playing area – approximately half a netball court for 20 pupils.
* Non-players (illness, disability) can be easily accommodated as judges and marshals.
* Everyone is a fish but these fish can walk (and ONLY walk!).
* If a fish leaves the playing area then they become trawlers.
* Pick two volunteers – they are the trawlers - they wait outside the playing area (“in port”)
* The trawler chases the fish and tries to “tag” them.
* Tagged fish then become a trawler.
* Trawlers must hold hands/link arms and together pursue the other fish.

**START THE GAME:**

* Usually the game will only last 2-3 minutes till there are no more fish left.
* Stop the game and regale the participants (with a suitably horrified tone): “Look what you have done?!! You have just made all fish life extinct!!! How are you going to feed your families or provide for your town/city? We have no biodiversity now! The oceans are now deserts!! This is not sustainable! How can we change the rules of this game so that we are more sustainable?”

Participants come up with suggestions such as:

* Marine reserves or protected sea mounts. “How can we represent a marine reserve using some of the props I have here? (show hula hoops). “What rules can we create? (e.g. fish are only allowed in a marine reserve for 20 seconds).
* Appropriate mesh size or fish hook design – small fish or breeding fish (with arm bands or pegs?) are immune from tagging, but participants often like swapping their pegs/armbands).
* Quota system - once a trawler has tagged ?3 fish it must retire to a port i.e. outside game area.
* Observers on trawlers – act as roving marshals? Using the nerf/sponge ball/soft toy (I got marine themed soft toys from $2 shop) “shoots” at the trawlers. If hit the trawler breaks from the chain and becomes a fish again, the remaining trawlers must all join again. MFish observer then retrieves the ball and does one complete lap of the playing area before being able to shoot again. Game continues for 4-5 minutes or until all the fish have become trawlers.
* Albatross impact (Do a spiel on longlining and how hooks catch albatrosses so fishing at night or not throwing fish offal overboard or redesigning hooks or adding sinkers keeps mortality down.)

*I usually only allow the participants to introduce one new rule per round or it becomes too confusing. At the end of each round, ask for a show of hands as to how many fish and trawlers there are. Also, tell them: “That fishing round took 3 min 47 seconds as opposed to 49 seconds with no rules.”*

**PART 1: PROCESSING**

* What happened to the trawler numbers during the game?
* What happened to the fish numbers? (“Hands up all the trawlers, hands up all the fish”)
* Why did this occur? (Trawlers keep increasing/fish decreasing)
* How did the MFish observer feel?
* Why did the MFish observer have to do a lap before shooting? (Track down prey again)
* What could we change in this model to investigate its effect? (Trawler numbers, MFish observer number, Fish numbers, area size, different MFish observer techniques etc.)

**PART TWO:** **PROCESSING AND VARIATIONS**

Depending upon the feedback from participants, vary different factors within the fishing community either individually or in combinations.

Run trial using larger area:

* What happened to the trawler numbers?
* How hard was it for trawlers to get food?
* Why harder? (Resource distribution)
* How was it different for the MFish observer?
* Why was this?

Introduce more MFish observers:

* What happened to the trawler numbers?
* How hard was it for the MFish observers this time?
* What did the MFish observers have to do to ‘control’ trawlers effectively? (e.g. co-operative strategies for MFish observers.)

What other techniques can we use to control exploitation?

* Introduce ice-cream container lid - MFish observer to drop it on playing area. If a trawler steps over it then the trawler is sunk or retired to port or becomes a fish. The MFish observer may collect and redistribute at will - but ONLY by DROPPING..

**PROCESSING (SUMMATIVE):**

For environmental education/resource exploitation processing questions may follow these lines:

**Q.** What strategies did the trawlers develop for success? (Both co-operative and individual strategies are important.)

**A.** Identifying and avoiding threats (MFish observer), catching fish. The MFish observer? Retrieval of ball, herding of trawlers, etc.

**Q.** Why are the trawlers so successful in this activity and in real life?

**A.** Because they are well adapted for finding fish and require Govt/public intervention to keep fishing in check.

Ref “Lucky Fish” file

**Q.** Are there any other resource depletion issues in New Zealand that present a similar problem?

**A.** Yes many – invasive pests - both plant (broom, gorse, wilding pines) and animal (cat, rat, mice stoat).

**Q.** Are there any ways that you and I are contributing to this problem?

**A.** Yes – planting exotic species in our gardens/buying unsustainably fished species. Talk about Forest and Bird Good Fish Guide.

**Q.** Is there anything that we can do to reduce this problem?

**A.** Yes – we can plant natives instead of exotics in our gardens, assist in replanting areas in natives, keep cats indoors at night, keep dogs on a leash when outdoors, minimise our resource use in general to lessen habitat destruction, buy local.

**Q.** What does the MFish observer represent?

**A.** Predation, disease, competitive exclusion - any occurrence that can cause the death of an individual.

**Q.** What are the fish representing?

**A.** Resources (Air, water, food, space, nests, etc)

**Q.** What does the marked playing area represent?

**A.** Habitat as defined by tolerance limits of the organism. (Hence death when leaving playing area)

**Q.** What is ecology?

**A.** The study of living things and their environment.

**Q.** What sort of things might affect an organism?

**A.** Start with a clean whiteboard and try the initial brainstorm activity again but this time, facilitate “correct” answers. As factors are called out try to retain the biotic/abiotic split as below and write these factors on the appropriate side of the whiteboard:

Conclusion/Summary Ecology is the study of living things and the environment, and particularly the interrelationship between the two. Ecology is most frequently investigated through populations. Populations are dynamic. ABIOTIC (Non-living factors) BIOTIC (Living factors) ECOLOGY Environment Light Water Air Nesting Sites/Territories Temperature Animals and Plants Predation Competition Disease Food