

# Inanga/Whitebait

*Te Kaupapa Mātauranga Toene Inanga ā-Motu*



Kei te tautokona te Kaupapa Mātauranga Toene Inanga ā-Motu e...

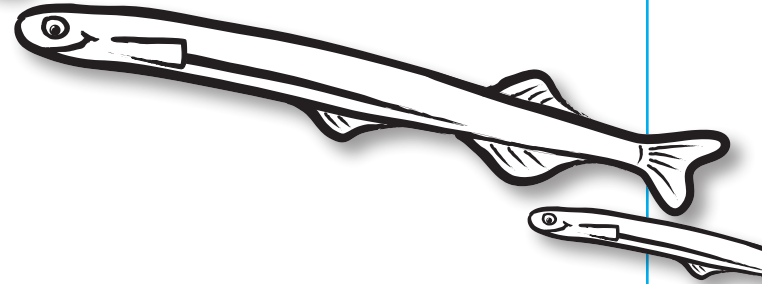






Welcome!

National Īnanga Spawning Education Programme



## Introduction

**Overall, native fish populations in New Zealand are in decline.** Part of the problem is the damage we have done to the spawning habitat of Īnanga, the species that makes up over 90% of the whitebait catch. Unfortunately, the habitat needed for their eggs to survive is often damaged or absent. **Less eggs = less Īnanga!** Likewise, introduced predators (particularly trout) eat lots of the adults and change their behaviour, meaning the Īnanga are not so successful at foraging for food. Why do we care? Īnanga is an important food source for many creatures, including us! **High biodiversity = healthy ecosystem = everyone has lots to eat!** Furthermore, many of the simple actions that can be taken to improve things for Īnanga, can also improve the overall quality of the water in our local environments, making it healthier for us to live by them and use them recreationally.

Te Kaupapa Mātauranga Toene Īnanga ā-Motu /The National Īnanga Spawning Programme (NISP) was created in 2016 by the Whitebait Connection (WBC) and offers opportunities for local decision-making, community involvement, freshwater research and monitoring, to give understanding and inspire and empower community into action. The NISP provides a comprehensive set of resources created to support teachers and students to learn more about Īnanga and how to find, monitor and restore their spawning grounds. The NISP was designed to be delivered alongside the Whitebait Connection's Investigating Freshwater Inquiry Framework that has stages of learning and links to suggested teaching and learning experiences which support inquiry into freshwater environments. The NISP is designed to be used in all levels of the curriculum by teachers and environmental educators, but can also be offered as a stand-alone resource for groups wanting to get stuck in and needing expertise advice.

## Background

The main reason for carrying out this project was that students and community members around NZ seemed to be becoming more and more aware that there were issues with their local waterways, but weren't often involved in the on-the-ground practical science that identifies, quantifies and remedies these issues. We saw that as an opportunity lost – an opportunity to engage the community in meaningful field work and involve them in the restoration planning and action. The result would be a more connected, aware and engaged public, improved whitebait spawning habitat and data on where the sites are, improved water quality and biodiversity corridors, and a set of comprehensive new supporting resources for iwi, educators, schools, community groups, Kura Māori and early childhood centres. We saw through delivery of our pilot project in 2016, that there was indeed a real need for this programme of work, due to the interest it sparked, and the demand we were experiencing in mentoring and supporting other groups to get involved. We acknowledge in an ideal world we could be mentoring and guiding groups through this whole process, but that we (and similar organisations) cannot be everywhere all the time, and if we can develop resources that meet the needs of these groups we can ensure long-term viability of this programme of work across a broader spectrum of community, especially those that are hard to reach and often not involved in science and technology.

*This is a truly innovative project that uses best practice ground-breaking scientific techniques that are sure to excite and engage groups who have fewer opportunities to be involved with science and technology. The scope of the project broadens participants' abilities to engage with science and technology in both a local and national level thus promoting the relevance of it within their own lives, as well as others. This empowers them to take part in the societal debates around freshwater management issues facing NZ as well as directly take part in tackling the issues head on and be involved in the technology that will mitigate these issues moving forward.*

*The development of this resource has involved expert training sessions and collaborative input from and with Inanga spawning site experts such as Dr. Michael Hickford, Kim Jones and EOS Ecology.*

## **Vision**

*A more connected, aware and engaged public, improved whitebait spawning habitat and data on where they are, improved water quality and biodiversity corridors, and a set of comprehensive new supporting resources in for iwi, educators, schools, community groups, Kura Māori and early childhood centres.*

