



AN EDUCATIONAL UNIT FOR SECONDARY SCHOOLS



Exploring the production and marketing of seafood

YEARS 9 & 10

Design and Technologies,
and Science

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The material in this Unit of Work is made available for the purpose of providing access to general information about food and fibre production and primary industries in Australia.



As content of the websites used in this unit is updated or moved, hyperlinks may not always function.

Rationale

This resource material aims to help teachers and students in primary schools investigate and understand more about primary industries in Australia.

The objectives of the educational resources are to:

- Support Primary Industries Education Foundation Australia and its members in expanding awareness about primary industries in Australia by engaging and informing teachers and students about the role and importance of primary industries in the Australian economy, environment and wider community.
- Provide resources which help build leadership skills amongst teachers and students in communicating about food and fibre production and primary industries in Australia.
- Develop educational resources that can be used across Australia to provide encouragement, information and practical teaching advice that will support efforts to teach about food and fibre production and the primary industries sector.
- Educate school students on ways food and animals are raised and grown.
- Demonstrate to students that everyone can consider careers in primary industries and along the supply chain of food and fibre products.
- Assist school students to spread this message to their families and the broader community.
- Develop engaging learning programs using an inquiry process aligned with the Australian Curriculum.
- Develop in school communities, an integrated primary industries education program that emphasises the relationship between food and fibre industries, individuals, communities, the environment and our economy.

These educational resources are an effort to provide practical support to teachers and students learning about food and fibre production and primary industries in schools.

An integrated primary industries education program that emphasises the relationship between food and fibre industries, individuals, communities, the environment and our economy.

The approach used, is the inquiry approach through five phases: Engage, Explore, Explain, Elaborate and Evaluate.

Several key principles underpin the theoretical and practical application to this unit.

In providing an integrated *framework for inquiry*, complemented by rich explorations of texts that are, in turn, supported by an emphasis on undertaking a challenge or task, the unit requires students to:

- Search for information using both digital and non-digital means
- Use research techniques and strategies
- Use thinking and analysis techniques
- Present findings to a real audience, and
- Reflect both on the product created and the process undertaken.

Rather than seeing knowledge as something that *is taught*, the emphasis in this unit is on knowledge and understanding that *is learned*.

The unit involves students in:

- Working from a basis of their prior knowledge and experience
- Seeing a real task or purpose for their learning
- Being directly involved in gathering information firsthand
- Constructing their knowledge in different ways
- Presenting their learning to a real audience
- Reflecting on their learning.

The approach used, is the inquiry approach through five phases: **Engage, Explore, Explain, Elaborate** and **Evaluate**. The phases of the model are based on the 5Es instructional model (Bybee, 1997). This unit of work containing student activities assists students to raise questions, gather and process data, make conclusions and take action. These phases are:

- **Engage:** The 'Engage' phase begins with lessons that mentally engage students with an activity or question. It captures their interest, provides an opportunity for them to express what they know about the concept or skill being developed, and helps them to make connections between what they know and the new ideas.
- **Explore:** The 'Explore' phase includes activities in which they can explore the concept or skill. They grapple with the problem or phenomenon and describe it in their own words. This phase allows students to acquire a common set of experiences that they can use to help each other make sense of the new concept or skill.
- **Explain:** The 'Explain' phase enables students to develop explanations for the phenomenon they have experienced. The significant aspect of this phase is that explanation follows experience.
- **Elaborate:** The 'Elaborate' phase provides opportunities for students to apply what they have learned to new situations and so develop a deeper understanding of the concept or greater use of the skill. It is important for students to discuss and compare their ideas with each other during this phase.
- **Evaluate:** The 'Evaluate' phase provides an opportunity for students to review and reflect on their own learning and new understanding and skills. It is also when students provide evidence for changes to their understanding, beliefs and skills.

Source: Primary Connections <http://www.primaryconnections.org.au/about/teaching>

Resource description

This is a unit with five inquiry teaching sequences about seafood production and marketing in Australia.

This unit encourages students to investigate and make judgements about the production and marketing of seafood.

The unit explores the variety of technologies and methods used by the wild-catch and aquaculture industries to catch or farm seafood.

It also explores the challenges and opportunities that exist in seafood production in Australian and overseas contexts, including depletion and recovery of fish stocks, developing new aquaculture technologies, consumer perceptions, and media coverage.

Having explored these contexts in an Australian wild-catch or aquaculture sector, students then consolidate and present these understandings to an audience following the study.

At each stage in the investigations, the students are encouraged to share their findings, arguments and explanations in a range of appropriate communication forms, selected for their effectiveness and to suit audience and purpose; using relevant terminology, and digital technologies.

Year levels: 9 and 10

Curriculum focus

In this unit, students:

- Explore a range of Australian wild-catch and aquaculture industries using digital resources.
- Examine production technologies and methods used in wild-catch and aquaculture industries.
- Examine the challenges in seafood production, including development of new technologies, resource management, consumer perceptions/expectations and media coverage.
- Examine other aspects of seafood production and marketing, for example: expansion of aquaculture, under-utilised fish species or environmental certification.
- Evaluate sources of information for their reliability, bias and usefulness.
- Reflect and evaluate what they know about the production and marketing of seafood.

Based on Australian Curriculum, Assessment and Reporting Authority (ACARA) materials downloaded from the Australian Curriculum website in February 2015. ACARA does not endorse any changes that have been made to the Australian Curriculum.

Explore the variety of technologies and methods used by the wild-catch and aquaculture industries to catch or farm seafood.

Australian Curriculum content descriptions

Design and Technologies

Strand: Design and Technologies Knowledge and Understanding

Investigate and make judgments on the ethical and sustainable production and marketing of food and fibre [ACTDEK044](#)

Explain how products, services and environments evolve with consideration of preferred futures and the impact of emerging technologies on design decisions [ACTDEK041](#)

Investigate and make judgments on how the characteristics and properties of materials are combined with force, motion and energy to create engineered solutions [ACTDEK043](#)

Science

Strand: Science as a Human Endeavour: Use and influence of science

People can use scientific knowledge to evaluate whether they should accept claims, explanations or predictions [ACSHE160](#)

Advances in science and emerging sciences and technologies can significantly affect people's lives, including generating new career opportunities [ACSHE161](#)

The values and needs of contemporary society can influence the focus of scientific research [ACSHE228](#)

Cross Curriculum Priorities

Sustainability

- OI.2:** All life forms, including human life, are connected through ecosystems on which they depend for their wellbeing and survival.
- OI.3:** Sustainable patterns of living rely on the interdependence of healthy social, economic and ecological systems.
- OI.4:** World views that recognise the dependence of living things on healthy ecosystems, and value diversity and social justice are essential for achieving sustainability.
- OI.5:** World views are formed by experiences at personal, local, national and global levels, and are linked to individual and community actions for sustainability.
- OI.6:** The sustainability of ecological, social and economic systems is achieved through informed individual and community action that values local and global equity and fairness across generations into the future.
- OI.7:** Actions for a more sustainable future reflect values of care, respect and responsibility, and require us to explore and understand environments.
- OI.8:** Designing action for sustainability requires an evaluation of past practices, the assessment of scientific and technological developments, and balanced judgments based on projected future economic, social and environmental impacts.
- OI.9:** Sustainable futures result from actions designed to preserve and/or restore the quality and uniqueness of environments.

Source: Australian Curriculum, Assessment and Reporting Authority (ACARA), downloaded from the Australian Curriculum website on February 2015.

Implementing the unit and activities in the classroom

Using the unit

The unit can be used in a number of ways. It will be of most benefit to teachers who wish to implement a sustained sequence of activities following the inquiry stages identified in the **About the approach** section of this unit and content descriptions in Year 9 and 10 in Design and Technologies, and Science as stated in the Australian Curriculum.

Selecting activities

At each stage several activities are suggested from which you are encouraged to select the most appropriate for your purposes. Not all activities in each stage of the unit need to be used. Alternatively, you may add to or complement the suggested activities with ideas of your own.

It is suggested that teachers create a hyperlinked unit. Organise the digital resources for your class's use on a website or wiki or provide them on your interactive whiteboard.

Resourcing the unit

The resources suggested are on the whole, general rather than specific. Schools and the contexts in which they exist vary widely as does the availability of some resources – particularly in remote areas. There is a strong emphasis in the unit on gathering information and data; research and observations also feature strongly as these methods develop important skills and ensure that the exploration of the topics are grounded in a relevant context.

