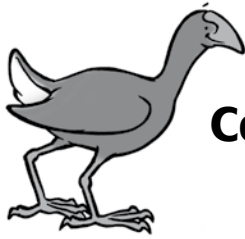


wet-feet

Investigating Fresh Water

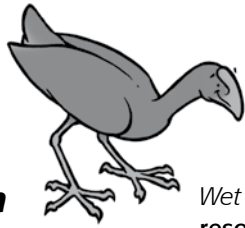
*A Teaching Resource for Fresh Water,
Wetlands, Dune Lakes, Streams & Rivers*





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Introduction

Wet Feet - investigating fresh water is a multi-curriculum, inquiry learning resource for schools. It uses decision-making, community consultation, and freshwater research and monitoring to inspire students into action. The resource is to be used in all levels of the curriculum, by teachers or facilitators.

Wet Feet is about involving schools and communities in the care and restoration of freshwater systems. By increasing understanding of these fragile systems and strategies for their ongoing sustainability, communities are empowered to care for their freshwater environment.

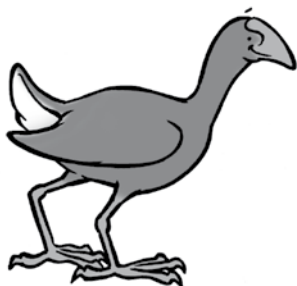
Although designed around Far North freshwater systems including dune lakes, streams, gum field drains, wetlands, and their native flora and fauna; it can be easily adapted to suit any region's freshwater system.

Acknowledgements

After ascertaining that there is a high level of interest in a Far North freshwater education programme (through surveying Far North schools) this resource was initiated and coordinated by the Department of Conservation in Kaitaia. They funded the production and publicity for the resource and designed a project plan. They also worked with the Royal Society of New Zealand to seek a suitably skilled teacher to develop the project into a resource, and provided professional support and field trips with scientists on monitoring programmes.

In addition the following organisations are acknowledged for their involvement and support of the project:

- the Royal Society of New Zealand for the teaching fellowship, which provided an opportunity to research and write the resource material
- the Northland Regional Council who provided professional support for monitoring the Far North dune lakes, and support resources
- the Mountains to the Sea Trust, as their Whitebait Connection programme was a catalyst for this project
- the teachers and pupils of Te Kao School in the Far North for taking part in trialling the units of work in the resource.



Carolyn Smith
Department of Conservation
Kaitaia Area Office

Ross Lyons
RSNZ Teacher Fellowship 2007



Vision

Wetlands are living resources of learning for students who are empowered now and into the future, to nurture and care for unique freshwater environments.

Goals

- To actively involve schools, Tangata Whenua and community groups in stream, dune lake and catchment restoration throughout the regions
- To support schools learning **in, about** and taking action **for**, their local freshwater environments
- To provide ongoing support for all participating groups and schools, creating links to similar programmes operating nationally and globally
- To provide better understanding of the biodiversity of wetland regions
- To strengthen relationships between the Department of Conservation, schools, community groups and Tangata Whenua





The aims of environmental education

Environmental education is:

A multi-disciplinary approach to learning that develops the knowledge, awareness, attitudes, values and skills that will enable individuals and the community to contribute towards maintaining and improving the quality of the environment.

*Learning to Care for Our Environment: Me Ako ki te Tiaki Taiao:
A National Strategy for Environmental Education*

The aims of environmental education are for students to develop:

- Aim 1: **awareness and sensitivity** to the environment and related issues
- Aim 2: **knowledge and understanding** of the environment and the impact of people on it
- Aim 3: **attitudes and values** that reflect feelings of concern for the environment
- Aim 4: **skills** involved in identifying, investigating, and problem solving associated with environmental issues
- Aim 5: a sense of responsibility through **participation and action** as individuals, or members of groups, whānau, or iwi, in addressing environmental issues

Environmental issues related to a sustainable future are often complex. Multi-disciplinary holistic teaching and learning approaches are therefore appropriate for meeting the aims of environmental education.

Environmental Education Curriculum Guidelines, Ministry of Education





Benefits of environmental education

Benefits for students of the primary and intermediate schools:

- Increase in awareness of environmental importance and pride in the environment
- Enhanced life skills
- Empowerment, ownership, and enjoyment
- Inclusion of all students
- Opportunity to learn life skills

Benefits for the school:

- The school grounds become more attractive and aesthetically pleasing
- Promotional and public relations opportunities are created
- Relationships with the public are improved
- There is an increase in cooperation to enhance the school environment
- There are cost and energy savings

Benefits for teachers:

- Improved workplace
- Increase in positive relationships
- Increase in student motivation
- Professional and personal development
- Decrease in work related stress
- Increase in job satisfaction

Benefits for the community:

- Increase in environmental awareness and action
- Partnerships are created
- Increased pride in the school
- Increase in community value
- Increase in positive relationships
- Increase in awareness of environmental issues

Benefits for students of the secondary schools and the area school:

- Increase in awareness and care for the environment
- Empowerment and ownership created
- Wide range of skills and values learnt
- Increase in respect for self and the environment

Benefits for the school:

- Improved relations within the school
- Enhanced environment
- A more positive atmosphere created

Benefits for teachers:

- Increase in job satisfaction
- Value, care, and pride for the environment created

Benefits for the community:

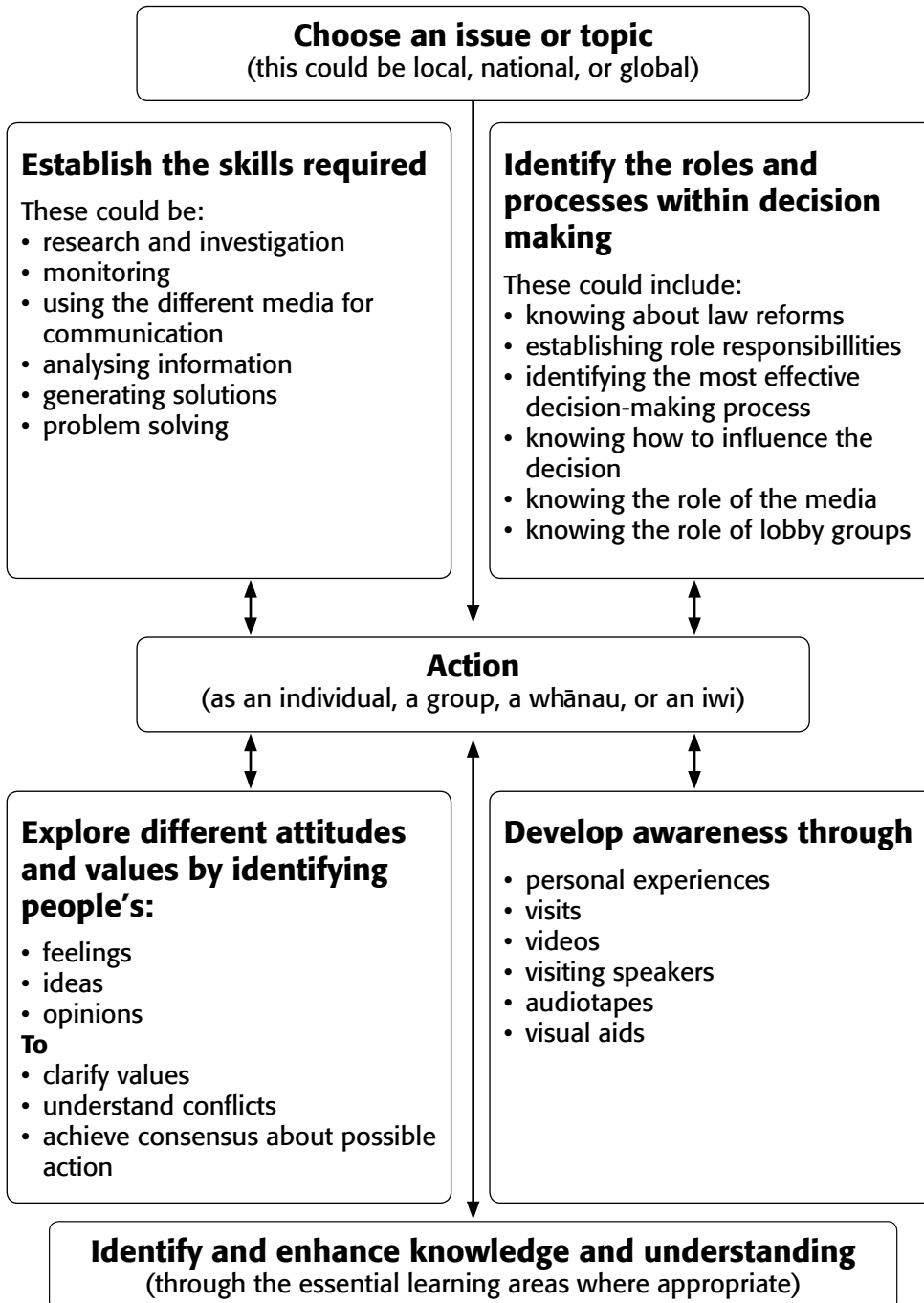
- Increase in community networking
- Environmental awareness and care created
- Increase in community integration

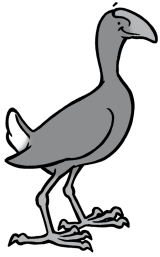
Environmental Education Curriculum
Ministry of Education