## **Goals**

- *Empowered kaitiaki. Connected, aware and engaged public.*
- *Improved whitebait spawning and adult habitat.*
- *Improved water quality and biodiversity corridors*
- *WBC Coordinators will offer scientific vigour throughout the process and training will be provided to them by way of MTSC's national wananga, training/evaluation visits, peer review forms and online training videos.*
- *Upload of all data onto our National Inanga Spawning database (data on where the spawning sites and fish are as well as the groups engaged in the project).*
- *Ensure that a Māori worldview is incorporated into programme delivery, by working alongside Kaiako and iwi/hapu, and that all cultural considerations are addressed.*

## **Contributors**

- *Dr. Michael Hickford – Marine Education Research Group (MERG), University of Canterbury (UOC)*
- *EOS Ecology – Kirsty Brennan, Bronwyn Gay, Shelley McMurtrie, Nick Hempston and Erron Henderson*
- *Mountains to Sea Wellington (MTSW) – Te Kawa Tangata Gordon Robb, Zoe Studd, Sarah Neighbours, Elizabeth Gibson*
- *Mountains to Sea Conservation Trust (MTSCT) – Kim Jones, Nicki Wakefield, Soozee McIntyre, Natalie Blandford, Jordan MacDonald, Sophie Tweddle*
- *Nga Mahi Te Taiao (NMTT) – Murray Palmer and Amy Hardy*



## Acknowledgements

- Department of Conservation (DOC)
- Auckland Council
- Landcare Trust
- Southern Trust
- Foundation North

## Feedback

We would love to hear your feedback on how you are using these resources! Please let us know and share your stories with us using the contacts below. It helps us to continually improve what we do and create more of what works!

Mobile phone: 027 243 4818

Email: [info@whitebaitconnection.co.nz](mailto:info@whitebaitconnection.co.nz)

Website: [www.whitebaitconnection.co.nz](http://www.whitebaitconnection.co.nz)

'Like' & follow WBC on Facebook: [www.facebook.com/whitebaitconnection](http://www.facebook.com/whitebaitconnection)

## Ngā mihi



**Kim Jones**

**WHITEBAIT CONNECTION NATIONAL COORDINATOR**

The National Inanga Spawning Education Programme is supported by...



AQUATIC SCIENCE & VISUAL COMMUNICATION






[www.whitebaitconnection.co.nz](http://www.whitebaitconnection.co.nz)









## PROGRAMME CONTENTS:






### WĀHANGA 1: Ngā Kōrero

	1A. PPT (me nga tuhinga).....	4
	1B. He aha • Kei hea • Te take • He pēhea .....	53
	1C. Te tautuhi i ngā pākeke me ngā hua .....	58

### WĀHANGA 2: Wheako

	2A. Te rapu i ngā wāhi toene tūturu .....	60
	2B. Kimihia te urunga wai tai .....	62
	2C. Te aromatawai i te nōhanga toene .....	65
	2D. Te tatau hua – mahinga aromatawai tōene .....	68

### WĀHANGA 3: Mahi

	3A. Te whakauru i tētahi nōhanga toene rangitahi .....	71
	3B. Te tiaki/manaaki i tētahi wāhi .....	73
	3C. He whakaoranga wā roa i te nōhanga .....	75
	3D. Tohu pae x2 .....	77
	3E. Me pēhea te aroturuki i ngā mahi a te kīrearea .....	79



ME PĒHEA TE WHAKAMAHI I TĒNEI PPT:

- *Me whakarite āu whakaaturanga ake mai i ngā kiriata e whai ake kia tika ai mō te rōpū taipakeke me ngā mōhiotanga o ō kaimātakitaki.*
- *I ētahi wāhi ko ētahi kiriata he nui ake/iti ake ngā kuputuhi hei whiriwhiri māu...nō reira me whakakore ko ngā mea kāore koe i te hiahia.*
- *He tuhipoka hei tohutohu i a koe i te wāhanga 'tuhipoka'.*
- *Ki te kore koe e hiahia whakamahi i te whakaaturanga nōhanga 'whare' me whakakore te katoa engari kua te whakamutunga i te raupapa.*
- *Kei reira ētahi 'whārangi matua' WBC taketake i hangaia māu ake mēnā he mahi paetata āu hei tāpiri.*
- *Me whakamahi ko te tītaha taekaha Myriad hei momotuhi, tītaha taekaha Calibri rānei mēnā kāore i a koe te Myriad.*
- *...me te aha – me tango tēnei kiriata mai i mua, i mua i te whakaatu :-)*

- Mukua tēnei kiriata i mua i te whakaatu

Te Kaupapa Mātauranga Toene Inanga ā-Motu



# Inanga

He aha • Kei hea • Te take • He pēhea

He mea tuku e:



Kei te tautokona te Kaupapa Mātauranga Toene Inanga ā-Motu e...