Some YouTube and online videos in addition to Internet based resources are suggested in the unit. You will need to investigate what is available in your school.




Some research organisations, fisheries management agencies, and fishing/aquaculture businesses and organisations welcome invitations to come to speak with students. Look for local links in the resource list.

Adapting the unit

The unit is targeted at Year 9 and 10 students. This is a suggested age range only and teachers are encouraged to modify activities to suit the needs of the students with whom they are working.

The unit's topics are based on content descriptions of the Australian Curriculum and on the key cross curriculum priority of sustainability. They embrace content that we believe is of relevance and significance to all students. We encourage you to explore ways in which the content can be adjusted to the context in which you are working.

Many of the activities contain the following icons offering a suggestion on how many students should be involved:

-  Suggested for individuals
-  Suggested for pairs or small groups
-  Suggested for larger groups or entire classes

Resource sheets are provided for some activities. Most are for photocopying and distribution to students. They are identified within units in bold italic: **Resource 1.1**.

The resource sheets are designed to assist teachers to facilitate learning without having to access a range of other resources.

What about assessment?

Rather than being a task carried out at the end of the unit, assessment is viewed as integral to the entire unit sequence. Each activity should be regarded as a context for assessment of student learning.

When planning and implementing the unit of work make clear decisions on what you will focus on in assessing learning. The unit provides an opportunity for a range of skills and understandings to be observed. We encourage you to devise an assessment plan or assessment rubric that features areas to be assessed over subsequent lessons.

In planning for assessment, student learning in the following areas can be considered:

- Understandings about the topic.
- Development of skills.
- Exploration and clarification of values.
- Use of language in relation to content.
- Ability to use and critically analyse a range of texts.
- Ability to analyse and solve problems.
- Ability to interpret information, perceive its meaning and significance, and use it to complete real-world tasks.
- Ability to work cooperatively with others.
- Approach to learning (independence, confidence, participation and enthusiasm).

For this unit, the following understandings are provided to assist teachers in planning for assessment.

Assessment strategies

Each stage in the inquiry sequence provides information about student learning. There are, however, two stages in the unit that are central to assessment: the **Engage** stage and the **Evaluate** stage. Work that is undertaken in these stages can assist teachers to monitor growth and observe concrete examples of the way student ideas have been refined or have changed through the unit sequence. Work samples should be retained for this purpose.

The unit contains a 'Student Task' which is well suited for assessment, as it is the summation of the work undertaken by the students in the unit.

Some questions and possible answers

Should I do all the activities?

At each stage of a unit, a number of activities are listed. You would not be expected to do them all. Instead, the unit is designed so that a selection of activities can be made at each stage. You should select the activities according to the needs and interests of your students and the time, relevance to the existing school curriculum and resources available to you.

While you are encouraged to follow the suggested inquiry sequence for each unit, it is quite possible to pick and choose from the range of activity ideas throughout the unit. It may also be used in conjunction with other programs you use.

How do these units fit into my weekly program?

Although the unit integrates a range of key subject areas, it is not designed to be a total program. It is assumed that regular routines that operate in your classroom will continue to run alongside your unit of work. For example, you may have regular times for use of the library, for maths, physical education etc. These things don't change – although student's writing topics or choice of topics to research in the library or in Information and Communication Technology classes may be influenced by this unit.

How long should the unit run?

This will of course depend on your particular circumstances but generally, a few weeks to a term are suggested.

I don't know much about seafood production myself – will I be able to teach it effectively?

Yes! The unit is designed in such a way that you, as the teacher are a co-learner, and you are therefore provided with teacher notes, plus readily available resources that are mainly web-based. Most importantly, you will find that you learn with the students and make discoveries with them.

Fast facts about Australian agriculture

Fishing and Aquaculture Industry

Australia's marine domain covers around 10 million square kilometres.

In 2011-12 Salmonids made up 52 percent of the total aquaculture production volume.

This page gives some basic food and fibre production information that may be helpful when you interact with the school students

Australia's marine domain, our Exclusive Economic Zone, is one of the largest in the world, covering around 10 million square kilometres. This is larger than mainland Australia (7.69 million square kilometres). Despite this size, Australian waters tend not to be as productive as those in many regions, and Australia ranks only 52nd in the world in terms of volume of fish landed.

Australia produces a broad range of seafood products. These include about 600 commercial species, about 1,000 recreational species and 100 species from aquaculture.

Australia's Commonwealth, state and territory governments manage fisheries on behalf of the Australian people in consultation with the fishing industry, scientists, economists and other user groups, such as Aboriginal and Torres Strait Islander communities, recreational fishing groups and the environmental non-government organisations. These management processes are used to implement controls, such as limits on catch or effort levels, and regulations of fishing methods in order to manage Australia's fisheries in a sustainable way.

Source: <http://www.agriculture.gov.au/fisheries>

Australia has progressively adopted a more ecosystem-based approach to fisheries management which looks at the effect of fishing practices not just on the target species, but also on the environment and other related species. Fisheries managers monitor both stock and fishing levels as well as a range of other environmental factors to ensure the amount of seafood harvested every year does not deplete stocks. In addition, government observers travel regularly on fishing boats to ensure compliance to quotas, bycatch limits and other regulations.

Source: Fisheries Research and Development Corporation, 2014 <http://frdc.com.au/>

During 2011–12 in Australia:

- There were 6,991 people directly employed in the commercial fishing, hunting and trapping sector, and 3,642 in aquaculture enterprises.
- The sector comprises approximately 120 wild catch fisheries and 70 aquaculture species.
- The gross value of Australian commercial seafood and products (e.g. pearls) was valued at \$2.3 billion, an increase of 3 percent on the previous year.
- Australian imports of fisheries products increased by 5 percent.
- The value of production for the wild-catch sector declined by 1 percent to \$1.3 billion and production volume decreased by 4 percent to 157,505 tonnes. While the gross value of aquaculture production rose by 10 percent (\$100 million) to \$1.1 billion.
- The largest contributor to Australian aquaculture production in 2011–12 was salmonids, which make up 52 percent of the total aquaculture production volume and 49 percent of the value.
- Tasmania accounted for the largest share of gross value of production (30 percent), followed by South Australia (19 percent) and Western Australia (17 percent). Commonwealth fisheries accounted for 13 percent of the gross value of production.

Source: ABARES, 2013 http://data.daff.gov.au/data/warehouse/9aam/afstad9aamd003/2012/AustFishStats_2012_v1.0.0.pdf

Australia's fisheries and have been recognised by scientists as some of the best managed.

Australian seafood industry is managed and sustainable

Australia's fisheries and aquaculture sectors have been consistently recognised by scientists around the world as some of the best managed in the world. This is supported by the high number that have obtained independent third party certification.

This includes, Marine Stewardship Council certification for Mackerel Icefish, the Heard and McDonald Island and Macquarie Island Patagonian Toothfish Fisheries, Northern Prawn Fishery, Spencer Gulf King Prawns, Lakes and Coorong fisheries, Western Rock Lobster and Atlantic Salmon which have Aquaculture Stewardship Council and Best Aquaculture Practice certification.

In addition, the Western Australian Government is investing \$14.5 million to give every commercial State fishery the opportunity to be independently certified.

The Status of Key Australian Fish Stocks Reports provides a high level of transparency and improved consistency in reporting across jurisdictions. The individual stock reports are a scientifically robust, simple tool for consumers and interested members of the public.

Australia's fisheries and aquaculture operations are underpinned by research, management and enforcement to ensure long term sustainability.

For more information on the Status of Key Australian Fish Stocks Reports visit:

<http://www.fish.gov.au>

For more information on the Marine Stewardship Council visit: <http://www.msc.org>

For more information on the Aquaculture Stewardship Council visit:

<http://www.asc-aqua.org/>

Australians should eat more seafood

Australians should be encouraged to eat more seafood because of its health benefits.

The scientific evidence shows benefit from the consumption of Omega 3 fatty acids for cardiovascular, brain and eye health.

The Australian Dietary Guidelines released by the National Health and Medical Research Council and the Department of Health and Ageing highlights that, depending on age and sex, health benefits may be seen with consumption of 1.4 to 2.8 serves (140–280 grams) of fish per week for adults.

Based on the Australian Dietary Guidelines, men need to increase their consumption of seafood by more than 40 percent to meet recommended intake.

Scientific evidence shows the benefits from consumption of Omega 3 fatty acids.