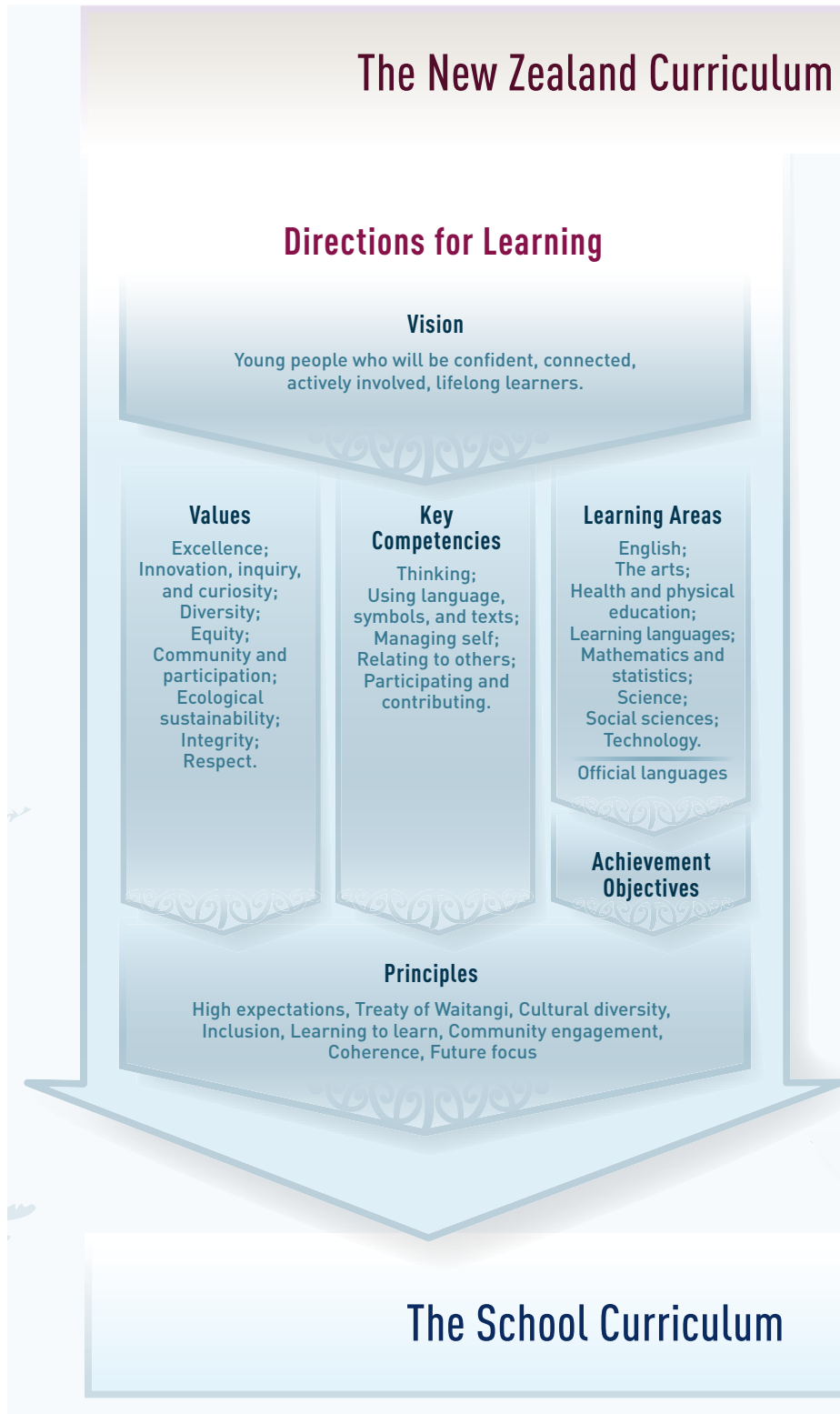
An action-oriented approach

The following diagram describes an action-oriented approach to environmental education.





NZ Curriculum



wet-feet

Investigating Fresh Water



Units of Work



Resources

This teaching resource (Wet Feet - investigating fresh water) contains:

- Units of work
- Worksheets
- Standard forms and letters
- Lists of:
 - wetland websites
 - interactive wetland activities
 - school journal references
- DVD
 - Digital version of the Wet Feet resource
 - Photo reference library of birds, fish, invertebrates and plants

Suggested resources

Videos/DVD

- Underwater under threat, New Zealand's native fish, (Ministry for the Environment)
- More whitebait, (Ministry for the Environment)
- Focus on bugs, (Waitakere City Council)
- Stream sense
- Guardians of the mauri, (Waitakere City Council)
- Forest/freshwater health, (DOC)

Posters

- From the mountains to the sea - Wetlands at work for us, (DOC)
- Ngaro wai Ngaro ora - Planting by water keeps it healthy, (DOC)
- New Zealand's most unwanted fish, (Ministry for the Environment)
- New Zealand's freshwater fish, (Ministry for the Environment)
- New Zealand's freshwater invertebrates, (Ministry for the Environment)
- Far North wetland systems, (DOC Kaitaia)

Photo packs

- The Pond Community, (Learning Media)
- The Stream Community, (Learning Media)

Booklets

- Clean Streams, (Northland Regional Council)
- Wetland restoration, (Northland Regional Council)
- Plant me instead, (Northland Regional Council)
- The good plant guide, (Northland Regional Council)
- Northland natives/planting for birds, (Northland Regional Council)
- Trees for the land, (Northland Regional Council)
- Aquatic weed and pest fish brochures, (Northland Regional Council)

Freshwater Investigation Kit

- fish traps
- scoop nets
- white rectangular plastic bins
- ID charts of invertebrates and fish
 - thermometer
 - pH test kit
 - clarity tube
- The Reed Field Guide To New Zealand Freshwater Fishes, (Bob McDowall)
- Native animals of New Zealand, (A. W. B. Powell)



Overview of units for wetlands and stream investigation using inquiry learning

Units of learning	Learning intentions	Curriculum area	Curriculum level	Facilitator (if required)
1. Pre-inquiry survey	Survey students for pre-inquiry knowledge about the wetland or stream. This will be the basis of your self-assessment and key competencies assessment (5-10 questions).	English Environmental Education Science	Any	Pre-inquiry visit with teacher. Yes
2. Inquiry questions	Students form inquiry questions that they wish to follow about the wetland or stream. Share the inquiry questions on wall displays.	Health English Mathematics Science	Any	Yes
3. Cultural Map	In groups, students are able to draw a cultural map of significant points of interest that they know about or have seen. A local waiata or legend may give indications of place names and previous uses. Learn and perform the waiata and legends.	Maori Information and Communication Technology Mathematics Social Sciences Art	Any	Yes
4. Interview questions	Students form inquiry questions for interviewing members of the community about the wetlands or stream.	English Social Sciences	Any	
5. Interviewing the community	Invite speakers into the school for a meeting to find out facts and uses of regional waterways by Tangata Whenua.	Health Social Sciences English Maori Information and Communication Technology	Any	
6. Using community information	Discuss what information was discovered and what can be used. Findings can be added to the wall display.	Information and Communication Technology English Maori Social Sciences	Any	
7. The cultural value of water for Maori	Myths, legends and place names have significant cultural identity for communities and regions. Investigate the language used for waterways and creatures.	Maori Art Environmental Education Social Sciences	Any	



Overview of units for wetlands and stream investigation using inquiry learning

Units of learning	Learning intentions	Curriculum area	Curriculum level	Facilitator (if required)
8. Stream investigation	Fieldwork in the stream and wetlands commence with using trapping equipment, scoop nets, ID, charts and data recording sheets.	Science Mathematics Environmental Education Technology	Any	Yes
9. Recording and sharing the inquiry	Students use individual student inquiry learning journals, the group wall display, the waterways mural, the group Powerpoint computer presentation and research mini projects.	Visual Language Science Information and Communication Technology Art	Any	Yes
10. Biodiversity	Students investigate the plants of the area to encourage a healthy wetland environment for all aquatic life. Are there any endangered species we know of in our region?	Information and Communication Technology Science English Health Environmental Education	Any	Yes
11. Self-assessment and key competencies assessment	How have previous answers changed by knowing what we know now? How has our inquiry learning helped us in our investigation?	English Science Information and Communication Technology Self-assessment and reflective learning	All	
12. Community hui - celebrate your discoveries	A consultation hui run by the students for the community using PowerPoint as a reference point, dance, drama and waiata displays from what you have found out.	English Information and Communication Technology Art Environmental Education	All	Yes
13. Enhancement and restoration	Future students continue monitoring of the waterway, future restoration and enhancement activities involving the community and environmental agencies for assistance and funding.	Environmental Education Social Sciences Health	All	Yes



Starter activity - Unit 1

The pre-inquiry survey

Specific learning intentions

In this stage, students can be introduced to the big picture key concepts of the inquiry in an engaging and/or experiential way. The key concepts are:

- Values of freshwater
- Interdependence, interconnections and cycles (eg water cycle, whitebait life cycle) from the mountains to the sea
- Ecology and biodiversity
- Threats to the freshwater environment
- Introducing personal and social responsibility - Kaitiakitanga.

Students will be able to:

- identify values associated with the environmental benefits of stream enhancement
- record their views in a reflective wall chart

- Students may select which photos from the photo packs suit their wetland community
- Survey students for pre-inquiry knowledge about the wetland or stream in your community. This will be the basis of your self-assessment and key competencies assessment (5-10 questions)

Examples of values questions

- Where does our water come from?
- Where does our wastewater go?
- How does our community use our wetlands and waterways?
- How can we help the wetlands environment?
- Are our local waterways protected?
- Do we have a variety of wildlife around the wetland?
- Are people involved in local environment care?
- What things can we do to help care for the environment?
- Do New Zealanders care for the environment?
- How does our school care for the environment?

Suggested resources

- **Poster:** *From the Mountains to the Sea - Wetlands at Work for Us*, (DOC)
- **Photo pack:** *Living Things: The Pond Community*, (Learning Media)
- **Photo pack:** *Living Things: The Stream Community*, (Learning Media)

continued over >>>

Teaching and learning activities

- Select an area for the display of your wetlands posters, and your student outcomes and inquiries
- Introduce the topic by discussing the wetland poster and selected photos, and their relationship to the school, community and students





Starter activity - Unit 1

The pre-inquiry survey

As a result of other people's explanations, students may choose to readjust or refine their answers. It is important that all answers are accepted and may be narrowed down to key statements.

Display a chart on the wall showing the answers for each question. On this chart, record students' initials. Younger students will need assistance in recording their opinions.

Before visiting your stream or waterway, consult with the landowner or agency that governs the land. For field trip details, resource consent and RAMS forms - refer *Wet Feet: Standard Forms & Letters*.

Assessment opportunities

As a pre-assessment activity, students record their answers as a group on a wall chart. This activity will be repeated at the end of the units. Use your camera for a digital image of their responses for the assessment and for their PowerPoint presentation.

Curriculum links

English

- Forming inquiry questions

Environmental Education and Science

- Living World
- Learning **about** freshwater environments and issues

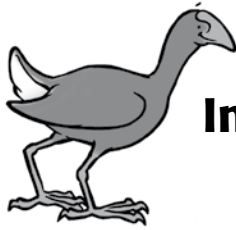
Useful websites

<http://www.doc.govt.nz/upload/documents/science-and-technical/SfC181.pdf>
Protecting habitats on private land.

<http://www.doc.govt.nz/templates/summary.aspx?id=33685>
Conservation and wetlands.

<http://nwp.rsnz.org/>
National Waterways Project.

http://www.tki.org.nz/r/wick_ed/themes/freshwater.php
Interactive water activities for students.



Inquiry questions for pre-visit - Unit 2

Specific learning intentions

Students will be able to:

- visit the wetland site to form opinions and ideas
- create a map of the local stream
- know about water safety and care of the wetlands
- read and interpret maps

Suggested resources

- Poster: *New Zealand's freshwater fish*, (Ministry for the Environment)
- Poster: *New Zealand's freshwater invertebrates*, (Ministry for the Environment)
- Poster: *Ngaro wai Ngaro ora - Planting by water helps keep it healthy*, (DOC)
- Clipboards and A4 paper
- Resource facilitator

Before your investigation starts, you should send a letter to parents stating your intentions, and ensure that a RAMS form is filled out.

Teaching and learning activities

A pre-visit (with teachers and the facilitator) to view and walk the area may be necessary to familiarise the students of the area of study.

Safety

All teachers understand the problems associated with having groups of students around water. Please:

- pre-check the wetlands site
- don't do field trips after storms (all the fun things would have washed away)
- have adequate supervision
- take heed of the weather forecast
- ensure students have suitable clothes
- take first aid kits with you and know how to use them
- don't put students in water that is above knee height for these activities
- take your own drinking water
- teach students simple water safety techniques before you go - use a buddy system for safety
- when using equipment, delegate care and responsibilities to the students

Recap on your wetlands visit with students, teachers and the facilitator in the classroom or discussion area.

continued over >>>





Inquiry questions for pre-visit - Unit 2

Students form inquiry questions on large banners that they wish to follow about the wetland or stream. It is important to accept all questions. Students may group similar questions together when presenting their work.