All photos & diagrams in this presentation are the © of EOS Ecology unless otherwise specified & cannot be used by any other party without written consent.

kiriata taitara

*i tēnei rā ka mōhio tātau...*



**HE AHA**  *te inanga*

**KEI HEA**  *rātau e noho ana, ā,  
e whakawhānau i ā  
rātau hua*

**TE TAKE**  *e heke haere ana  
te maha*

**ME PĒHEA**  *tā tātau āwhina*

- Ngā mea ka kōrerohia e tātau i tēnei rā

## HE AHA te inanga

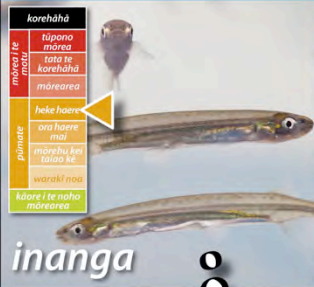


- **KAEAEA** = kupu mō te wāhanga pūhou o ngā momo ika e 5 (*Galaxiidae*)
- **INANGA** = wāhanga pakeke o tētahi momo inanga 1 o ngā mea e 5 (*Galaxias maculatus*)
- Ko ngā **INANGA** ngā mea iti rawa, kāore e roa atu i te 110 mm te tipu



# ā mātau momo inanga e 5

Te Kaupapa Mātauranga Toere Inanga ā-Motu



inanga

korehāhā	
āpōno mōrea	tūpano mōrea
tata te korehāhā	mōrea mōrea
heke haere	ara haere mai
āra haere mai	mārehu kai tāiao kē
waraki noa	kāore i te noho mōrea



shortjaw kōkopu

korehāhā	
āpōno mōrea	tūpano mōrea
tata te korehāhā	mōrea mōrea
heke haere	ara haere mai
āra haere mai	mārehu kai tāiao kē
waraki noa	kāore i te noho mōrea

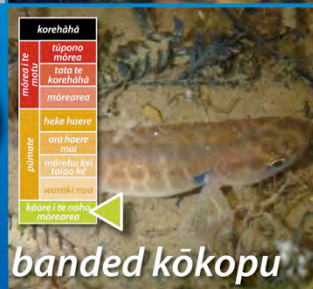


kōaro

korehāhā	
āpōno mōrea	tūpano mōrea
tata te korehāhā	mōrea mōrea
heke haere	ara haere mai
āra haere mai	mārehu kai tāiao kē
waraki noa	kāore i te noho mōrea



**TĒ** taea e te inanga te piki ārai...hāunga ētahi atu o ngā momo e 4



banded kōkopu

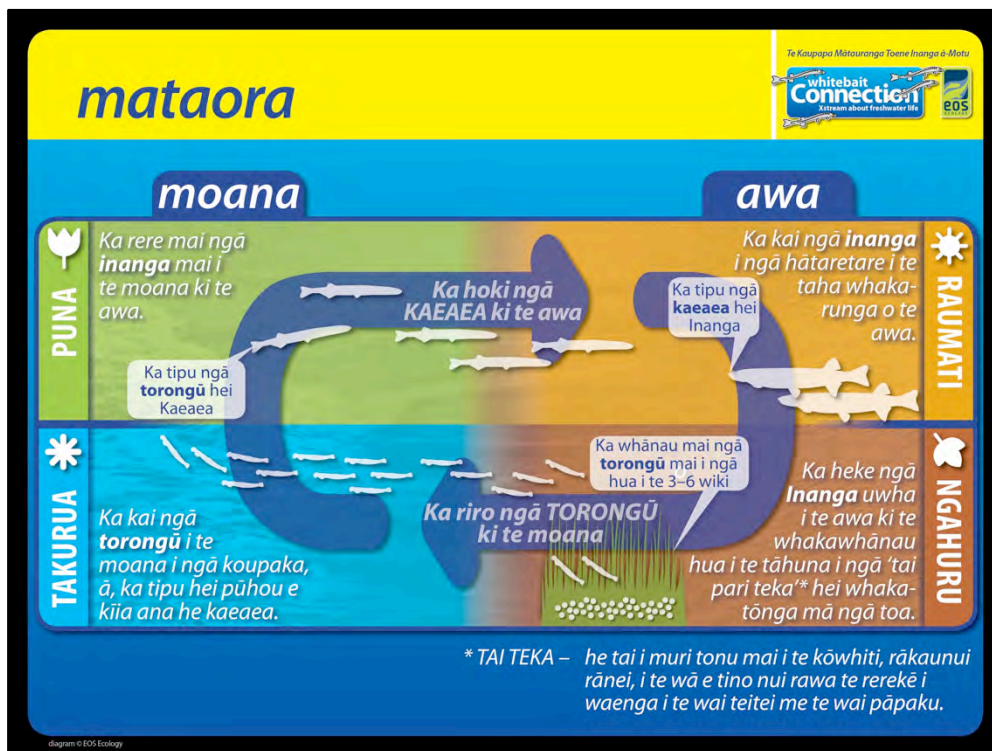
korehāhā	
āpōno mōrea	tūpano mōrea
tata te korehāhā	mōrea mōrea
heke haere	ara haere mai
āra haere mai	mārehu kai tāiao kē
waraki noa	kāore i te noho mōrea