Australia has an Australian Fish Names Standard

The Australia Fish Names Standard is the 'definitive document' on common and scientific names for seafood.

The standard is a fundamental component to both food standards and fisheries management regulations and was designed to resolve the confusion that previously existed over the marketing names of seafood and restore consumer confidence in the seafood they purchase.

Inappropriate labelling has implications for both food safety and sustainability.

For more information on fish names visit:

<http://seafoodstandards.com.au/fish-names/Pages/default.aspx>

Australia needs imported seafood

Seafood plays an important role in Australia, whether imported or domestic.

Australia needs imported seafood. The reality is Australia's fisheries and aquaculture sectors do not produce enough seafood to meet demand.

78 percent of all seafood consumed in Australia is imported from overseas.

Inappropriate fish labelling has implications for both food safety and sustainability.

Australia does not produce enough seafood to meet demand.



Step 1: Engage with the topic

Getting started

Purpose

To provide students with opportunities to:

- share information about the seafood they eat
- gather information about student's prior knowledge about the production of seafood
- pool ideas and share with others
- build an interest about seafood production and the labelling used on these products
- explore a range of ways seafood are caught and farmed to develop their understanding of fishing and production technologies and methods
- develop skills in making connections between ideas
- help set directions for an investigation.

The scientific evidence shows benefit from the consumption of Omega 3 fatty acids for cardiovascular, brain and eye health.

Diets containing seafood

Each day we behave in particular ways and eat particular foods. Seafood has many important health benefits. The scientific evidence shows benefit from the consumption of Omega 3 fatty acids for cardiovascular, brain and eye health.



TALK with students about the particular seafood they eat, the number of times per week that seafood is eaten; ways seafood is prepared for eating and their favourite seafood meals.



Capture student interest and **FIND OUT** what they know about places where the seafood people consume originates from.

PRESENT a scenario.

This week you may have eaten a tuna and lettuce sandwich, sushi rolls containing salmon, fresh tuna or prawns, a serve of fish n' chips, a dozen oysters, a piece of grilled mackerel, some tinned sardines, a piece of whiting or some calamari.

The local fish shop may source fish from Australian and overseas. The shop might source aquaculture (farmed) products such as Atlantic Salmon from Tasmania and Black Tiger Prawns from Queensland; or wild caught seafood such as King Prawns from South Australia's Spencer Gulf, and Gummy Shark (sold as Flake) caught in the deep waters off Victoria.

The shop might also stock overseas produce from New Zealand, Thailand, China, Japan, Russia and the United States.

The local supermarket shelves might contain packaged Tuna pieces from South Australia labelled as 'Responsibly Fished', and Anchovies packed in Morocco, Rollmop's packaged in Germany, Herring packed in Scandinavia and canned Salmon that might have been manufactured in Tasmania, Alaska or wild-caught in the western and central Pacific Ocean.



TALK about how these seafood species might have been caught and produced.



Ask students to **CONSIDER** and **DISCUSS** whether they think 'country of origin' labelling or labelling that describes how the seafood was fished and caught is important? Why? or Why not? Does it matter?

Note: Australia has an Australian Fish Names Standard. The standard was designed to resolve the confusion that previously existed over the marketing names of seafood and ensure consumer confidence in the seafood they purchase. Inappropriate labelling has implications for both food safety and sustainability.



BRAINSTORM students' ideas and display for future reference.



Talk about Australian wild-catch or commercial fishers who supply fish for domestic consumption and export, and recreational fishers who catch fish for personal eating and recreation.

Major fishing types

People go fishing for many different reasons...food, enjoyment, work and income.



FIND OUT about a fisherman who loves what he does.

See: <http://seafoodcrctraining.com.au/a-day-in-the-life/professional-fisherman/>

TALK with students about Australian wild-catch or commercial fishers who supply fish for domestic consumption and export, and recreational fishers who catch fish for personal eating and recreation.



INTRODUCE the term aquaculture and fish farmers who farm fish for our consumption too.

EXPLAIN that there are a range of aquaculture production systems where seafood is farmed in ponds, raceways, tanks, sea cages, baskets and racks.



Also **TALK** about the important role that fish and fishing play in the diets and cultural lives of Indigenous Australians. The Australian Museum has a new exhibition titled: Garrigarrang Sea Country.

See: <http://australianmuseum.net.au/event/Garrigarrang-Sea-Country>



CREATE a Wordle summarising what is known about types of fisheries.

See: <http://www.wordle.net/>

Marine and freshwater regions

Australia has a diverse range of freshwater and marine (saltwater or brackish) waters where seafood species grow and are sourced from.



TALK about the marine and freshwater regions and different waters where seafood could be caught or farmed.

INTRODUCE geographical language to talk about these places.

For example: rivers, channels, creeks, estuaries, beach, coast, sea, deep sea, mid water, benthic and surface, shore and ocean.



USE the Fishfiles website <http://www.fishfiles.com.au/Pages/default.aspx>

to discover where fish are fished in Australian waters. Then select the 'Knowing' tab for information about seafood species.

Sustainability



TALK about the word 'sustainability.'



As a class **CONSIDER** the differences between 'environmental sustainability', 'economic sustainability', 'social sustainability' and 'political sustainability'.



Ask students to **DEVELOP** a concept map describing what they know about sustainable seafood.

Encourage students to **THINK** about how seafood might be produced.



Step 1: Engage with the topic



The class may like to **CONSIDER** possibilities like small scale, large scale and commercial scale production. **THINK** about issues like overfishing, illegal and unregulated fishing, the continued monitoring of fish stocks by State and Commonwealth agencies, ecosystem based fisheries management, fishing licences and permits, closed seasons, closed areas, fishing limits, quotas, environmental impact assessments, satellite global positioning systems used for pin-point navigation and technological advances in fishing equipment to reduce the catch of unwanted species.

As a class, **BUILD** understanding by sharing concept maps and ideas.

Setting the task

Note: This is a suggested assessment task.



EXPLAIN to the class that working in groups, their task is to select either a wild-catch fishery or aquaculture industry sector, and to **RESEARCH** and **RECORD** information about it including technologies and methods used by the industry to catch or farm seafood and to **EXPLORE** the use of these technologies and methods in terms of productivity and sustainability.



Explain that groups will also **INVESTIGATE** the marketing practices and the labelling used to demonstrate where the seafood comes from, how it was caught or how it was produced.

Think about issues like overfishing, illegal and unregulated fishing, and the continued monitoring of fish stocks by State and Commonwealth agencies.



Step 2: Explore the topic

Explore commercial wild-catch and aquaculture production systems

Purpose

To provide students with opportunities to explore:

- wild-catch and aquaculture production techniques and methods
- aquaculture production systems
- management strategies used by both industries
- sustainability
- fisheries management.

Talk about what the students know about the types of species caught by commercial or wild-catch fisheries.

Revisit the task

REVISIT the student task and **TALK** with students about the importance of understanding some of the facets of seafood production in both the commercial and aquaculture industries before selecting either sector as part of their research.

It is important at this point to **DISCUSS** why these industries are in existence, i.e. the fact that consumers are demanding seafood products in their diets. It may be worthwhile also to consider the parallels in the red meat sector and grain sectors.

Likewise, to really understand issues relating to all food and farming today, it is necessary to know about 'the food supply chain'. See Table 1.1 below.

Table 1.1 – The food supply chain

1. Agricultural inputs (for example: fertilisers, seeds, pesticides, veterinary drugs).
2. Primary production (for example; fishers, farmers, fish farmers).
3. Primary food processing (for example: on farm dairies, abattoirs, grain mills).
4. Secondary food processing (for example: canning, freezing, drying, brewing).
5. Food distribution (for example: national/international, export/import).
6. Food retailing (for example: supermarkets, shops).
7. Food catering (for example: schools, restaurants, hospitals).
8. Domestic food (for example: at home and in the family).
9. Recycle, reclaim or dispose of the product.

Source: Lang and Heasman, Food Wars

Use the following activities to **PROVIDE** insights into both sectors of the seafood industry who supply us with seafood.

Commercial wild-catch fishing and the different sizes of fishing businesses/operations

REVISIT the meaning of commercial or wild-catch fisheries with the class.



TALK about what the students know about the types of species caught by commercial or wild-catch fisheries, the type of commercial fishing boats in Australia, and the types of fishing gear used for particular species (for example: nets, traps and long lines).