Share the inquiry questions on wall displays.

Display wall posters and discuss.

Curriculum links

Health

- Water safety

English

- Visual language
- Speaking and listening

Mathematics

- Mapping and coordinates

Science

- Living world
- Investigate wetland environment
- Nature of Science – Aims and Investigations

Assessment opportunities

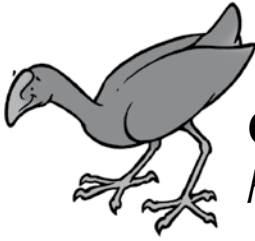
- Students share thoughts on their local stream community
- Students can form open questions

Useful websites

http://www.tki.org.nz/r/eotc/resources/safety_e.php
Water safety guidelines for schools.

<http://nwp.rsnz.org/>
National Waterways Project.

http://www.landcareresearch.co.nz/research/research_details.asp?Research_Content_ID=7
Projects for maintaining and restoring wetlands.



Cultural map - Unit 3

Forming visual impressions

Specific learning intentions

Students will be able to:

- sketch maps of their wetland
- position points of interest and names of features on a map
- research local legends and waiata about their wetland
- learn and perform local legends and waiata

Suggested resources

- Notes and sketches from the students' pre-visit
- Large paper (A2)
- Drawing and colouring equipment
- Local human resources for legends and waiata

Teaching and learning activities

Students are able to draw a cultural map in groups, to show significant points of interest that they know about or have seen. This may be a group or whole class activity.

Using their sketches and maps of the local area, students map the section of the stream or wetland they are studying. Include possible sources of water pollution, e.g. factories, service stations, fishing, boating.

A local waiata or legend may give indications of place names and previous uses. Learn and perform the waiata and legends as a feature performance in your celebration later.

Students are able to share their cultural maps with presentations on the wall display. These may be photographed and added to a PowerPoint presentation.

Assessment opportunities

- Using and creating maps
- Development of identification skills

Curriculum links

Māori

- Place names

Information and Communication Technology

- Collating required information from appropriate sources

Mathematics

- Location and grid interpretation

Social Sciences

- Social studies
- Place and Environment
- Cultures

Art

- Creating maps

Useful websites

<http://www.ecan.govt.nz>
Environment Canterbury.

<http://www.nzgo.govt.nz>
New Zealand Government.

<http://www.niwa.cri.nz>
National Institute of Water & Atmospheric Research.

<http://www.rsnz.org/education/emap/>
Environmental Monitoring and Action Project.

<http://www.whitebaitconnection.co.nz/>
Whitebait Connection education programme.

<http://www.biodiversity.govt.nz/kids/>
Up the Creek - a bilingual interactive game for kids.



Interview questions - Unit 4

Gathering information

Specific learning intentions

Students will be able to:

- form open-ended questions
- integrate different sources of information
- focus questions towards finding specific information

Suggested resource

- Photocopy of inquiry question sheet - refer *Wet Feet: Worksheets*

Teaching and learning activities

Discuss with the students what sort of information they need to ask about, and what they need to know about their wetland.

Students are to form inquiry questions for use when interviewing members of the community about the wetlands or stream. The students are to be guided towards creating open-ended questions which encourage place names, historical significance, use of the wetlands, stream - then and now, and land use of the wetlands - then and now.

Use the photocopy inquiry question sheet. This may be enlarged after the interview for your display to share the student's answers.

The answers from the community will be important for their cultural map and mural work.

Assessment opportunities

- Forming open-ended questions
- Relevance of key questions

Curriculum links

English

- Developing inquiry thinking skills
- Developing focus questions

Social Sciences

- Place and Environment

Useful websites

www.tki.org.nz
Environmental education.



Interviewing the community - Unit 5

Gathering information

Specific learning intentions

Students will be able to:

- understand the significance of waterways for communities
- understand the value of waterways in communities
- record their findings for future reference

Suggested resources

- Photocopy of inquiry questions - refer *Wet Feet: Worksheets*
- Photocopy of guest list and invitation design - refer *Wet Feet: Worksheets*
- Human resources
- Maps
- Large pieces of paper and marker pens
- Video or audio recorder

Teaching and learning activities

Students involve their community for learning opportunities by inviting speakers into the school to find out facts and uses by Tangata Whenua

Students are to design invitations and decide whom to send them to by group discussion and listing the outcomes.

Not all community members are parents. Other people can have important information too.

The invitations need to specify why the students need to interview the community. Dates, time and venue must be included.

On the interview day, students can have roles in the process depending on how formal you wish to be.

Students may wish to welcome their guests with an opening explanation, and spread the questions around to the other students.

Discussion by the guests often leads to further impromptu questions. It is important to write down their findings and for students to record the speakers by making a video or audio recording for future reference.

Large paper or maps are useful guides for the guest speakers to use.

Refreshments made by the students usually follow a closing thank you speech to all the guests.

continued over >>>





Interviewing the community - Unit 5

Gathering information

Assessment opportunities

- Inquiry learning
- Leadership
- Collating information

Curriculum links

Health

- Healthy communities and environments

Social Sciences

- Place and environment

Visual Language

- Designing invitations

Oral Language

- Asking key questions
- Welcoming and thanking people

Māori

- Place names
- Tikanga issues and protocols

Information and Communication Technology

- Using video or audio equipment to record information
- Using PowerPoint to store information

Useful websites

<http://www.ew.govt.nz/enviroinfo/profile/maoriperspective.htm>

Māori perspective on the environment.



Using community information - Unit 6

Discovering our heritage

Specific learning intentions

Students will be able to:

- understand the importance of local ecological heritage sites
- identify the past roles of local waterways
- recognise the cultural value of wetlands to communities

Suggested resources

- Question and answer sheets
- Video or audio recording of the interviews
- Class computer
- Large strips of paper for enlarging answers contributing to the wall display

Teaching and learning activities

Discuss what information was discovered and what can be used, in groups or as a whole class. Record these on larger strip paper for adding to the wall display under the inquiry questions as report writing or caption quotes. Add reference names of who said what.

Community information about place names and areas of interest can be added to the cultural maps.

Group work with older students should include using PowerPoint on class computers, and uploading the video recordings. This will form the support media of reporting back later, in community consultation by the students to celebrate their stream or wetland investigation.

Assessment opportunities

- Interacting and engaging with local iwi and community towards a common goal
- Collating and sorting information for a purpose

Curriculum links

Māori

- Place names and terms

Social Sciences

- Using local heritage sites

Information and Communication Technology

- PowerPoint presentation
- Video and audio recording
- Digital images

English

- Oral/visual language and listening

Useful websites

<http://www.ecokids.co.nz/>
Auckland Regional Council interactive site for kids.

<http://www.ew.govt.nz/enviroinfo/water/index.htm>
Environment Waikato guide to waterways and school resources.



The cultural value of water for Māori - Unit 7

Understanding our heritage

Specific learning intentions

We are learning to:

- state the Māori words for types of waterways and related vocabulary
- explain Māori cultural values related to the use of streams and waterways
- understand the importance attached to Māori names of regional waterways

We know we have achieved this when:

- we can use and pronounce each of the Māori words for water correctly
- we can tell another person three reasons why water is important in Māori culture
- we can describe the meanings for the Māori names for waterways in our area

Teaching and learning activities

Read a Māori story or myth (related to your region if possible) that highlights the spiritual value of water and streams, and the importance of these to Māori.

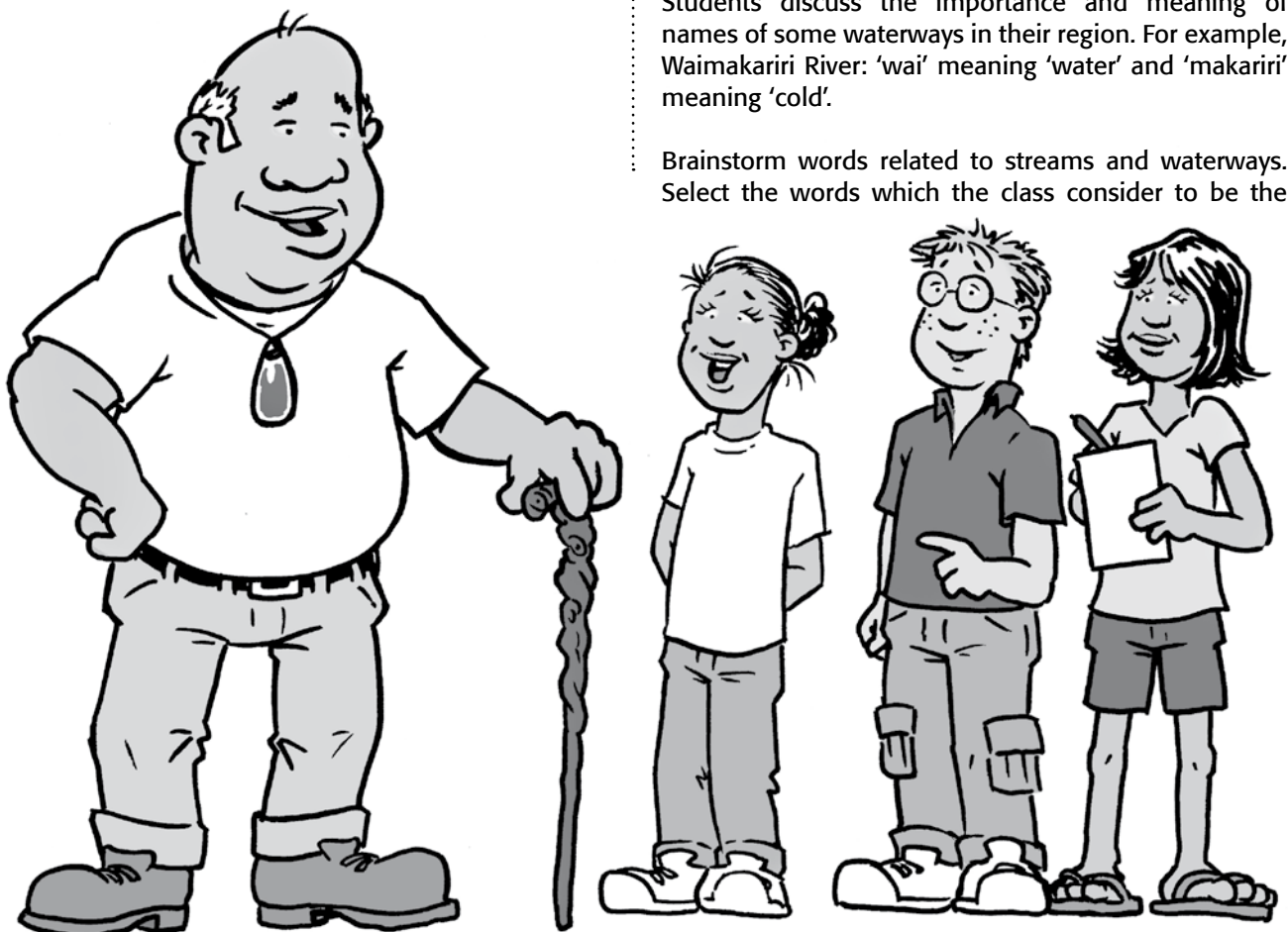
Discuss the myth/legend. Examples of questions include:

- What values in the story do you think would still be important to people today?
- Why do you think these values are important?
- Do you share these values? Why or why not?
- What values and beliefs do you think Māori have about streams and waterways?