giant kōkopu

korehāhā	
āpōno mōrea	tūpano mōrea
tata te korehāhā	mōrea mōrea
heke haere	ara haere mai
āra haere mai	mārehu kai tāiao kē
waraki noa	kāore i te noho mōrea

all photos © EOS Ecology / Shelley McMurtrei



- Diadromous – noho i te wai moana me te wai māori
- Tērā ētahi taupori ka haere kē ki ngā roto kua ki te moana
- Haere ki te moana kia rawaka te kai, kia ruirui hoki
- Mā te ruirui i te moana ka mātua puta te ranunga ira, me te āhei ki te uru anō hoki ki ngā awa kua taea kētia i mua
- He mōrearea - ka kainga pea, ka mate kai pea, ka ngaro pea
- He kaha ngā pākeke ki te kai i ngā para rauropi - ngā ngārara e taka ana ki te awa - me whai māheuheu e tauwharewhare ana kia taka atu ai ngā ngārara, kia mātaotao ai hoki te wai
- Ka whai te mataora i te tāwere - ka mate atu te nuinga



- Kotahi te purei aunoa o te riu ororongo kātahi ka mutu.



## UME WHAKAMAHI **KO** TĒNEI KIRIATA, KO TE MEA E WHAI AKE **RĀNEI**

- 1,500–3,000 ngā hua e whakawhānauhia ana i te wā kotahi (kei te nui o te uwaha)
- he 0.8–1.25 mm ia rahinga
- i whakawhānau i te pito o te raumati/ngahuru
- i whakawhānau i te tai pari teka teitei, i runga ake i te teitei rerenga awa
- i whakawhānau i te take o ngā otaota roa
- ka kite koe i ngā karu e rua i te 2 wiki
- ka paopao i muri i te 1 marama
- He rui te āhua o te toene a ngā inanga - ka whakawhānau ngā uwaha i ngā hua, ā, ka whakatōtia



**wāhanga hua**

Te Kaitiaki Take Kōwhiri  
 whitebait Connection  
 A stream about freshwater life  
 EOS

1,500–3,000 ngā hua ka whakawhānauhia i ia wā  
 he 0.8–1.25 mm ia rahinga  
 i te pito o te raumati/ngahuru i whakawhānau  
 i whakawhānau i te tai teka teitei, i runga ake i te teitei rerenga awa  
 i whakawhānau i te take o ngā otaota roa  
 ka paopao i muri i te 1 marama

ka kite koe i ngā karu e rua i te 2 wiki



- He rui te āhua o te toene a ngā inanga - ka whakawhānau ngā uwha i ngā hua, ā, ka whakatōtia ā-wahotia e ngā toa
- Ka pupuhi ngā hua i muri i te whānautanga - he ngongo wai
- Kei roto i ia hua ko tētahi kukune tino iti
- Ka whakahā hāora ngā kukune - me mākūkū tonu ngā hua kia uru atu ai te hāora
- Me puta te kukune i ētahi wāhanga whanaketanga - ko te mahana ake o te hua, ko te terenga atu o te puta i ēnei wāhanga
- Ka teitei te whakawhānau atu o ngā hua ki te tāhuna hei ārai atu i ngā kaikonihī o te wai, hei taurira, ētahi atu ika (tae atu ki ngā inanga - he kaiinanga anō rātau)




## ME WHAKAMAHI **KO** TĒNEI KIRIATA, KO TE MEA E WHAI AKE **RĀNEI**

- 7 mm te roa ina paopao
- ka heria e ngā ia 'tai pari teka' ki te moana
- ka kai i te poi ioka i te wiki tuatahi
- kātahi ka kai i ngā tipu iti me ngā kararehe iti
- atu i te 6 marama te noho i te moana
- ko te nuinga kāore e ora
- Ko ngā torongū hou ka paopao mai ka whai i te rama (positively phototaxic) - pērā anō i ngā kōwenewene ka kumea e te rama = te karetai
- He kaha ake ngā ia tai i te karetai nō reira ka tere kawea atu ngā torongū ki te moana