TALK about the fact that there are small commercial fishing boats owned by families that have fished for generations using a range of fishing gear, deepwater trawlers, purloiners and long-liners owned by larger commercial companies.



VIEW a video that features a commercial line fishing boat and fisher.

<http://www.youtube.com/watch?v=HCNfF4XaU5I&list=UUnoxDA5iji0limevCrFQVSA&index=60>



Step 2: Explore the topic



LEARN more about a factory ship and a commercial fishing boat that uses netting to catch fish and **CONSIDER** why there was so much controversy around the Magiris (nick-named super trawler) and renamed the Abel Tasman. **INVESTIGATE** why the size of the boat was such an issue. Are larger boats more or less sustainable – think about other aspects of design and efficiency, for example: fuel consumption.



LOOK at sources of information that are for or against the Abel Tasman factory ship. Students could read and analyse the following sources for insights.

<http://theconversation.com/super-trawler-gone-but-is-fisheries-policy-in-trouble-12755>

<http://www.abc.net.au/news/2012-08-15/super-trawler-debate/4200114>

Technologies involved in the commercial wild-catch industry

As a class **TALK** about how technologies have changed the way people fish.

DISCUSS what is known about the technologies and methods used by recreational and commercial fishing vessels to produce seafood.

INTRODUCE students to technologies like: Global Positioning System, by-catch reduction devices; remote sensing, sonar and video cameras to view catches, and turtle exclusion devices.

For example:

- Large trawlers may have computer-controlled deep water trawl nets. Some may use sonar and video cameras to view the catch. Some may even have their own fish processing plants and on board canneries that can process 200+ tonnes of fish a day.
- Commercial fishing boats use Global Positioning System monitoring systems, sonar, by-catch reduction devices and mass-capture techniques such as trawl, traps, nets, multiple-hooks and long-lines.
- Recreational fishing boats use Global Positioning System monitoring systems, sonar and depth sounders, nets, rods and traps too.

COLLATE ideas using iThoughts a mind mapping app or map ideas using a concept mapping technique.

BRAINSTORM and **LIST** the different types of commercial fishing boats and techniques that could be researched as part of the student's inquiry.

For example:

- Commercial fishing boats that use nets to catch Mullet, Barramundi or Australian Salmon.
- Commercial fishing boats that use beach seines or pulse seines to catch fish.
- Trawlers that use trawl nets to scoop up seafood.
- Commercial fishers who use a dredge to harvest shellfish.
- Fishers who use many different types of hooks, lures and lines to catch fish.
- Fishers who use baited traps or crab dillies and snares to catch crabs.

VIEW images of different fishing techniques at:

<http://www.afma.gov.au/species-gear/fishing-gear/>

Discuss what is known about the technologies and methods used by recreational and commercial fishing vessels to produce seafood.



Consider the efforts of fishers and marine scientists who work together sharing data about catches of different fish stocks that contributes to science and fishing regulations.

Explore sustainability and management strategies valued by the commercial wild-catch industry



TALK with the class about how the productivity and sustainability of wild-capture fisheries depends heavily on the state of wild fish stocks. **CONSIDER** the efforts of fishers and marine scientists who work together sharing data about catches of different fish stocks that contributes to science and fishing regulations.



VIEW a video about the Spencer Gulf Prawn Fishery in South Australia that helps explain the goals of fishermen whose work is informed by science and whose technologies and methods of fishing are based on stock assessments, understanding fish reproduction rates, understanding environmental sustainability, involvement in regular surveys & monitoring of the fishery, commitment to ecosystem-based fishing management, and fishing within quotas.

See: <https://www.youtube.com/watch?v=USzAE6CVI6I&feature=youtu.be>



FIND OUT more about South Australia’s Rock Lobster fishery. Ask students to **VIEW**: <https://www.youtube.com/watch?v=SBqX9EGBboE#t=41> and **RECORD** information about management strategies mentioned by the fishers and consider how this fishery is managed to ensure sustainability.



Explore aquaculture designs



TALK with students about the different types of aquaculture and the many different techniques for farming aquatic species.

INTRODUCE ‘water-based’ and ‘land-based’ techniques. Talk about intensive, semi-intensive and extensive aquaculture. **EXPLAIN** how aquaculture can be undertaken in ponds, pens, tanks, cages, baskets and racks.

Note: There can be various stages of aquaculture operations including:

- Hatchery operations which produce fertilised eggs, larvae or fingerlings.
- Nursery operations which produce small larvae to fingerlings or juveniles.
- Grow-out operations which farm fingerlings or juveniles to marketable sizes.

Depending on the species being farmed, aquaculture can be carried out in freshwater, brackish water or marine water.

Farming can be extensive, semi-intensive or intensive, depending on the level of input and output per farming area and the stocking density. Intensive aquaculture involves intervention in the growing process, such as with supplemental feeding and water aeration, and high levels of technology to produce high concentrations of fish in constructed growing systems, whereas extensive aquaculture allows the stock to grow on its own, using natural food sources and conditions.



Step 2: Explore the topic



VIEW a range of videos to learn more about aquaculture designs and construction. Ask students to **RECORD** key ideas shared about the designs used, the methods and technologies used in farming various species.



See *Aquaculture fishes for the future*: <http://splash.abc.net.au/media/-/m/1542451/aquaculture-fishes-for-the-future>



BRAINSTORM the different types of aquaculture industries that could be researched. For example: trout, oysters, scallops and abalone, prawns, salmon, barramundi, Southern Bluefin Tuna, Silver Perch.

Explore aquaculture production systems

POINT OUT to students that aquaculture production systems vary and many are being informed by scientific research and the implementation of scientific findings.



Ask students to **RESEARCH** an 'intensive' aquaculture seafood farm that is undertaken in managed ponds and involves the production of the larval seafood in a hatchery, high density rearing. **EXAMINE** the use of formulated diets to maximise growth and systems that aerate the water, provide automatic feeding and systems that can vaccinate the seafood against disease.



Or, ask students to **RESEARCH** an intensive sea cage farm where Atlantic Salmon are grown.



Similarly, ask students to **FIND OUT** more about an 'extensive' aquaculture system for oysters, where their young (or seed) are harvested from hatcheries and reared to market size using a variety of techniques. Ask students to **DESCRIBE** oysters in trays or pouches hung from posts or rafts in areas of high plankton and strong currents, where the quality of the water and the availability of natural sunlight to grow food naturally for the oysters are the most important ingredients for the oyster to grow.



Encourage students to **SKETCH** both production systems and **LABEL** their elements.



Sustainability issues in the aquaculture industry



Ask students to **LIST** the sustainability issues they think might be involved in aquaculture industries.



Ask students to **CONSIDER**:

- Catchment or land-based runoff and discharges (for example: sewage, stormwater, oil spill, fertiliser discharges).
- Fish feeds and feeding, and new techniques where companies have reduced the fishmeal content and produce pellets in appropriate sizes and shapes for different species and their growth stages.
- Water quality and actions that can be taken to maintain water quality, like aeration and water quality monitoring.
- Diseases and actions that can be undertaken to reduce these, like vaccinations, appropriate water temperatures, maintenance of good water quality and use of high quality food.
- Pests and predators and techniques like screens and loud noises that can be used as deterrents.

Research an 'intensive' aquaculture seafood farm that is undertaken in managed ponds and involves the production of the larval seafood in a hatchery, high density rearing..



Investigate the marketing practices and the labelling used to demonstrate where the seafood comes from, how it was caught or how it was produced.

Sustainable resource management

We all live in a catchment and what we do on land can affect marine biodiversity.



TALK about environmental management. What does it mean?



BRAINSTORM a list of terms that might be associated with the idea of environmental management.



CONSIDER land management, water management, pest management, energy management, catchment management and waste management in fisheries and aquaculture contexts.



DISCUSS why it is important to catch fish on a sustainable basis; ensuring sustainable fishing practices are used.

TALK about why it is important to minimise the environmental impact of aquaculture development.

Selection of a sector



Remind the class that their task is to **SELECT** either a wild-catch or aquaculture industry sector or fishery, and to **RESEARCH** and **RECORD** information about it including technologies and methods used by the industry to catch or farm seafood and to **EXPLORE** their use in terms of productivity and sustainability.



Explain that groups will also **INVESTIGATE** the marketing practices and the labelling used to demonstrate where the seafood comes from, how it was caught or how it was produced.

Start researching

This is part of the suggested assessment task.