Invite your local kaumatua to talk to the students about Māori values and beliefs related to the use of streams and waterways, and their importance. Allow time for questions.

Students discuss the importance and meaning of names of some waterways in their region. For example, Waimakariri River: 'wai' meaning 'water' and 'makariri' meaning 'cold'.

Brainstorm words related to streams and waterways. Select the words which the class consider to be the



continued over >>>



The cultural value of water for Māori - Unit 7

Understanding our heritage

most useful to learn in Māori. Write these words in Māori and teach students the correct spelling and pronunciation.

Working in pairs, students are to make a memory game using the Māori words. For example, write the Māori word for fish on one card and the English on another; repeat for all the vocabulary selected. In pairs, students spread all the cards out face down and then take turns to turn two cards over at a time. As they turn the card over, they must say the word out loud, focusing on correct pronunciation.

In conclusion, play a class game of bingo. The students rule up a 3 x 3 grid. They select any nine words of the vocabulary used to fill up their grid. The teacher, or a selected student, calls out either an English or Māori word. Students are to place a counter over each word as it appears in the opposite language, for example if the teacher calls out 'ika' the student would place the counter on the word 'fish'.

Teaching notes

Water is pivotal and very sacred. Water is seen as 'noa', capable of changing the status of something that was tapu to something neutral. For example, Māori people sprinkle water over themselves before leaving an urupa (cemetery). Waterways were important sources of food, plants used for tool making, and plants used for medicinal purposes.

Waitangi Tribunal cases provide guidance, including five principles:

- Fresh water is a life-giving gift
- The Māori conception of rivers is holistic
- It is irrelevant to consider whether waste can be treated to be 'pure' before being discharged into rivers
- Only Tangata Whenua can determine the spiritual and cultural significance of a river resource to Māori
- Environmental consultation with iwi is a partnership duty

Useful vocabulary

stream	awa iti	eel	tuna
water	wai	trees	rakau
plants	huata	fishing	hi ika
fish	ika	food	kai
flax	harakeke	medicine	rongoā
birds	manu	ferns	rauaruhe
ducks	rakiraki	insects	ngarara

Assessment opportunities

- Listen to the students' pronunciations when playing memory in pairs
- Students may write a paragraph explaining the values that Māori hold regarding streams and waterways

Curriculum links

Māori

- Students could use the vocabulary to label a picture, the words could also be used in basic sentences

Art

- Draw or paint a stream/waterway using koru designs to express shapes in the environment

Social Sciences

- Place and Environment
- Cultures
- Histories

Environmental Education

- Learning **about** the freshwater environment

Useful websites

<http://www.ecan.govt.nz/>
Environment Canterbury. All regional councils host websites which will give information about monitoring stream health.

<http://www.eednz.org.nz/>
Environmental education directory of New Zealand.

<http://www.ew.govt.nz/enviroinfo/profile/maoriperspective.htm>
Māori perspective on the environment.

<http://www.biodiversity.govt.nz/kids/>
Up the Creek - a bilingual interactive game for kids.

Strife in Streamville. Environmental Education Resource Ministry of Education



Stream investigation - Unit 8

Dipping our feet

Specific learning intentions

Using the inquiry questions formed in Unit 2, students can now plan their investigation of the wetland or stream.

Students will be able to:

- identify what methods they need to use to carry out the investigation
- develop an execution plan
- set a timeline
- ensure the methods are ethical and safe
- determine the methods they will use to interpret and present the results eg video, graphs, maps.
- understand the importance between humans and their physical environment
- understand the process for collecting data during stream investigation

Suggested resources

- Poster: *New Zealand's freshwater fish*, (Ministry for the Environment)
- Poster: *New Zealand's freshwater invertebrates*, (Ministry for the Environment)
- Video: *Focus on Bugs*, (Waitakere City Council)
- Resource facilitator
- Freshwater Investigation Kit: traps, scoop nets, white rectangular plastic bins, ID charts, thermometer, pH stick, clarity tube.
- Clipboards for students with the following data sheets:
 - *How healthy is your stream environment?* - refer *Wet Feet: Worksheets*
 - *Freshwater fish record sheet* - refer *Wet Feet: Worksheets*
- Digital photo or video camera

Teaching and learning activities

- Provide a list of potential methods to carry out an investigation to students and they can identify which will be useful to their inquiry. eg. survey, interviewing experts, field investigation, stream health indicators, getting information from maps, books, people.
- Plan how students will record the investigation.
- Provide a list of recording/documenting methods to choose from.

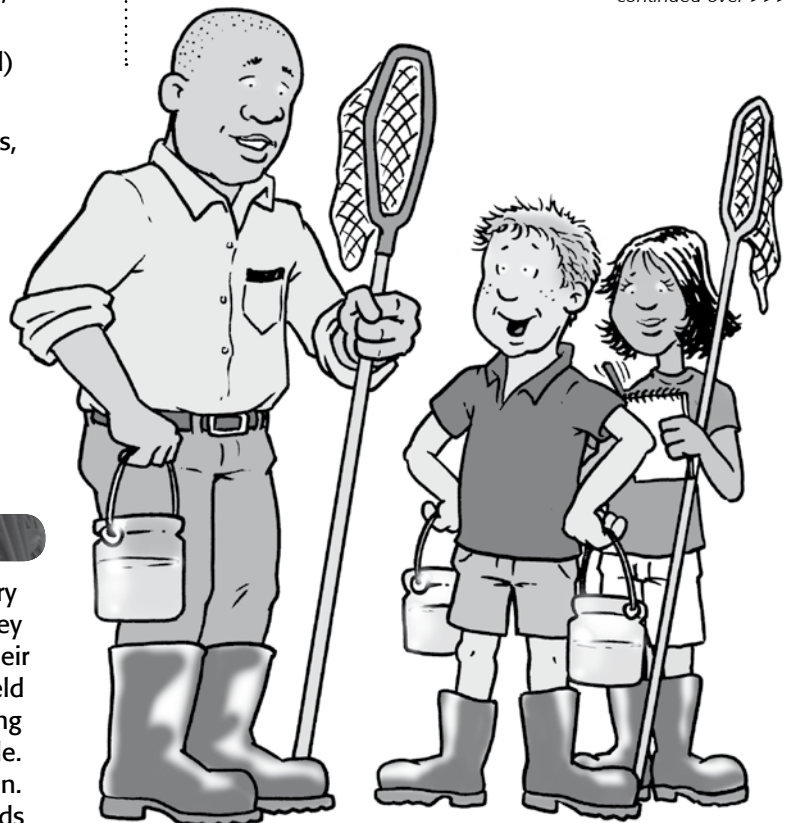
- Carry out a Risk Assessment and Management System (RAMS) exercise with students for any planned field trips.
- Field investigation methods – this may require a facilitator or local expert assistance to plan the field methodology based on local knowledge.
- Develop a workplan for the investigation including a timeline and investigation plan checklist.
- Deliver a lesson on scientific information gathering. If possible, preset the fish traps the night before your stream investigation. A good bait to use is a finger of marmite or a teaspoon of canned cat food.

Have the *Freshwater fish* and *Freshwater invertebrates* posters on show to discuss what the students may find.

View the video *Focus on Bugs* and discuss.

It is important to have a pre-visit discussion about the protocol of wetland investigation, and to demonstrate the use of the equipment and ID charts.

continued over >>>





Stream investigation - Unit 8

Dipping our feet

Students will be collecting data on water quality (temperature and clarity) and species of fish and invertebrates. This may be done in groups or individuals. You may want to record the activities using a digital photo or video camera.

Investigation into the stream and wetlands may now commence using trapping equipment, scoop nets, ID charts and data recording sheets with facilitator supervision.

This is the time to start conducting water quality surveys with the facilitator using the Freshwater Investigation kit.

Use the *How healthy is your stream environment?* recording sheet and the *Freshwater fish record sheet* for each student or in small groups.

Share the equipment and clipboards around the students with demonstrations by the facilitator about their use, and commence your investigations with care for the environment and waterway. Aquatic creatures are placed into a plastic, white, water-filled basin for observation, taking care not to handle the species found.

Record your findings on the data sheets and return your aquatic creatures to their environment afterwards.

You can extend this unit by carrying out several visits to build up a data bank of water quality and species discovered which might change over a season. When back at school, have a recap meeting about the stream investigation, saving all data sheets.

This can run parallel with the students' research into freshwater fish and invertebrates. Recordings can be graphed as wall charts, or on the class computers.

Assessment opportunities

- Aquatic insect and freshwater fish classification
- Ability to work responsibly and cooperatively
- Ability to use equipment appropriately

Curriculum links

Science

- Investigating insect classification
- Investigating local ecosystems
- Understanding interdependence of living organisms
- Investigating freshwater fish classification

Mathematics

- Statistics
- Gathering data

Environmental Education

- Learning **in** freshwater environments

Technology

- Learning to use monitoring equipment (traps, scoop nets, thermometer etc)

Useful websites

<http://www.ecan.govt.nz>
Environment Canterbury.

<http://nwp.rsnz.org>
National Waterways Project.

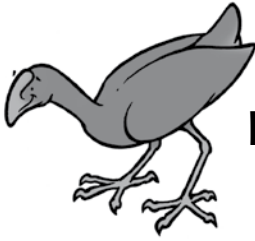
<http://www.waitakere.govt.nz/AbtCit/ei/EcoWtr/FrshWtrFsh/frshwater-fish.asp>
Identification of freshwater fish.

<http://www.niwa.cri.nz/rc/freshwater/fishatlas/fishfinder>
Identification of freshwater fish.

http://www.tki.org.nz/r/eotc/resources/safety_e.php
Water safety guidelines for schools.

<http://www.waterlink.org.nz/>
Interactive freshwater game for kids. The adventures of Pakura and friends.

<http://www.landcare.org.nz/shmak/>
SHMAK monitoring kit information.



Recording and sharing the inquiry - Unit 9

Specific learning intentions

Students will be able to:

- Collate records of their investigation
- share their learning with other students and the wider school community
- use research skills for individual learning

Suggested resources

- Data recording sheets
- Inquiry learning journals
- Resource books about wetlands, dune lakes, rivers, freshwater fish and invertebrates
- Class computers
- List of useful websites
- Art equipment suitable for murals

Teaching and learning activities

Students can record their findings in a variety of ways over a length of time.

By carrying out a series of stream investigations the students are able to gather more data and look at changes over time and seasons.

Groups of students can vary their roles.

The facilitator is able to guide and assist the students' stream or wetland monitoring.

- The individual student inquiry learning journal is a good way for all students to have a record of what activities they have achieved each visit and what they have discovered. Data recording sheets may be pasted in with other information they have found over a period of time.
- The wall display is a way for groups to share their investigation with others and the whole school. Records, creature information and graphs can be added to as their investigation continues.
- The waterways mural on a large wall is a visually effective display that can be added to as the investigation progresses. It is a very informative way of communicating to the wider school community with a variety of information on display. If the waterway is of significance to the school, you may choose to do your mural on an outdoor wall with

the guidance of an enthusiastic, artistic parent or caregiver.