**wāhanga torongū**

Te Kaitiaki Take Kōwhiri  
whitebait Connection  
A stream about freshwater life  
EOS

- 7 mm te roa ina paopao
- ka heria e ngā ia 'tai teka' teitei ki te moana
- ka kai i te poi ioka mō te wiki tuatahi
- kātahi ka kai i ngā tipu iti, kararehe iti hoki  
(phytoplankton me te zooplankton)
- ka noho i te moana atu ki te ono marama
- ko te nuinga kāore e ora



- Ko ngā torongū hou ka paopao mai ka whai i te rama (positively phototaxic) - pērā anō i ngā kōwenewene ka kumea e te rama = te kareta
- He kaha ake ngā ia tai i te kareta nō reira ka tere kawea atu ngā torongū ki te moana
- Me whakawhanake i te kite me te kaha ki te kau i te tuatahi nō reira ka whai i tētahi poi ioka (he kawenga tina) hei whāngai i a rātau i te tuatahi
- Kei te rahi o te waha hāmama e tohutohu ai i ngā kai ka taea - kāore he ringaringa nō reira ki te kore e taea te horomi kāore e taea e rātau te kai - kāore e taea ngā kararehe nui ake te kai kia nui ake rā anō rātau
- Kāore tātau i te mōhio e haere ana rātau ki hea
- Kua kitea ētahi e hia rau kiromita i tawhiti mai i te



- He tino maha ngā torongū i te tuatahi i te mea ka mate te nuinga
- He maha ngā kararehe e ora ana i te kai kōurarangi me ngā ika torongū
- Ko te whāinga o ngā torongū he kimi kai, kia tere te tipu kia tino nui rawa ai, kia tino tere rānei kia kore ai e kainga e ngā kaikonihī





## ME WHAKAMAHI **KO** TĒNEI KIRIATA, KO TE MEA E WHAI AKE **RĀNEI**

- ngā pūhou 6 marama
- he haere ā-rōpū nui me ētahi atu momo nā te mea he haumaru
- ka kimi i ngā awa mā te hongihongi i te wai māori
- he piki whakarunga, engari he ngoikore te piki awa – tē taea te piki
- ko te nuinga kāore e ora
- Ka hoki ngā torongū i ora ki te wai takutai ina eke ki te 6 marama
- Ka noho pīranga nui i te moana, ā, ki tō mātau whakaaro ka neke rātau i te takutai kia rongu rā anō





- Ka noho pīranga ngā ika i te mea he haumaru te noho takitini
- Kāore e taea e ngā kaikonihī ngā ika katoa te kai, ā, ka rangirua hoki i te tino tokomaha rawa
- Kāore mātau i te tino mōhio ka aha i te moana, engari he rerekē ngā inanga i waenga i ngā galaxiids i te mea he noho pīranga mai i te wāhanga kaeaea mai i te pakekehanga ki te toene - ko ētahi atu o ngā momo kaeaea e 4 me ngā galaxiids kore-heke he tautahi katoa
- He tino maha ngā kaeaea ka kainga e ngā kaikonihī i te wahapū o te awa (kahawai), i te awa (taraute), i te taha hoki o ngā tāhuna (ngā manu noho awa)




## ME WHAKAMAHI **KO** TĒNEI KIRIATA, KO TE MEA E WHAI AKE **RĀNEI**

- momo pakeke
- pakari i te awa tata ki te 6 marama
- noho rōpū
- kāore e tino tawhiti te piki whakarunga ki ētahi atu momo
- kua reri ki te toene – 1 tau
- ko te nuinga kāore e ora
- Tata ki te 6 marama mō ngā mea pakeke e reri ana ki te toene
- I te nuinga o ngā wā ka noho ki ngā wai takutai i te mea kāore e kaha ki te pikipiki

**wāhanga inanga**

Te Kaitiaki Take Kōwhiri  
 whitebait Connection  
 A stream about freshwater life  
 EOS

- momo pakeke*
- pakari i te awa tata ki te 6 marama*
- noho rōpū*
- kāore e tino tawhiti te piki whakarunga ki ētahi atu momo*
- kua reri ki te toene – 1 tau*
- ko te nuinga kāore e ora*



- Tata ki te 6 marama mō ngā mea pakeke e reri ana ki te toene
- I te nuinga o te wā ka noho ki ngā wai takutai i te mea kāore e kaha ki te pikipiki
- Ka heke whakararo ngā inanga pakeke ki te wahapū toene ai
- Ko te āhua nei he maha ngā ika 1 tau te pakeke ka toene, ā, mate tonu atu
- Kāore ētahi e toene kia eke rā anō ki te 2, 3 tau rānei te pakeke
- Ka taea e ētahi ika te toene mō ētahi tau