EXPLAIN to the students that their task is to begin their research. Invite students in groups to select an industry to **INVESTIGATE** and **REVIEW** relevant resources to explain the production and marketing practices used by the sector.



Invite groups to **CONSIDER** sources of information located in **Resource 1.1** for their research tasks.

Develop a retrieval chart

When investigations are completed as drafts, remind groups to **DEVELOP** a retrieval chart on which student's document information and ideas.



Step 3: Explain understandings

Purpose

To provide students with opportunities to:

- consider the sustainable use of marine biodiversity
- describe the use of labelling to inform where the seafood comes from, and how it was caught and produced
- gather information about what the industry is doing to improve its environmental, economic and social performance
- consider actions or new technologies for the industry to improve its performance in one of those areas
- develop presentation ideas and information
- develop a storyboard.

Talk with the class about how producing things from natural resources like the sea and consuming the seafood produced is important to sustain a growing population.

Resources and the environment

TALK with the class about how producing things from natural resources like the sea and consuming the seafood produced is important to sustain a growing population - but we need effective policies, investment in science and education to reduce the impact on the earth's natural environment.



Ask students what they **THINK** are the most important things we need to know if we are going to ensure we have seas and oceans for food and recreation purposes, for tourism opportunities, to maintain culture, allow shipping activities and to conserve habitat to sustain marine biodiversity?



DISCUSS the need for user groups to use marine and freshwater resources in a sustainable way.

DISCUSS how the sea supports important fishing industries, the number of people these industries employ and the earnings that are made from fishing.



CONSIDER our increasing appetite for seafood and how this might affect the natural environment. How can impact be managed?

SHARE examples and create flow charts to describe these. For example:

Land clearing ➔ reduces fish nursery areas ➔ loss of aquatic biodiversity

Adapting industry practices to our food demands ➔

Sustainable fishing methods ➔

Consumer demands for more seafood ➔

Media investigation



Ask students in pairs or small groups to **COLLECT** information about well managed and sustainable fishing or aquaculture businesses.

See: <http://www.msc.org/healthy-oceans>



VIEW 'Drawing the Line'. See: <https://www.youtube.com/watch?v=qaaASQVs9JY>

READ about Atlantic Salmon farming in Tasmania at:

<http://www.tsga.com.au/salmon-farming/>



CONSIDER the messages shared in these sources and create cause and effect wheels outlining the effects of catching or farming fish. Consider positive effects like feeding people, economic effects such as increasing markets for Australian products and environmental effects too.



Students **SELECT** an issue they consider is affecting the seas and oceans, and **IDENTIFY** first, second and third order effects of the issue.

Encourage students to **EXCHANGE** information about the issues and their effects. See **Resource 1.2**.



Before developing the consequence wheel, **REFLECT** on what has been learned in the research tasks and then **BRAINSTORM** the types of issues the class thinks might be associated with catching and farming seafood.



Consider issues like reducing interactions with threatened, endangered or protected species (for example: sea birds, turtles, dolphins, seals)..



CONSIDER issues like:

- Fishing controls – input controls such as seasonal closures or type of gear able to be used, or output controls such as fishing quotas (wild catch).
- Environmental approvals to develop an aquaculture operation.
- Reducing interactions with threatened, endangered or protected species (for example: sea birds, turtles, dolphins, seals).
- Protecting workers through technology and design (for example: shark protection for abalone divers).
- Waste management (in aquaculture).
- Water management (in aquaculture).
- Feed management (in aquaculture).
- Animal welfare management.
- Food miles.
- Managing people.
- Continual improvement.
- Profitability.
- Supporting communities.
- How fishers might feel in response to negative publicity, or when their fishery is closed.

To develop a consequence wheel the issue is written in the centre of a sheet of paper and a series of concentric circles are then drawn lightly around it. The first question asked is “What are the immediate consequences?” See **Resource 1.2** for an example.



Ask groups to **DISCUSS** what the repercussions might be and briefly **WRITE** them around the first circle. Ask groups to **LINK** each statement to the central point by a single line. Next, students **DISCUSS** what consequences may follow on from the first ones. Following on, third and fourth order consequences can be explored and marked in a similar way.



SHARE consequence wheels and **EXPLORE** the difference between intended and unintended consequences for a range of issues.

Encourage the students to ask critical questions of one another’s work. For example:

- What do you feel, hope and fear in relation to this particular issue?
- Do you think everybody agrees?
- Why might other people think and feel differently?
- How did the issue come about?
- Who do you think influenced your opinions?
- Who gains and who loses?
- Who has power in this situation and how do they use it?



Step 3: Explain understandings

- Is it used to the advantage of some and to the disadvantage of others?
- What values can we use to guide our choices in the way seafood is produced?
- What are the possible courses of action open to fishers?
- What are the technologies available to fishers?
- What are others already doing?
- How might the industries work together?
- Whose help might they need?
- How do we measure their success?
- What are some of the things that industry is doing to combat these consequences?

Adapted from "Education for the Future – a practical classroom guide, D. Hicks, World Wildlife Fund, 1994, page10.

Expand on the task

Note: This is part of the assessment task.

EXPLAIN to the students that their task in this unit is to also **INVESTIGATE** the marketing practices used by the sectors and the labelling used to inform where the seafood comes from, how it was caught or farmed and how it was processed and answer the following question:

‘What are the important issues about sustainably caught and ethically produced seafood?’



VIEW the Marine Stewardship Council’s website and find out more about MSC certified products. See: <http://www.msc.org/>

LEARN more about the ‘Cleanfish Australia Endorsement Program’ at: <http://www.cleanfishaustralia.com.au/sustainable-program>



CONSIDER the messages shared about sustainable seafood and a sustainable seafood certification scheme as presented by ‘Friend of the Sea’. **VIEW** marketing and promotional videos promoted by ‘Friend of the Sea’ at: <http://www.friendofthesea.org/download.asp?ID=23> and **CONSIDER** their approach to the marketing of the certified brand.



CONSIDER when labelling can confuse or help the consumer.

Examine what are the important issues about sustainably caught and ethically produced seafood?’



Presentation planning

This is part of the assessment task.

Using the information gathered, each student **PREPARES** a presentation about the ethical and sustainable production of seafood, and the marketing of these food products and answers the following question:

‘What are the important issues about sustainably caught and ethically produced seafood?’



Ask students to **LOOK UP** the term ‘maximum economic yield’ and ‘maximum sustainable yield’. How do they differ?



What would you **CONSIDER** to be acceptable environmental impact? (You may wish to consider other activities as well as fishing, for example: trucking and refrigeration)

Decide on what to present and how to do so



Re-state the purposes of the task and ask students to **CONSIDER** how they are going to bring their information together and **PRESENT** it so that the main points come across clearly. **MODEL** the construction of video and slideshow tools. Students now use the information they have gathered to **CONSTRUCT** a presentation for the research being undertaken.



Step 4: Elaborate on concepts and ideas

Deeper thinking and presentation planning

Purpose

To provide students with opportunities to:

- consider the differences and/or similarities of how seafood is produced and marketed overseas compared to Australia
- view and read stories from other cultures about the way seafood is produced and consumed
- identify the environmental, social, economic and political factors that influence the human alteration of aquatic environments to produce seafood the environmental effects of these alterations
- identify what is being done to combat these effect
- elaborate on the opportunities and challenges for producing seafood
- apply what they have learned and communicate sustainable practices in the production and marketing of seafood
- plan their presentation
- conduct their presentation
- share investigation findings.

Delving deeper

DISCUSS with students how they could answer the following question:

‘What are the important issues about sustainably caught and ethically produced seafood?’

BREAK the question into three parts investigating the opportunities, the challenges and what the Australian and overseas industries and their marketing campaigns are doing.



TALK with the class about the opportunities in the seafood industries for sustainable production, marketing ethics and reduced environmental impacts.



VIEW the videos, recommended below. Ask students to **LIST** the opportunities and benefits being presented and to **COMMENT** about whether the changes cited are due to better science, new technology, better management or smarter ways of doing things.



VIEW:

How to buy sustainable seafood – Wall Street Journal:

<http://www.wsj.com/video/how-to-buy-fresh-sustainable-seafood/D106B5AD-E333-42C1-8CFB-EA2DA728F0B3.html>

How to buy sustainable seafood III right off the dock:

<https://www.youtube.com/watch?v=lCh3NAo1E1Y>

Ask students to **EVALUATE** sources for their reliability, bias and usefulness.