- The group PowerPoint computer presentation is a wonderful learning tool for compiling and organising your information towards giving a slide show presentation to your school and community. This can be built and added to each week with ongoing information. Your school's ICT assistant can have useful input in guiding students.
- Students can be guided to do research mini projects on the aquatic creatures they have found which can be an additional display feature of their investigation. There are many useful books and internet resources available, as well as local councils, the Department of Conservation, and human resources that are very helpful.

Consult the website list in the *Wet Feet* resource for student guidance.

Assessment opportunities

- Students share their investigation with an audience
- Inquiry learning journal
- Cooperative group learning and presentation

Curriculum links

Visual Language

- Form and communicate selected ideas on a topic

Science

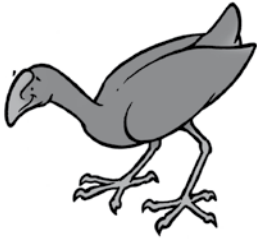
- Carrying out investigations to develop explanations
- Explain how living creatures are suited to a particular habitat and how they respond to environmental changes

Information and Communication Technology

- Presenting information to an audience from inquiry learning

Art

- Sequence and link ideas as they solve problems in a body of work using observation



Recording and sharing the inquiry - Unit 9

Useful websites

<http://www.biodiversity.govt.nz/kids/>
Up the Creek - a bilingual interactive game for students.

<http://www.waterlink.org.nz/>
Interactive freshwater game for kids. The adventures of Pakura and friends.

<http://nwp.rsnz.org/>
National Waterways Project.

<http://www.nzetc.org/tm/scholarly/tei-Bio14Tuat01-t1-body-d3.html>
Information about inanga (whitebait) by R. M. McDowall.

<http://www.niwa.cri.nz/rc/freshwater/fishatlas/fishfinder>
Identification of freshwater fish.

http://www.tki.org.nz/r/wick_ed/themes/freshwater.php
Water activities for students.



Biodiversity - Unit 10

The big picture

Specific learning intentions

Students will be able to:

- observe and record the biodiversity of a habitat
- identify flora and fauna of their wetland region
- the relationship of living creatures and plants to an environment

Suggested resources

- Resource books:

1. *Native animals of New Zealand*, (A.W.B. Powell)
2. *Common birds in New Zealand*, (Marshall, Kinsky and Robertson)

- Flip guide for New Zealand birds

- Posters:

1. *New Zealand lake plants* (Environment Waikato and DOC)
2. *New Zealand insects*
3. *New Zealand wetland birds*

- Data sheets on clipboards for recording wildlife

Teaching and learning activities

Introduction of the terms 'habitat' and 'biodiversity' can now extend the inquiry into what makes a good habitat for the creatures and plants of a stream, dune lake or wetland environment.

From the environmental freshwater fish and invertebrates monitoring and recording, students will have a good indication of what features their wetland contains.

From their mini projects research about freshwater fish and invertebrates, students will have gathered evidence about the fauna of freshwater in their region and any rare or endangered species that may exist in the wetlands. Highlight these.

To add to the larger picture of biodiversity, further investigations need to be taken in the stream, dune lake or wetland environment.

Preparation of the students is done in the classroom by introducing them to posters and identification books on lake plants, insects and birds of New Zealand. This may

be divided up into cooperative group investigations where they can research their individual genre for biodiversity. If you are working with younger students it may become a sitting and observing time in the environment with the ID books and charts, looking at the more basic plants and wildlife.

Some inquiry questions to discuss with students are:

- What are the plants we have at the moment that encourage a healthy wetland in and around our environment?
- What bird, animal and insect life do we have in our stream or wetland environment?
- Do we have any endangered species that we can protect or encourage?
- How can we improve the wetland environment to encourage good habitats?

Field investigation trips this time focus on identification of plants on the banks or submerged plants in the water. Leaf samples can be identified in the classroom, and pressed to preserve the collection.

Students also need to sit quietly and visually identify any bird, animal or insect life that takes place in the environment. Underneath logs and rocks are good places to investigate for insects. Good eyes and ears are needed - some birds you may hear but not see.

Migratory birds are seasonal and rely upon the Far North wetlands for recovery time after their long journey to New Zealand.

Record any evidence of pest flora and fauna.

After your field trips

Record and research information about what the students have observed by using resource and library books, and the internet.

Add your discoveries, information and pictures of any plants, insects or birds that are significant to



Biodiversity - Unit 10

The big picture

your environmental area of study to the mural, inquiry learning journal, wall display or PowerPoint presentation.

Assessment opportunities

- Bird, insect and plant classification
- Ability to observe and identify flora and fauna of New Zealand
- Working in cooperative groups towards a goal

Curriculum links

Science

- Living world ecology

Health

- Healthy communities and environments

Information and Communication Technology

- Gathering information from appropriate sources

English

- Listening, reading and writing

Environmental Education

- Understanding freshwater environments
- Learning **in** the freshwater environments

Useful websites

<http://www.bushmansfriend.co.nz/>
Plant identification and information.

<http://www.teara.govt.nz/EarthSeaAndSky/en>
Te Ara: The Encyclopedia of New Zealand
environmental information for students.

<http://www.niwascience.co.nz/rc/freshwater/>
National Institute of Water & Atmospheric Research
freshwater page.

<http://www.biodiversity.govt.nz/kids/>
Up the Creek—a bilingual interactive game for kids.

<http://www.doc.govt.nz/upload/documents/science-and-technical/WONI-Pamphlets.pdf>
Freshwater biodiversity.



Reflection and self-assessment - Unit 11

Specific learning intentions

- Interpret data acquired in the field to answer our inquiry questions about freshwater

Students will be able to:

- identify values associated with the environmental benefits of waterway enhancement
- reflect upon what they have learnt
- assess their learning about the waterway environment

Suggested resources

- Key questions from the student survey
- Students' mini projects and field survey data sheets
- Assessment sheet for key competencies and values

Teaching and learning activities

- Introduce processing and interpreting activities
- Introduce reporting activities and skills list
- Compare the inquiry plan with the actual inquiry, including the timeline.

This is a reflective time for self-assessment and key competencies assessment. It is important to ensure that the students are guided towards reflective learning in order to set new learning goals towards environmental enhancement in their community.

Display the key questions from the first unit of work and discuss with the students. The students will discover that they now know the answers and provide much more information than their first tentative answers.

After students discuss and share their informed answers, they are given time to record on strip paper their answers as short statements. These are pasted below the original questions.

Self-assessment of how well the students have achieved their learning goals can now take place. This would vary according to the students' levels. Juniors may enjoy a smiley face grading on their self-assessment, while seniors are able to use a slide scale to assess their learning.

Refer to the Key Competencies and Values pages in the New Zealand curriculum to make up your assessment sheets. They should cover managing self, relating to others, participating and contributing, thinking skills and using language, symbols and texts.

Self-assessment sheets may be pasted in their learning journals or their portfolios.

Some discussion questions and activities afterwards may include:

- How have our answers changed by knowing what we now know?
- How did we find the solutions to our questions?
- What are we going to do with our survey information?
- What could be the next steps to take in our waterways enhancement?
- Who could assist us in our cause?

Assessment opportunities

- Inquiry learning
- Reflective self-assessment
- If we didn't answer our inquiry questions, what is needed to answer them?
- Were our questions and methods suitable?
- Evaluation of the students' learning
- Networks list activity - who has been a part of our inquiry? Make a list of all those involved. Write letters of thanks and share what you learnt with them.
- **Celebrate and share the learning! Hold a community hui** (Unit 12).

Curriculum links

English

- Listening, reading, viewing, speaking and writing

Science

- Living world
- Nature of Science
- Understanding about science and communication in science.

Information and Communication Technology

- Interpreting data – graphs, spreadsheets, presentations

Useful websites

http://www.tki.org.nz/r/enviro_ed/guidelines/index_e.php

Guidelines for Environmental Education in New Zealand Schools, (Ministry of Education).

<http://nzcurriculum.tki.org.nz/>

The New Zealand Curriculum, (Ministry of Education).



The community hui - Unit 12

Celebrate your discoveries

Specific learning intentions

Students will be able to:

- share their learning with the community
- organise and participate in a community hui
- use ICT multimedia skills and equipment
- celebrate their achievements
- consult with the community for support towards future environmental projects

Suggested resources

- Students' work
- Poster: *Freshwater*, (Ministry for the Environment)
- Computers, projector and monitoring equipment
- *Cultural Health Index*, (Ministry for the Environment)

Teaching and learning activities

Celebrate your discoveries in a hui run by the students for the community consultation. The celebration may include:

- PowerPoint and/or video presentations

- dance, drama and waiata performances
- student proposals for stream enhancement projects using the *Cultural Health Index* as a guide to protect the waterways for future generations of Tangata Whenua

This is when all the learning comes together with the community.

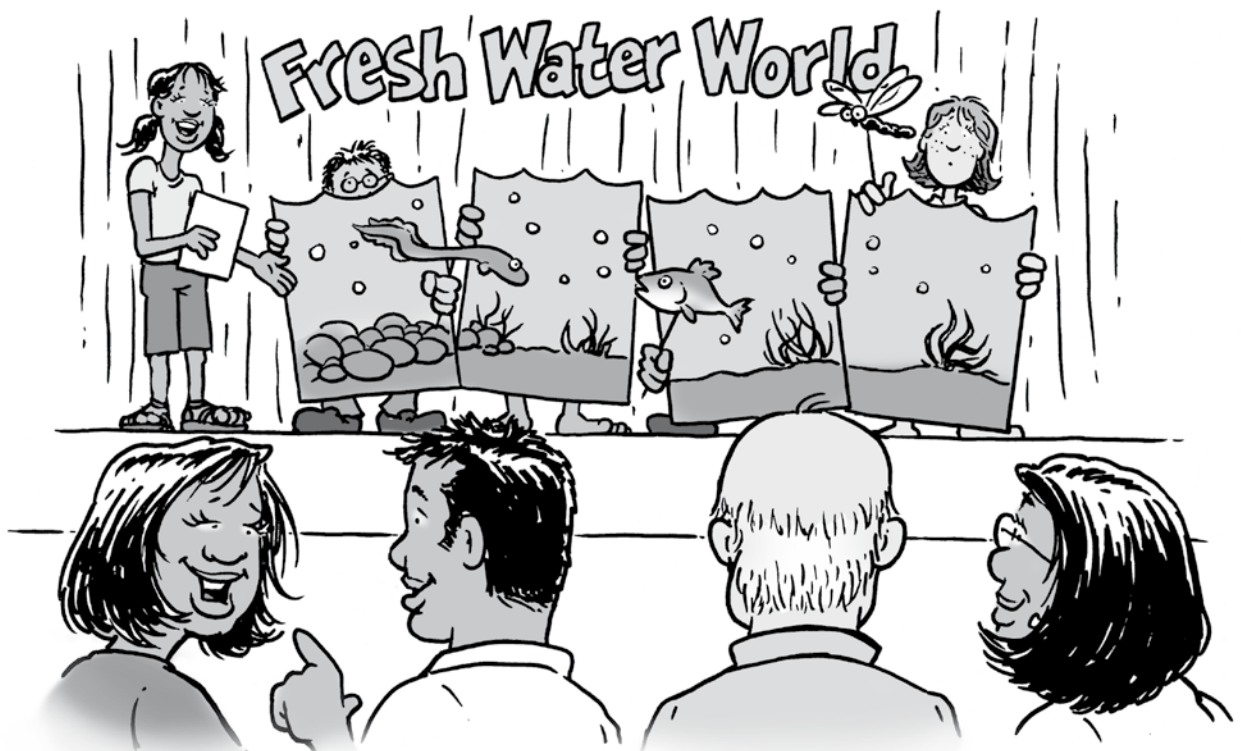
It is important for the students to have ownership by planning and organising this event.