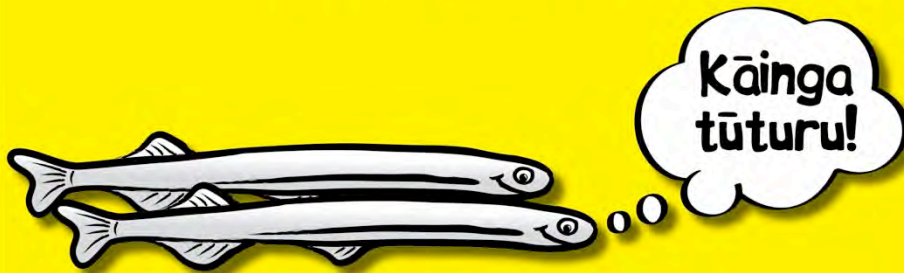


- He maha ngā inanga e kainga ana e te kaikonihī (te tuna) i a rātau e toene ana
- He tikanga whaitake te rongō i te oro ngongo o ngā tuna e kai ana mō te kimi i ngā wāhi toene



- Ka purei aunoa te ataata, he rahinga mata whānui

*KEI HEA rātau e noho  
ana, ā, e whakawhānau  
i ā rātau hua*



- I muri i te whakaatu i te hekenga ki te moana (diadromy), me kōrero anō pea mō ngā taupori inanga kāore e puta atu ki te moana (non-diadromy) ka whakamahi i ngā roto hei 'moana' mō rātau





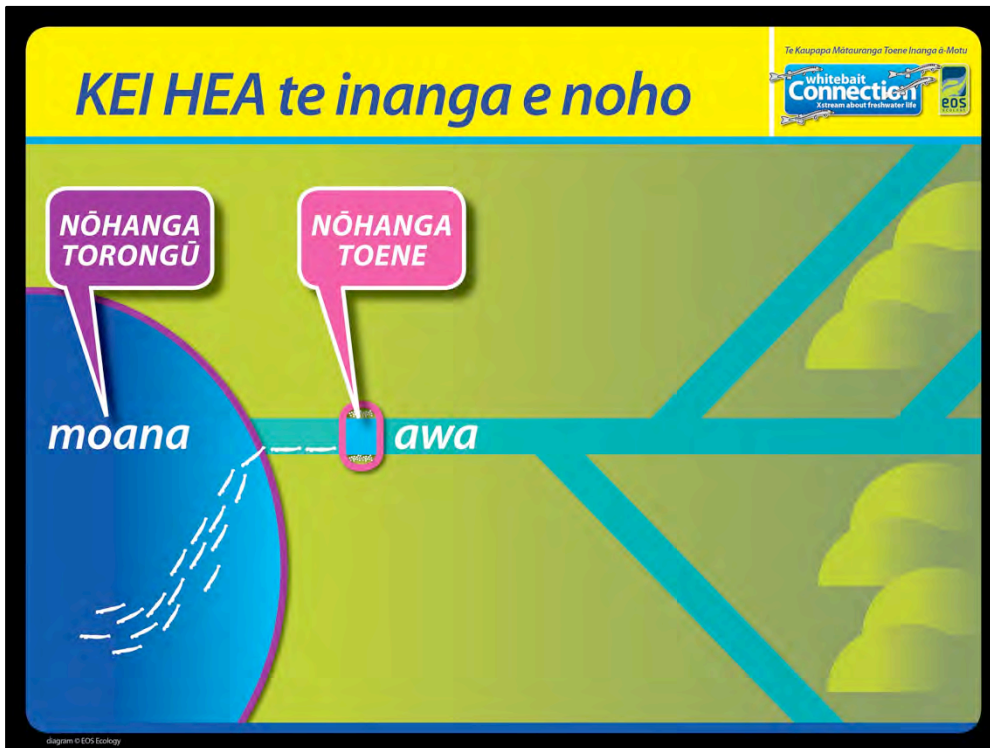
- Ka taea e ngā taupori inanga te noho i tētahi wāhanga roa tonu o te awa (he maha ngā kiromata), ā, me kimi e rātau ētahi atu ika hei toene - ina kitea ka mahia e rātau he 'whakahiatonga toene' - he pīranga nui ake
- Me whai tai e pai ai ngā tāhuna awa mō te toene
- Me whai ia tai hoki hei whakaterere atu i ngā torongū ki te moana
- Ka whakamahia e rātau te urunga o te wai tai hei tohu ārahi - "me tatari i konei mō ngā hoa, ā, kia tae mai rātau me toene ki konei"
- Ka whakaatu ngā whakahiatonga toene i tētahi whanonga rapu i mua i tā rātau toene - te āhua nei e hia ngā kuhunga atu me te 'whakamātautau' i ngā māheuheu i mua i te toene