Challenges

TALK with the class about challenges in the seafood industries that might be preventing sustainable production, and the impact on marketing of some products.



VIEW the videos suggested below and ask students to identify the challenges being faced in the industries and ask students to evaluate sources for their reliability, bias and usefulness.

‘The Dry Sea’ How Developed Countries are Destroying Third World Fisheries: <https://www.youtube.com/watch?v=xtZBfkBfl6c>

Killer Shrimp – Check Clean Dry – Invasive Aquatic Species (biosecurity) https://www.youtube.com/watch?v=lfWiaS_VxSA

Over-Exploitation: How Humans Affect Ecosystems by Decreasing Species Populations: <http://education-portal.com/academy/lesson/over-exploitation-how-humans-affect-ecosystems-by-decreasing-species-populations.html#lesson>



See how sectors have tried to provide solutions to people wanting to buy sustainable seafood.

Marketing 



TALK with students about the marketing and labelling of seafood in Australia. How do we find solutions and:

- provide consumers with the information they want.
- make information more accessible.



Ask students, in groups to **RESEARCH** the information communicated in the websites below to see how sectors have tried to provide solutions to people wanting to buy sustainable seafood.



Ask each group to **REPORT** back to class providing examples from the website or app they think provides solutions.

Cleanfish Australia Endorsement Program

<http://www.cleanfishaustralia.com.au/sustainable-program>

Marine Stewardship Council – Ecolabelled products

<http://www.msc.org/get-certified/use-the-msc-ecolabel>

Friend of the Sea

<http://www.friendofthesea.org/aquaculture.asp>

<http://www.friendofthesea.org/fisheries.asp>

Good Fish Bad Fish

<http://goodfishbadfish.com.au/>

http://goodfishbadfish.com.au/?page_id=39

http://goodfishbadfish.com.au/?page_id=35

Australia’s Seafood Guide (also available an free app – link from home page) <http://www.sustainableseafood.org.au/>

Plus, Minus, Interesting

Plus, Minus, Interesting – is a useful way of exploring an issue in terms of its positive and negative aspects and those which provoke deeper thought.



Use the technique to **IDENTIFY** different directions that student’s conclusions could have taken. Ask them to **DISCUSS** their key findings about the seafood industry in terms of:



- Which aspects are most sustainable.
- What directions the industries might grow.
- What needs to change in the industry including consumer information.
- Any economic and health benefits that are identified.
- The environmental impacts that might need to be reduced.
- How developing nations and their economies and people are affected by the global industry.



Step 4: Elaborate on concepts and ideas

PLUS - include opportunities	MINUS - include challenges	INTERESTING - what we think is interesting

Compass rose

TALK with the students about how all ideas, approaches, methods, processes and actions, or lack of them, carry a range of implications. Some can affect places/ environment, people/society, economies and policies.



Ask students to **REFLECT** on information about opportunities and challenges within the fishing and aquaculture industries and **ANSWER** the following key questions with respect to each text:



- Who are the people involved?
- What opportunities and challenges (environmental, economical, social/ cultural and political) exist?
- How will these opportunities and threats affect the seas and oceans?
- How might consumers influence the fishing and aquaculture industries?



USE the compass rose in **Resource 1.3**.

Instead of naming the four compass points north, south, east and west use:

- Natural environment/ ecological questions.
- Social and cultural questions.
- Economic questions.
- Who decides? Who benefits? i.e. political questions.



Using this 'compass' in nominated groups, **IDENTIFY** the environmental, social, economic and political factors that influence the ways in which the group's chosen fish or seafood product and its production and marketing practices might impact on consumer's perceptions.



Complete this activity for all ideas generated by the class to really understand all of the implications involved in the ethical production and marketing of seafood. Ask students to **SHARE** and **DISCUSS** their compass rose and ideas.

Reflect on information about opportunities and challenges within the fishing and aquaculture industries.



Step 4: Elaborate on concepts and ideas



Alternatively use a flow chart to **LIST** a series of events that might happen, sequentially as a result of the production practice. Other boxes could be added to show related events.

Going further with the planning of the presentation

Invite students to **CONFIRM** the idea planned for their presentation.



Ask students to **CREATE** a final plan for completing the presentation. Students may need to **DOCUMENT** their key messages, **CREATE** an image bank and **COLLATE** references and acknowledgements for their work sample. Invite them to **SUMMARISE** these and the learning achieved in a journal log or reflection.

Review and submit

Note: This is part of the assessment task.

Invite students to **REVISE** and **FINE-TUNE** their presentation about the ethical and sustainable production and marketing of seafood.



Step 5: Evaluating

Think back and evaluate

Purpose

To provide students with opportunities to:

- reflect on their own learning
- provide a source of data for assessment.

To provide teachers with:

- insights into student's understanding and attitudes, as well as their perceptions of their own strengths and weaknesses.

Reflective writing

Begin by **MODELLING** reflective writing through a whole class learning log.

PROVIDE students with a set of focus questions for their writing:

- Write about something new you learnt in this unit about the ethical and sustainable production and marketing of seafood.
- What is one thing you have learned when it comes to producing seafood?
- Describe what you now know about the similarities and differences between production practices of seafood in developed and developing countries.
- Describe what you know about sustainable fishing and aquaculture practices.
- How might you help others know more about how Australian farmers produce seafood?
- What have you learned about the marketing of seafood?
- What would you still like to find out about the ethical and sustainable production of seafood?
- How well did you participate in any group/team learning activities?
- What questions do you have about the topic at the moment?
- What piece of work are you most satisfied with?

References

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- Hill, S. and Hill, T. (1990) *The Collaborative Classroom*, Eleanor Curtin, Melbourne.
- Inman, S and Wade, R. (1997) *Shaping a Better Future: Development Education*. Oxfam Publication, Oxford, United Kingdom.
- Lang, T. and Heasman, M. (2004) *Food Wars. The Global Battle for Mouths, Minds and Markets*. Earthsac, London.
- Wilks, S. (1992) *Critical and Creative Thinking: strategies for classroom inquiry*, Eleanor Curtin, Melbourne.

Websites (viewed February 2015)

This is a list of websites used in the unit for teacher use. As content of the websites in this unit is updated or moved, hyperlinks may not always function.

Aquaculture Stewardship Council

<http://www.asc-aqua.org/>

Australia's Sustainable Seafood Guide

<http://www.sustainableseafood.org.au/>

Australian Broadcasting Corporation

ABC News. Super trawler: destructive or sustainable? <http://www.abc.net.au/news/2012-08-15/super-trawler-debate/4200114>

ABC Splash. Aquaculture fishes for the future <http://splash.abc.net.au/media/-/m/1542451/aquaculture-fishes-for-the-future>

Australian Curriculum, Assessment and Reporting Authority. Australian Curriculum

<http://www.australiancurriculum.edu.au>

Australian Government Australian Fisheries Management Authority

Fishing gear <http://www.afma.gov.au/species-gear/fishing-gear/>

Australian Government Department of Agriculture

Fisheries home <http://www.agriculture.gov.au/fisheries>

Australian fisheries statistics 2012 http://data.daff.gov.au/data/warehouse/9aam/afstad9aamd003/2012/AustFishStats_2012_v1.0.0.pdf

Australian Museum

Garrigarang: Sea Country exhibition <http://australianmuseum.net.au/event/Garrigarrang-Sea-Country>

Cleanfish Australia

Sustainability, certification and endorsement <http://www.cleanfishaustralia.com.au/sustainable-program>

Creative Commons

<http://creativecommons.org/licenses/by-nc-sa/3.0/au/>

Education Portal. Over-exploitation: How humans affect ecosystems by decreasing species populations

<http://education-portal.com/academy/lesson/over-exploitation-how-humans-affect-ecosystems-by-decreasing-species-populations.html#lesson>

Fisheries Research and Development Corporation

<http://frdc.com.au/>

Aquaculture Sector <http://frdc.com.au/environment/Aquaculture/Pages/default.aspx>