A hui attendance is an unknown factor, it may range from 5 to 50 guests, but the procedure and presentation of the learning is the same.

Pre-hui tasks

- Decide upon a venue, time and date
- Notify your principal and the Board of Trustees of your intentions
- Have a press release with photos about your project in your local paper to advertise your hui
- A group of students are to design invitations and A4 flyers on the computer for your community. Send

continued over >>>





The community hui - Unit 12

Celebrate your discoveries

them home with the students, and email or post to the guests. Display the flyers on community notice boards

- Make a list of who shall be invited. Don't forget that there are interested people in organisations and areas beyond your community. You may need their support to push your project further
- Make sure the wall display of the students' work is up to your presentation standard and is at eye height. The equipment used for the investigation, data sheets, freshwater posters and learning books are also of interest to those attending the hui
- Editing video and PowerPoint presentations takes time and expertise. Senior students are capable of doing this or you may have a computer consultant or parent associated with the school who can assist you. Check the timing sequences for these to fit in to your programme of events. Put all your audiovisual presentations onto one laptop computer to be used with a projector
- Practise your dance/drama/waiata and seek assistance in these cultural events
- Decide which students will speak and on what topic. The PowerPoint presentation can be supported in this way
- The facilitator and the Department of Conservation may be invited to speak in support of your project
- Make a sequence list of events for the hui
- Decorate your venue and provide seating for all attending. Check blackout curtains and lighting
- Organise for refreshments after the hui. Student home baking is always a winner
- Check all audiovisual equipment is working on the day

The hui

- Make sure that students know the list of events and who is responsible for their part
- Check equipment that is to be used
- Check the visual presentations around the wall
- Some schools enjoy a formal welcome into the venue while others will have a student introduce and welcome the guests to the hui inside the venue; it is your choice of what you feel comfortable with
- Proceed with your programme of events
- Later a student can speak about the next steps they wish to take and how the community can assist

and support their cause in the future, and is to give thanks to all who have attended including your guest speakers

- Provide a time for questions from the guests
- Students and guests share refreshments and discussion while viewing the displays
- Report your hui to the local newspaper with photos

Assessment opportunities

- Speaking and presenting
- Information Technology
- Art
- Organising and participating in events
- Environmental education

Curriculum links

English

- Speaking and presenting

Art

- Visual, dance, drama and music

Information and Communication Technology

- Presentations
- Powerpoint

Environmental Education

- Sharing knowledge **about** the freshwater environment

Useful Websites

<http://nwp.rsnz.org/>
National Waterways Project.

http://www.landcareresearch.co.nz/research/research_details.asp?Research_Content_ID=7
Maintaining and Restoring Wetlands Project.

<http://ramsar.org/>
The Ramsar Convention on Wetlands.

<http://www.emap.rsnz.org/>
Environmental Monitoring and Action Project.

http://www.wwf.org.nz/index.php/new_zealand_conservation/education/resources/
World Wildlife Fund teacher resources.



Enhancement and restoration - Unit 13

Specific learning intentions

Students will be able to:

- use freshwater data to support enhancement activities
- research legal strategies towards enhancement and restoration projects
- apply for assistance and funding from environmental agencies
- research native freshwater planting guides
- make decisions for future freshwater monitoring and restoration projects

Suggested resources

- Agencies such as the Department of Conservation, local council, community members, and funding agencies for environmental education
- Student data

Teaching and learning activities

Having identified and monitored your freshwater system over a period of time, you have now established a database that the students can continue with. Students are now able to share their information and skills with other classes in the school as tutors.

Use of the mural and PowerPoint as learning tools enable future students to continue monitoring the waterway and develop future enhancement activities.

Monitoring is usually done in the summer terms. Restoration and enhancement activities are excellent for the winter months and are long-term projects over several seasons.

Continuing interest in the adopted waterway can progress into enhancement and restoration projects involving the planting of the banks and riparian land with native plant species of the region.

Students are to seek permission from landowners and agencies that administer the land surrounding the waterway before any decisions can be made towards enhancement or restoration projects. The students need to have a good action plan devised before approaches to the

landowner can be made.

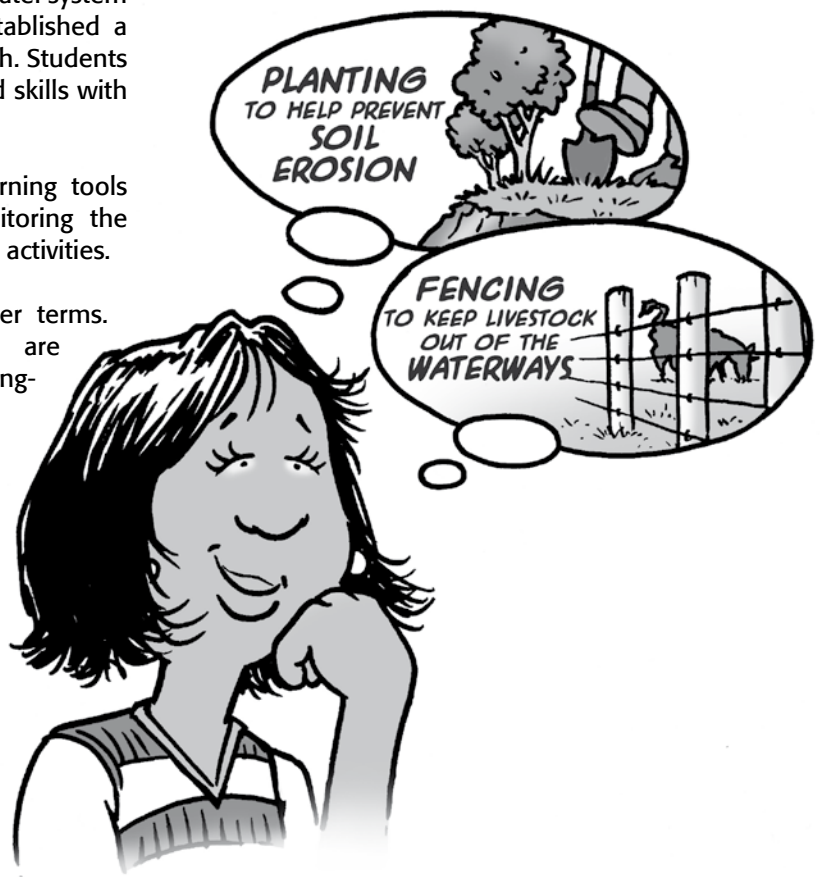
Students need to research native freshwater plants of the region to establish a list of possible plants to use. The Department of Conservation in your area is able to assist your students with a planting guide.

They will need to seek advice and assistance from government agencies such as the Department of Conservation and their local council who are encouraging all waterways to be fenced from stock and restored to encourage good habitats for native species.

Funding for your future projects is available from various agencies. Consult the website list and research these to see which one would apply to your project.

Once the students have permission from the landowner to proceed with their planting project, decisions need to be made.

continued over >>>





Enhancement and restoration - Unit 13

If the waterway banks need stock protection, a fence will be needed. Your local council has waterway fencing grants that the students can apply for. Quotes can be obtained from your local fencing contractor, and the council will guide them through the process. Fencing must be secure before planting can start.

If your waterway requires no fencing, then the students should seek quotes on native plants from your regional nursery. The students will need to know how many of each species they require for a season of planting. Once these figures are obtained, application by the students for funding can start. Consult the list of websites for funding application.

Seek support and planting equipment from your immediate school community (parents) and set aside an afternoon each week for planting, depending on the weather. Students will need instruction and guidance in planting techniques and areas to plant. Keep potted plants watered in a shaded area.

This becomes a great project to improve the school and community relationship, and to involve parents in their children's learning.

Everyone benefits from the restoration and enhancement of a waterway and it improves the habitat for the biodiversity of native fauna, in and out of the freshwater.

Curriculum Links

Environmental Education

- Taking action **for** the freshwater environment

Social Sciences

- Place and environment

Health

- Healthy communities and environments

Useful websites

<http://www.mfe.govt.nz/publications/water/cultural-health-index-for-streams-and-waterways-feb06/index.html>

How organisations and groups can assess the health of streams and waterways.

<http://nwp.rsnz.org/>
National Waterways Project.

<http://www.bushmansfriend.co.nz/>
Plant identification and information.

<http://www.recycleglass.co.nz/fund.htm>
Funding for projects.

<http://www.nzwwa.org.nz/wheretheswater.html>
Funding for projects.

wet-feet

Investigating Fresh Water



Standard Forms & Letters



Safety considerations

Included in the following pages are some standard letters that you can use to ensure your students' and others' safety. To use the letters, you can copy onto your own school letterhead and fill in the appropriate gaps.

Use the safety checklist below as a simple reminder that you have covered each safety aspect. For more information on both your and the property owner's legal obligations, contact your local Department of Labour's Occupational Safety and Health representative. Another useful reference is the Hillary Commission's *Outdoor Pursuits: Guidelines for Educators*, which outlines a number of safety considerations.

Protecting your students

Most schools are required to complete a risk analysis before embarking on a field trip - your school should have the appropriate forms to do this.

The farm hazard checklist will help you to identify possible hazards at the site, but you will also have to consider travel to the site and individual students' needs. Included in the following pages are:

- a standard letter to parents/caregivers about the *Wet Feet* programme
- field trip details
- a permission slip which includes medical details

Please use and adapt these forms as necessary.

Protecting the property owner

Under the Occupational Safety and Health Act (1992) farmers have a duty to warn of any significant hazards. This Act has been known to intimidate farmers and make them unwilling to allow non work-related visitors to their properties.

To make it as easy as possible for farmers to fulfil their obligations under the Act and allow school groups to visit their properties safely, we have included a standard letter that can be sent to farmers/property owners which they can complete and send back to your school. As well as completing the farm hazard checklist, it is also advisable for there to be contact with the property owner a day or two prior to the visit to ensure that no additional hazards have arisen since your last communication.

It is then the responsibility of the group leader to ensure that the students have a good understanding of possible hazards and how they can be avoided. A possible teaching strategy to do this is by having students label the hazards on a cluttered diagram.

Protecting the environment

It is also important to remember not only the potential risks to your students and yourself, but the potential risks of your visit to the environment. Included in the following pages is a copy of the *Environmental Risk Analysis and Management System*. Please use this or a similar form when embarking on a Wet Feet field trip.

It would be a good idea to get the students to complete this form themselves and then pool ideas to draw up a class environmental risk analysis.