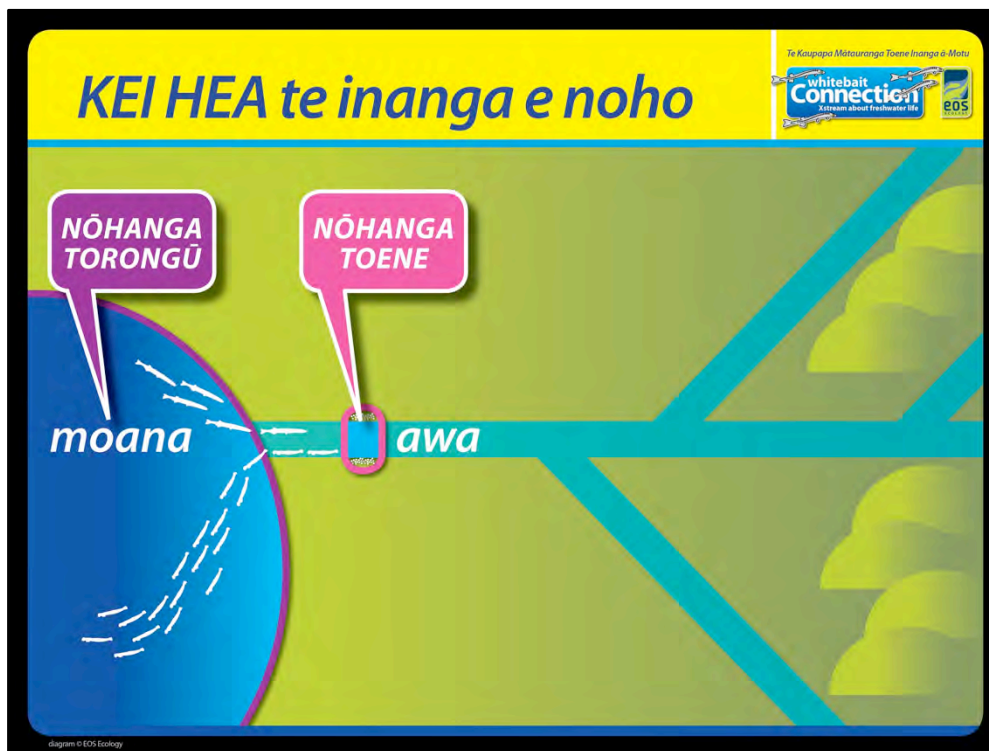
- Ka taea e ngā taupori inanga te noho i tētahi wāhanga roa tonu o te awa (he maha ngā kiromata), ā, me kimi e rātau ētahi atu ika hei toene - ina kitea ka mahia e rātau he 'whakahiatonga toene' - he pīranga nui ake
- Me whai tai e pai ai ngā tāhuna awa mō te toene
- Me whai ia tai hoki hei whakaterere atu i ngā torongū ki te moana
- Ka whakamahia e rātau te urunga o te wai tai hei tohu ārahi - "me tatari i konei mō ngā hoa, ā, kia tae mai rātau me toene ki konei"
- Ka whakaatu ngā whakahiatonga toene i tētahi whanonga rapu i mua i tā rātau toene - te āhua nei e hia ngā kuhunga atu me te 'whakamātautau' i ngā māheuheu i mua i te toene



- Ka taea e ngā taupori inanga te noho i tētahi wāhanga roa tonu o te awa (he maha ngā kiromata), ā, me kimi e rātau ētahi atu ika hei toene - ina kitea ka mahia e rātau he 'whakahiatonga toene' - he pīranga nui ake
- Me whai tai e pai ai ngā tāhuna awa mō te toene
- Me whai ia tai hoki hei whakaterere atu i ngā torongū ki te moana
- Ka whakamahia e rātau te urunga o te wai tai hei tohu ārahi - "me tatari i konei mō ngā hoa, ā, kia tae mai rātau me toene ki konei"
- Ka whakaatu ngā whakahiatonga toene i tētahi whanonga rapu i mua i tā rātau toene - te āhua nei e hia ngā kuhunga atu me te 'whakamātautau' i ngā māheuheu i mua i te toene