Fishfiles <http://www.fishfiles.com.au/Pages/default.aspx>

Fishing Methods http://fish.gov.au/fishing_methods/Pages/default.aspx

Status of Key Australian Fish Stocks 2014 <http://www.fish.gov.au>

Friend of the Sea

Downloads – Videos <http://www.friendofthesea.org/download.asp?ID=23>

Aquaculture <http://www.friendofthesea.org/aquaculture.asp>

Fisheries <http://www.friendofthesea.org/fisheries.asp>

Good Fish Bad Fish

Sustainable seafood <http://goodfishbadfish.com.au/>

Fish names and labeling http://goodfishbadfish.com.au/?page_id=39

The role of consumers http://goodfishbadfish.com.au/?page_id=35

References

Marine Stewardship Council

<http://www.msc.org>

Use the MSC ecolabel <http://www.msc.org/get-certified/use-the-msc-ecolabel>

Oysters Australia

<http://www.oystersaustralia.org.au/>

Primary Connections

<http://www.primaryconnections.org.au/about/teaching>

Seafood CRC Training and Education

Professional fisherman <http://seafoodcrctraining.com.au/a-day-in-the-life/professional-fisherman/>

Seafood Standards

Australian fish names standard AS SSA 5300 <http://seafoodstandards.com.au/fish-names/Pages/default.aspx>

Tasmanian Salmonid Growers Association

<http://www.tsga.com.au/salmon-farming/>

Tassal. Our Salmon

<http://www.tassal.com.au/sustainability/our-salmon/>

The Conversation

Super trawler gone, but is fisheries policy in trouble? <http://theconversation.com/super-trawler-gone-but-is-fisheries-policy-in-trouble-12755>

Wall Street Journal. Video

How to buy fresh, sustainable seafood <http://www.wsj.com/video/how-to-buy-fresh-sustainable-seafood/D106B5AD-E333-42C1-8CFB-EA2DA728F0B3.html>

Wordle

<http://www.wordle.net/>

YouTube videos:

Drawing the Line (2013) <https://www.youtube.com/watch?v=qaaASQVs9JY>

Fisheries Research Australia channel <http://www.youtube.com/user/FisheriesResearchAU>

Fisheries Research Australia channel. Series 10 Bluefin Tuna Aquaculture <http://www.youtube.com/watch?v=LHHqIDnfm3g&feature=c4-overview-vl&list=PLF00C116929C7ADB5>

The Great Barrier Reef Marine Park Authority. Gareth Andrew, Reef Line Fisher Gladstone <http://www.youtube.com/watch?v=HCNfF4XaU5I&list=UUnoxDA5iji0limevCrfQVSA&index=60>

David Suzuki Foundation. How to buy sustainable seafood III right off the dock <https://www.youtube.com/watch?v=ICh3NAo1E1Y>

Great Britain non-native species secretariat channel. Killer Shrimp - Check Clean Dry - Invasive Aquatic Species https://www.youtube.com/watch?v=lfWiaS_VxSA

South Australian Rock Lobster Advisory Council. South Australian Southern Rock Lobster Industry <https://www.youtube.com/watch?v=SBqX9EGBBoE#t=41>

Spencer Gulf King Prawns. Spencer Gulf Prawn Fishery <https://www.youtube.com/watch?v=USzAE6CVI6I&feature=youtu.be>

“The Dry Sea” How Developed Countries are Destroying Third World Fisheries <https://www.youtube.com/watch?v=xtZBfKBf16c>

Resource 1.1

A selection of resources

Select either a wild-catch or aquaculture industry and research and record information about it including technologies and methods used by the industry to produce fish or seafood and explore the use of these technologies and methods in terms of productivity and sustainability.

Aquaculture resources

Learn more about the aquaculture sector at: <http://frdc.com.au/environment/Aquaculture/Pages/default.aspx>

Explore how salmon are farmed by Tassal in Tasmania: <http://www.tassal.com.au/sustainability/our-salmon/>

Find out more about oysters, oyster growing, oyster farming and the oyster industry: <http://www.oystersaustralia.org.au/>

Research tuna aquaculture in South Australia: <http://www.youtube.com/watch?v=LHHqIDnfm3g&feature=c4-overview-vl&list=PLF00C116929C7ADB5>

Commercial or wild catch fishing

View a YouTube video showing trawling for King Prawns in South Australia's Spencer Gulf. The at sea footage was taken during a stock assessment in April 2014. <http://youtu.be/USzAE6CVI6I>

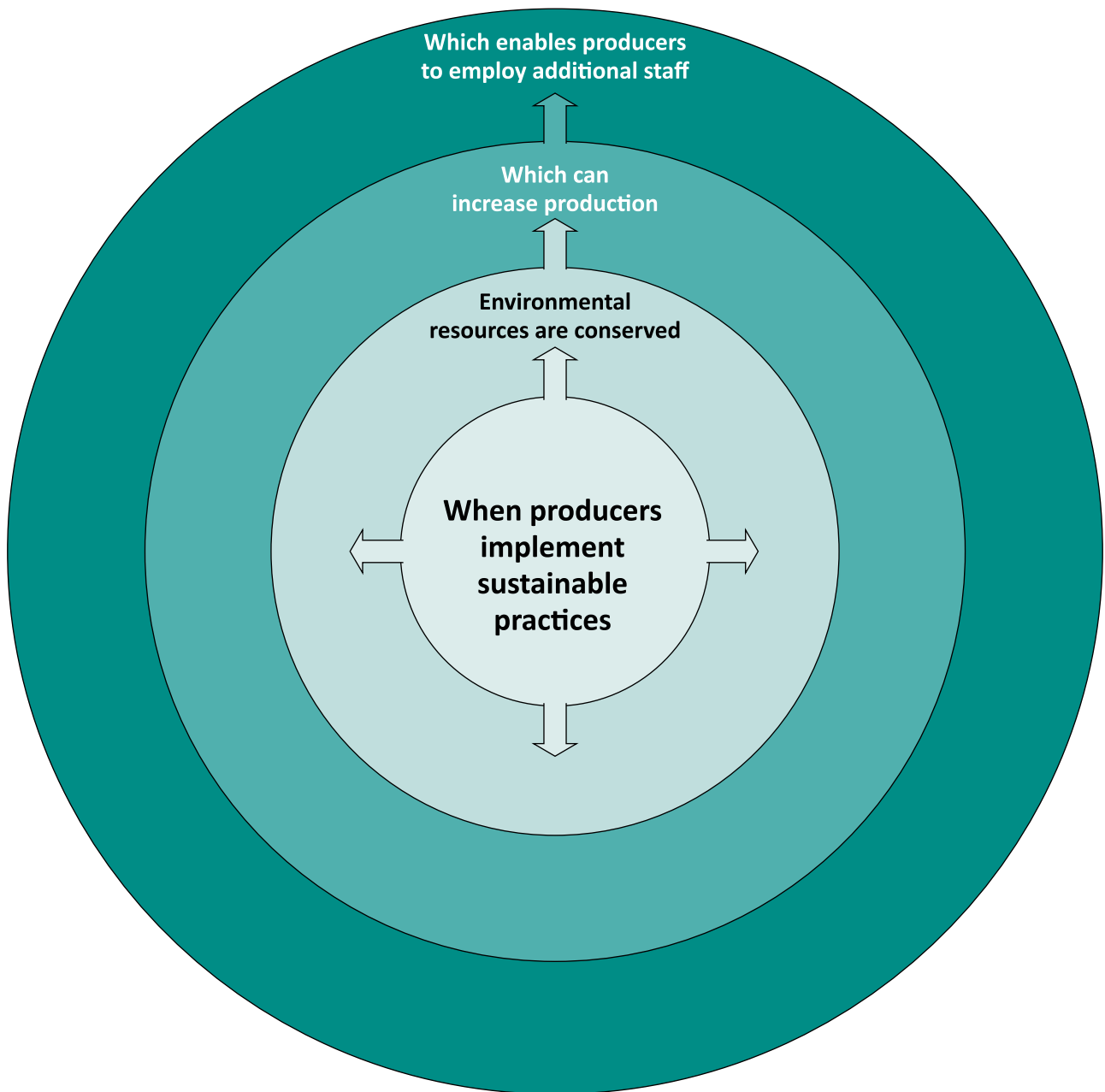
For specific fishing methods see http://fish.gov.au/fishing_methods/Pages/default.aspx

Check out the Fisheries Research Development Corporation YouTube Channel containing videos about a range of fisheries related topics. It contains playlists on the fishing industry; aquaculture; management and conservation; climate change; seafood species including their life cycles, how they are grown, fished and farmed. Link: <http://www.youtube.com/user/FisheriesResearchAU>