Safety checklist

- First aid kit
- Leader with current first aid certificate
- Permission slips completed by parents/guardians
- Farm hazard checklist completed by farmer/property owner
- Farm hazards conveyed to, and understood by, students
- Environmental risk analysis completed by students
- Safety briefing with students upon arrival at site (this should be done on each visit - even to the same site!)



A standard letter to parents/caregivers about the *Wet Feet* programme

Date

Dear Parents/Caregivers

Water monitoring and investigation field trip

Our school is involved in an environmental education project called Wet Feet. This project is facilitated by class teachers, a Wet Feet facilitator and the Department of Conservation in

Wet Feet aims to increase student awareness and understanding of the sustainable management of natural/physical resources. Through the development of appropriate skills and knowledge, students will gain the ability to contribute positively to the management/enhancement of their local environment.

An essential element of the project is the collection of information on the qualities of local catchments - social and economic as well as environmental.

Environmental data will be collected during field trips to the stream / dune lake / wetland and includes:

- Freshwater fish, invertebrates, wetland plants investigation
- Physical features of the stream (water clarity, stream flow and morphology)
- Assessment of the life support capacity of the stream

All activities will be carried out in accordance with current risk management and safety standards. Normal school rules will apply throughout the duration of the field trip.

Attached please find details of the field trip and a medical and consent form for you to complete and return by

Yours sincerely



Field trip details

Field trip details

- Purpose:** To collect water quality data and assess habitat of the stream
- Date:**
- Location:**
- Transport:**
- Departure time:**
- Return time:**
- Accompanying staff:**
- First aid qualification:** Staff have standard first aid certificates.
- Number of students:**
- Clothing:** Sunhat and sunscreen, or raincoat and warm clothing depending upon the weather. Suitable footwear for in-stream activities.
- Activity details:** Students will be divided into groups and will carry out sampling of the stream. All equipment will be supplied.
- Contingency plans:** The trip will be postponed if the weather is unsuitable. If the weather deteriorates during the field trip, students will return to school early and attend their normal timetabled classes.
- Costs:**

Please complete and return the medical and consent form and have your child return it to school by



Medical and Consent form

Medical and Consent form

I/We give permission for (Student Name)

to participate in the Wet Feet field trip to the
stream / dune lake / wetland. I expect him/her to follow all school rules and
instructions given during the time and realise that failure to do so may result
in him/her being sent home.

I authorise medical assistance being given to my son/daughter in the event
of an accident or if deemed necessary, by the staff present.

My son/daughter has the following medical conditions:

Medication which will be sent with my child and instructions for its use are:

I understand that there are risks associated with activities in the outdoors. I
am aware that all risks will be managed appropriately and that safety will be
of prime importance in all activities. My child will be expected to follow all
instructions to ensure his/her safety.

My child _____ is / is not (circle one)
allowed to participate in the outdoor trip to a wetland.

Signed _____ Date _____

Telephone contact: Day _____



Field trip resource consent

Dear

Thank you for allowing School to visit the wetland / dune lake / stream running through your farm/property on This will enable our students to undertake water quality and freshwater fish monitoring activities.

For the safety of our students and for your own peace of mind, I would appreciate it if you could take a few minutes to complete the farm hazard checklist below to inform us of any possible dangers that could be associated with our visit to your farm.

Farm hazard checklist

Terrain

- Cliffs
- Bluffs
- Holes
- Tomos
- Rocky

Paddocks

- Ruts
- Swampy
- Muddy
- Rubbish dump
- Narrow ditches
- Effluent ponds

Crossings

- Bridges
- Fords
- Culverts
- Rivers

Stock

- Bulls
- Horses
- Dogs
- Deer
- Roosters

Tracks

- Steep
- Narrow
- Winding
- Washout
- Greasy when wet

Fences

- Standard
- Electric
- Barbed
- Overhead wires
- Wires on tracks

Other

- Beehives
- Dead trees
- Tree stumps
- Wood lots
- Barberry
- Blackberry
- Tutu
- Harrows
- Plough
- Vehicle bodies
- Discarded tools
- Rooks or magpies

Others not listed (please specify): _____

If you have ticked **electric fences**, please indicate if these will be turned off for the duration of our visit: yes no

Please feel free to contact me at school (ph.) or at home (ph.) if you would like to further discuss any aspects of our field trip. I will contact you a day or so prior to our visit to check if any other potential hazards have arisen in the meantime. Once again, thank you for your assistance, and if you are interested in the results of our monitoring please contact me.

Yours sincerely

wet-feet

Investigating Fresh Water





Inquiry questions

Name _____

My inquiry questions to ask the members of the community are:

My answers are:



Invitations

Name _____

The members of our community I wish to invite to our wetlands hui are:

My design for an Invitation

--



Research log

Name: _____ Room: _____

Use this sheet to record your research data.

Date	Steps taken	Source used
E.g. 10 March	Spoke with Department of Conservation officer about pest control guidelines. Taped interview. Collected brochure.	Oral

From the Environmental Education primary unit *Biodiversity in New Zealand*.



How healthy is your dune lake environment?

1. Critter search

Count the number of different species of insects living in and around the water

- Excellent diversity 10+ Excellent 4
- High diversity 6-9 Good 3
- Moderate diversity 3-5 Fair 2
- Low diversity <3 Poor 1

2. Water clarity

- 80 - 100 cm Excellent 4
- 50 - 80 cm Good 3
- 25 - 50 cm Fair 2
- 0 - 25 cm Poor 1

3. Water temperature

- Below 15°C Excellent 4
- 15°C - 18°C Good 3
- 18°C - 20°C Fair 2
- Above 20°C Poor 1

4. Water colour

- Clean, clear water Excellent 4
- Slightly murky water Good 3
- Murky water Fair 2
- Oily, foamy or strongly coloured water Poor 1

5. Water smell

- No smell Excellent 4
- Faint smell Good 3
- Some smell Fair 2
- Strong smell Poor 1

6. Algae

- Thin film or mat Excellent 4
- Medium film or mat Good 3
- Thick mat Fair 2
- Long filaments Poor 1

7. Bank cover

- Lots of trees covering the bank Excellent 4
- Some trees covering the bank Good 3
- A few trees covering the bank Fair 2
- No trees covering the bank Poor 1

8. Erosion

- No evidence of erosion Excellent 4
- A small amount of erosion Good 3
- Some evidence of erosion Fair 2
- A lot of erosion Poor 1

Use the information you have recorded and found to describe the health of your dune lake. Add up your score and circle the right one.

Excellent: 25 - 32

Good: 17 - 24

Fair: 9 - 16

Poor: 0 - 8

Name _____

Class _____

Dune lake _____





How healthy is your stream environment?

1. Critter search

Count the number of different species of insects living in and around the water

- Excellent diversity 15+ Excellent 4
- High diversity 10-14 Good 3
- Moderate diversity Fair 2
- Low diversity <5 Poor 1

2. Water clarity

- 80 - 100 cm Excellent 4
- 50 - 80 cm Good 3
- 25 - 50 cm Fair 2
- 0 - 25 cm Poor 1

3. Water temperature

- Below 15°C Excellent 4
- 15°C - 18°C Good 3
- 18°C - 20°C Fair 2
- Above 20°C Poor 1

4. Water colour

- Clean, clear water Excellent 4
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- Thin film or mat Excellent 4
- Medium film or mat Good 3
- Thick mat Fair 2
- Long filaments Poor 1

7. Stream cover

- Lots of trees covering the stream Excellent 4
- Some trees covering the stream Good 3
- A few trees covering the stream Fair 2
- No trees covering the stream Poor 1

8. Erosion

- No evidence of erosion Excellent 4
- A small amount of erosion Good 3
- Some evidence of erosion Fair 2
- A lot of erosion Poor 1

Use the information you have recorded and found to describe the health of your stream. Add up your score and circle the right one.

Excellent: 25 - 32

Good: 17 - 24

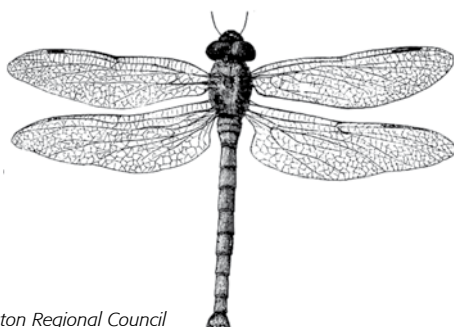
Fair: 9 - 16

Poor: 0 - 8

Name _____

Class _____

Stream _____





How healthy is your wetland environment?

1. Critter search

Count the number of different species of insects living in and around the water

- Excellent diversity 10+ Excellent 4
- High diversity 6-9 Good 3
- Moderate diversity 3-5 Fair 2
- Low diversity <3 Poor 1

2. Water clarity

- 80 - 100 cm Excellent 4
- 50 - 80 cm Good 3
- 25 - 50 cm Fair 2
- 0 - 25 cm Poor 1

3. Water temperature

- Below 15°C Excellent 4
- 15°C - 18°C Good 3
- 18°C - 20°C Fair 2
- Above 20°C Poor 1

4. Water colour

- Clean, clear water Excellent 4
- Slightly murky water Good 3
- Murky water Fair 2
- Oily, foamy or strongly coloured water Poor 1

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- Thin film or mat Excellent 4
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7. Bank cover

- Lots of trees covering the bank Excellent 4
- Some trees covering the bank Good 3
- A few trees covering the bank Fair 2
- No trees covering the bank Poor 1

8. Erosion

- No evidence of erosion Excellent 4
- A small amount of erosion Good 3
- Some evidence of erosion Fair 2
- A lot of erosion Poor 1

Use the information you have recorded and found to describe the health of your wetland. Add up your score and circle the right one.

Excellent: 25 - 32

Good: 17 - 24

Fair: 9 - 16

Poor: 0 - 8

Name _____

Class _____

Wetland _____

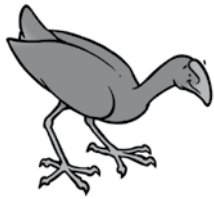




Freshwater fish record

Native Fish Species	Scientific names	Quantity	Juvenile	Adult
Lamprey	<i>Geotria australis</i>			
Longfin Eel	<i>Anguilla dieffenbachii</i>			
Shortfin Eel	<i>Anguilla australis</i>			
Spotted Eel	<i>Anguilla reinhardtii</i>			
Smelt	<i>Retropinna retropinna</i>			
Banded Kokopu	<i>Galaxias fasciatus</i>			
Shortjaw Kokopu	<i>Galaxias postvectis</i>			
Giant Kokopu	<i>Galaxias argenteus</i>			
Koaro	<i>Galaxias brevipinnis</i>			
Inanga	<i>Galaxias maculatus</i>			
Dwarf Inanga	<i>Galaxias gracilis</i>			
Crans Bully	<i>Gobiomorphus basalis</i>			
Common Bully	<i>Gobiomorphus cotidianus</i>			
Redfin Bully	<i>Gobiomorphus huttoni</i>			
Giant Bully	<i>Gobiomorphus gobioides</i>			
Black Mudfish	<i>Neochanna diversus</i>			
Northland Mudfish	<i>Neochanna heleioides</i>			
Torrentfish	<i>Cjeimarrichthys fosteri</i>			
Mullet	<i>Mugil cephalus</i>			

Koura	<i>Paranephrops planifrons</i>			
Freshwater Crab	<i>Amarinus lacustris</i>			
Freshwater mussel	<i>Hyridella menziesii</i>			
Snail	<i>Potamopyrgus</i>			
Snail	<i>Corneocydas</i>			
Freshwater shrimp	<i>Paratya</i>			



Environmental Risk Analysis and Management System

Environmental Risk Analysis and Management System

School:

Date of field trip:

Activity: *Wet Feet water monitoring field trip*

Site:

UNDESIRED ENVIRONMENTAL DAMAGE				
CAUSAL FACTORS OF ENVIRONMENTAL DAMAGE		By People	By Equipment	By Natural Events
ENVIRONMENTAL MANAGEMENT STRATEGIES				
	Coping with an environmental emergency			

National Waterways Project, (RSNZ)

wet-feet

Investigating Fresh Water



List of websites for freshwater waterways in New Zealand

Wetlands and waterway information

<http://www.doc.govt.nz/upload/documents/science-and-technical/SfC181.pdf>
Protecting habitats on private land.