Resource 1.2

Consequence wheel

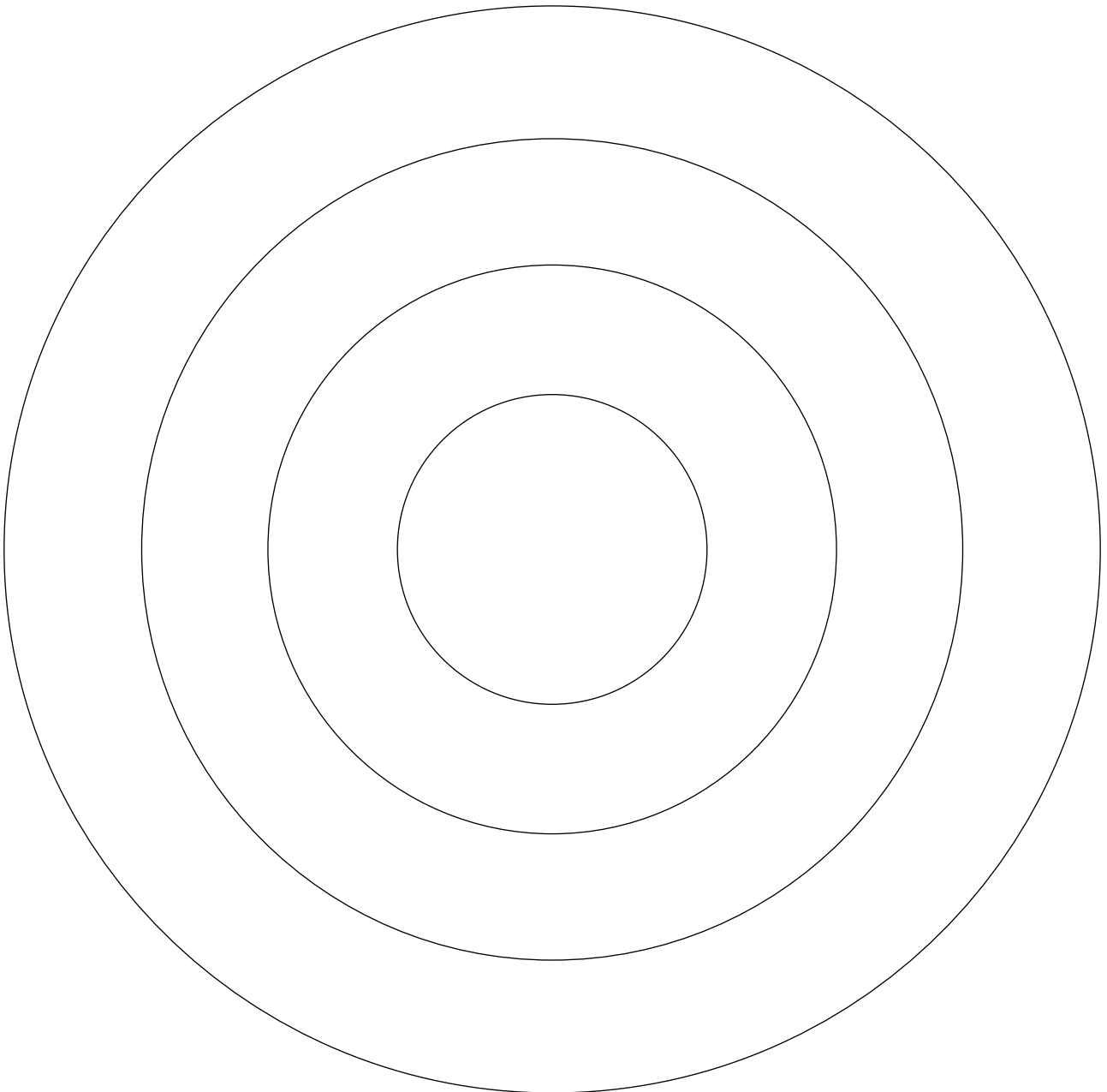
Consequence wheels are used to explore wide ranging consequences that can follow from actions, issues or trends in the present. Look at the example below.



DECIDE on an issue related to the ethical and sustainable production or marketing of seafood. **PLACE** the focus in the centre of the consequence wheel. Then, **EXPLORE** the focus by asking the question “What are the immediate consequences?”

WRITE the immediate consequences in the inner ring around the main idea. **LINK** each consequence to the main idea with a single line. This indicates that they are first order consequences. **CONTINUE** exploring second, third and fourth order consequences using the outer circles.

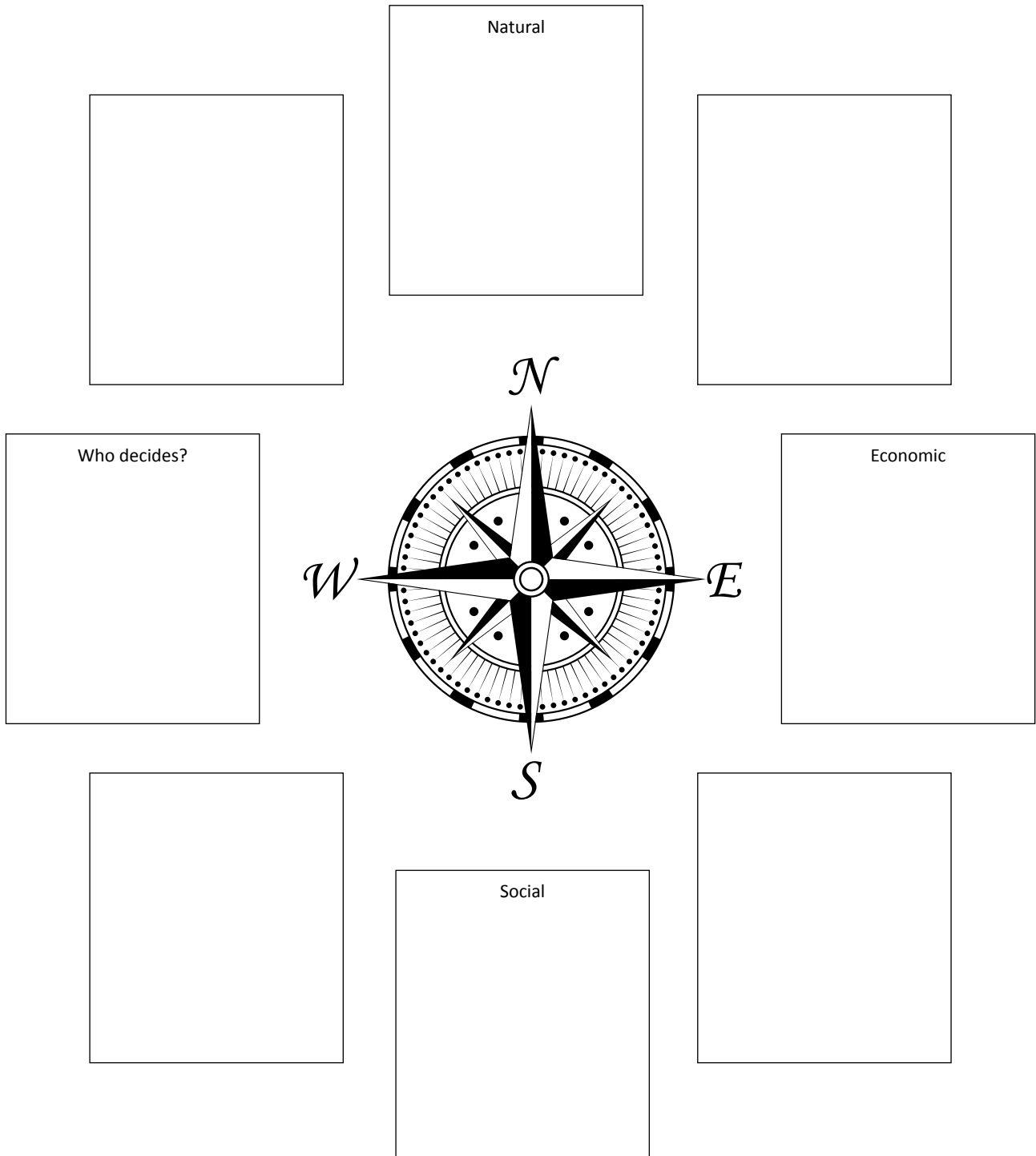
Use the four concentric circles below to **EXPLORE** the consequences of an action, issue or trend relevant to the production and marketing of seafood.



Resource 1.3

Compass rose

Use the compass rose to examine your chosen primary industry and its use of sustainable production practices from a variety of perspectives – the 'natural', 'economic', 'social' and 'who decides (power)'.





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