<http://www.waterinfo.org.nz/>
Information on freshwater in New Zealand - rainfall, levels, flows, etc.

<http://www.nrc.govt.nz/Environment/>
Northland Regional Council.

http://www.landcareresearch.co.nz/research/research_details.asp?Research_Content_ID=7
Maintaining and Restoring Wetlands Project.

<http://ramsar.org/>
The Ramsar Convention on Wetlands.

<http://www.wetlandtrust.org.nz/>
National Wetland Trust areas of New Zealand.

<http://www.niwascience.co.nz/rc/freshwater/>
National Institute of Water & Atmospheric Research freshwater page.

<http://www.nzwwa.org.nz/>
New Zealand water and waste sustainable management.

<http://environment.org.nz/>
Christchurch Environment Centre.

<http://www.biodiv.org/>
The Convention on Biological Diversity.

<http://www.doc.govt.nz/templates/summary.aspx?id=33685>
Conservation and wetlands.

<http://www.ew.govt.nz/enviroinfo/indicators/inlandwater/lakes/index.htm>
Environmental indicators in lakes.

<http://www.ew.govt.nz/enviroinfo/indicators/inlandwater/riversandstreams/index.htm>
Environmental indicators in streams.

<http://www.ew.govt.nz/enviroinfo/indicators/inlandwater/wetlands/index.htm>
Environmental indicators in wetlands.

<http://www.ew.govt.nz/enviroinfo/profile/maoriperspective.htm>
Māori perspective on the environment.

<http://www.mfe.govt.nz/publications/ser/metadata/env-class/page22.html>
New Zealand wetland classifications.

<http://www.mfe.govt.nz/publications/water/cultural-health-index-for-streams-and-waterways-feb06/index.html>
Cultural Health Index—a tool to assess the health of streams and waterways.

<http://www.landcare.org.nz/shmak/>
SHMAK monitoring kit info.

<http://www.nzetc.org/tm/scholarly/tei-Bio14Tuat01-t1-body-d3.html>
Information about inanga (whitebait) by R. M. McDowall.

<http://www.nzs.com/science/environment/>
Listing of environmental services on the Web for New Zealand.

<http://www.niwa.cri.nz/services/free/nzffd>

National Institute of Water & Atmospheric Research freshwater fish database.

<http://www.niwa.cri.nz/rc/freshwater/fishatlas/fishfinder>

Identification of freshwater fish.

<http://www.doc.govt.nz/upload/documents/science-and-technical/WONI-Pamphlets.pdf>

Freshwater biodiversity.

<http://www.e4s.org.nz/efs/>

Education for Sustainability.

http://www.nzpcn.org.nz/vascular_plants/advanced_search.asp

New Zealand Plant information.

Education resources

<http://www.learnz.org.nz>

Virtual field trips for new Zealand.

<http://nwp.rsnz.org/>

National Waterways Project.

<http://www.nrc.govt.nz/For-Schools/>

Northland Regional Council resources for schools.

<http://www.ew.govt.nz/enviroinfo/water/index.htm>

Environment Waikato waterways, school resources.

<http://www.emap.rsnz.org/>

Environmental Monitoring and Action Project.

<http://www.waicare.org.nz/site/main/data.aspx>

Water quality monitoring, education and action programme.

<http://www.es.govt.nz/Departments/Environmental%20Education/resources/index.aspx>

Environment Southland stream connection resources for a variety of levels.

<http://www.lernz.co.nz/>

Lake Ecosystem Restoration New Zealand.

<http://www.teara.govt.nz/EarthSeaAndSky/en>

Te Ara: The Encyclopedia of New Zealand, information for students.

<http://www.ccc.govt.nz/Education/LearningThroughAction/PrimaryProgrammes/WaterwaysAndWetlands/>

Christchurch City Council's education programmes and guided walks in wetlands.

<http://www.hbrc.govt.nz/Education/EnvironmentalEducationinSchools/ResourcesforSchools/tabid/189/Default.aspx>

Hawke's Bay Regional Council's resources for schools.

<http://www.fishandgame.org.nz/Site/Environment/environmentwetlands.aspx>

Wetlands resources for fishing and hunting.

http://www.tki.org.nz/r/eotc/resources/safety_e.php

Water safety guidelines for schools.

<http://www.waitakere.govt.nz/AbtCit/ei/EcoWtr/FrshWtrFsh/frshwater-fish.asp>

Identification of freshwater fish.

<http://www.learningmedia.co.nz/>

Useful resources for wetlands.

<http://www.nzfreshwater.org>

New Zealand native freshwater life.

<http://nwp.rsnz.org/content/index.htm>

Royal Society of New Zealand resources.

Interactive student freshwater activities

<http://www.biodiversity.govt.nz/kids/>

Up the Creek—a bilingual interactive game for kids.

<http://www.ecokids.co.nz/>

Auckland Regional Council interactive site for kids.

<http://www.waterlink.org.nz/>

Interactive freshwater game for kids. The adventures of Pakura and friends,.

http://www.tki.org.nz/r/wick_ed/themes/freshwater.php

Stream and waterways planting guides

<http://www.ccc.govt.nz/parks/theenvironment/streamside.asp>

Christchurch City Council's streamside planting guide.

<http://www.bushmansfriend.co.nz/>

Plant identification and information.

Environmental funding for projects

http://www.wwf.org.nz/index.php/new_zealand_conservation/education/resources/

World Wildlife Fund teacher resources.

<http://www.mfe.govt.nz/withyou/funding/index.html>

Funding for projects.

<http://www.recycleglass.co.nz/fund.htm>

Funding for projects.

<http://www.nzwwa.org.nz/wherethereswater.html>

Funding for projects.

<http://www.nrc.govt.nz/For-Schools/>

Funding for environmental projects in Northland.

Global environmental websites

<http://www.globe.gov/fsl/html/templ.cgi?about>

Environmental projects and resources.

<http://eelink.net/ee-linkintroduction.html>

North American Association for Environmental Education.

<https://www.streamwatch.org.au/streamwatch/connect/Streamwatch>

Australian environmental freshwater monitoring, teacher resources.

<http://www.earthforce.org/>

Teacher resources and monitoring programmes in the USA.



Watery resources - School journals

TOPIC	YEAR	PART	TYPE
RIVERS			
Big Grey	1991	4.1	Poem
Gunboats on the Waikato	1983	4.2	Article 1-13
River Story (Waipa)	1983	4.2	Poem
Waikato Canoe Chant	1983	4.2	Poem
Highway on the Whanganui	1983	4.2	Article 9-10
After the Storm	1992	2.2	Story 9-10
Friday of No Mercy	1986	3.1	Article 8-9
Gisborne Floods	1990	YPW	Poem
The River Crossing	1995	4.1	Story 11-13
Rain in the Hills	1990	1.1	Article
Testing the North River	1998	Connected No.2	Article
The secret life of estuaries	2006	Connected No.3	Article

WATER AND USE			
Waiere	1987	4.2	Poem
Power Crisis - Where to Now?	1993	4.2	Article 10-11
Turning on the Power	1981	4.3	Article 9-10
White Knuckle Territory	1996	SJ	Story Library
Make a Water Wheel	1989	1.2	Article 9-10
The Old Water Wheel	1989	1.2	Article 9-10
Shapes of Water	1995	1.4	Article 10-12
Drought	2002	3.3	Poem
Water Supply	1978	4.3	Article
Don't Waste the Water!	1999	3.3	Article
Easy as Child's Play	2002	Connected No.2	Article
Laying the Drains	1981	3.3	Article 9.5-10.5
The Water Cycle	2002	Connected No.2	Article
Water power	2005	2.4	Article 9-10

WATER POLLUTION AND CONSERVATION			
Rain in the Hills	1990	1.1	Article 8-9
Blue Fish on the Footpath	1992	2.2	Article 8-9
Pollution – What Happens?	1988	3.1	Article 10-12
Testing the North River	1996	2.3	Article 9.5-10.5
Turid Reid: Field Studies Scientist	1979	4.1	Article 12-14
Water Supply	1978	4.3	Article 12-14
Don't Waste the Water!	1999	3.3	Article 8.5-9.5
Using Water	1979	4.1	Article 10-12
Wonderful water	2004	Connected No.3	Story

TOPIC	YEAR	PART	TYPE
World's water running out	2007	2.1	Article 9.5-10.5
The bittern	2009	3.1	Story 9.5-10.5
Saving Poorman's Stream	2010	3.1	Article 10-12
The water wardens	2002	Connected No.2	Story
Pest fish	2005	2.4	Article 8.5-9.5
RELATED TOPICS			
Landscapes by the Foot	1989	2.1	Article 9-10
Diane Oud - Nursery Worker	1979	1.2	Article 9-10
How we came to have Town Belts	1983	3.1	Article 9-10
Building a House in India	1993	2.1	Article 9.5-10.5
The Water we Breathe	1978	3.2	Article 10-12
Windows made of Water	1982	1.2	Article 8.5-9.5
Salt from the Sea	1982	1.4	Article 8.5-9.5
Branches	1988	1.1	Article 7-8
An Interview with a Glass of Water	2002	Connected No.2	Story
Making Puddles	2000	Connected No.1	Article
It's All Happening	1996	2.3	Story
Pollution - What Happens	1988	YPW	Article

FISHY TALES			
A Fishy Question	1985	3.3	Article 12-14
Eels Have feelings Too!	1978	1.6	Story
Eel	1989	3.3	Poem
Eeling	1988	YPW	Story
The Eel Business	1980	4.1	Story
Hinaki	2000	SL	Story
Hopu Koura	1981	2.4	Article
Nanny's Whitebait	1981	2.3	Story
Our Tame Eels	1997	YPW	Article
Queen of the River	1999	1.1	Story
Whitebaiting	1981	2.3	Article
Bait	1998	4.2	Story
The Whitebait Game	1996	2.3	Story
Catching the Big Ones	1994	4.3	Article

Books / Stories
Kiwi Adventures Trout Fishing by Gillian and Darryl Torckler Reed Publishing
Native Animals of New Zealand A.W.B. Powell

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Investigating Fresh Water



Department of Conservation
Te Papa Atawhai



For further information contact:

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