- Ka taea e ngā taupori inanga te noho i tētahi wāhanga roa tonu o te awa (he maha ngā kiromata), ā, me kimi e rātau ētahi atu ika hei toene - ina kitea ka mahia e rātau he 'whakahiatonga toene' - he pīranga nui ake
- Me whai tai e pai ai ngā tāhuna awa mō te toene
- Me whai ia tai hoki hei whakaterere atu i ngā torongū ki te moana
- Ka whakamahia e rātau te urunga o te wai tai hei tohu ārahi - "me tatari i konei mō ngā hoa, ā, kia tae mai rātau me toene ki konei"
- Ka whakaatu ngā whakahiatonga toene i tētahi whanonga rapu i mua i tā rātau toene - te āhua nei e hia ngā kuhunga atu me te 'whakamātautau' i ngā māheuheu i mua i te toene



- Ka taea e ngā taupori inanga te noho i tētahi wāhanga roa tonu o te awa (he maha ngā kiromata), ā, me kimi e rātau ētahi atu ika hei toene - ina kitea ka mahia e rātau he 'whakahiatonga toene' - he pīranga nui ake
- Me whai tai e pai ai ngā tāhuna awa mō te toene
- Me whai ia tai hoki hei whakaterere atu i ngā torongū ki te moana
- Ka whakamahia e rātau te urunga o te wai tai hei tohu ārahi - "me tatari i konei mō ngā hoa, ā, kia tae mai rātau me toene ki konei"
- Ka whakaatu ngā whakahiatonga toene i tētahi whanonga rapu i mua i tā rātau toene - te āhua nei e hia ngā kuhunga atu me te 'whakamātautau' i ngā māheuheu i mua i te toene



- Ka taea e ngā taupori inanga te noho i tētahi wāhanga roa tonu o te awa (he maha ngā kiromata), ā, me kimi e rātau ētahi atu ika hei toene - ina kitea ka mahia e rātau he 'whakahiatonga toene' - he pīranga nui ake
- Me whai tai e pai ai ngā tāhuna awa mō te toene
- Me whai ia tai hoki hei whakaterere atu i ngā torongū ki te moana
- Ka whakamahia e rātau te urunga o te wai tai hei tohu ārahi - "me tatari i konei mō ngā hoa, ā, kia tae mai rātau me toene ki konei"
- Ka whakaatu ngā whakahiatonga toene i tētahi whanonga rapu i mua i tā rātau toene - te āhua nei e hia ngā kuhunga atu me te 'whakamātautau' i ngā māheuheu i mua i te toene





- Ka taea e ngā taupori inanga te noho i tētahi wāhanga roa tonu o te awa (he maha ngā kiromata), ā, me kimi e rātau ētahi atu ika hei toene - ina kitea ka mahia e rātau he 'whakahiatonga toene' - he pīranga nui ake
- Me whai tai e pai ai ngā tāhuna awa mō te toene
- Me whai ia tai hoki hei whakaterere atu i ngā torongū ki te moana
- Ka whakamahia e rātau te urunga o te wai tai hei tohu ārahi - "me tatari i konei mō ngā hoa, ā, kia tae mai rātau me toene ki konei"
- Ka whakaatu ngā whakahiatonga toene i tētahi whanonga rapu i mua i tā rātau toene - te āhua nei e hia ngā kuhunga atu me te 'whakamātautau' i ngā māheuheu i mua i te toene



- Ka taea e ngā taupori inanga te noho i tētahi wāhanga roa tonu o te awa (he maha ngā kiromata), ā, me kimi e rātau ētahi atu ika hei toene - ina kitea ka mahia e rātau he 'whakahiatonga toene' - he pīranga nui ake
- Me whai tai e pai ai ngā tāhuna awa mō te toene
- Me whai ia tai hoki hei whakaterere atu i ngā torongū ki te moana
- Ka whakamahia e rātau te urunga o te wai tai hei tohu ārahi - "me tatari i konei mō ngā hoa, ā, kia tae mai rātau me toene ki konei"
- Ka whakaatu ngā whakahiatonga toene i tētahi whanonga rapu i mua i tā rātau toene - te āhua nei e hia ngā kuhunga atu me te 'whakamātautau' i ngā māheuheu i mua i te toene





- Ka taea e ngā taupori inanga te noho i tētahi wāhanga roa tonu o te awa (he maha ngā kiromata), ā, me kimi e rātau ētahi atu ika hei toene - ina kitea ka mahia e rātau he 'whakahiatonga toene' - he pīranga nui ake
- Me whai tai e pai ai ngā tāhuna awa mō te toene
- Me whai ia tai hoki hei whakaterere atu i ngā torongū ki te moana
- Ka whakamahia e rātau te urunga o te wai tai hei tohu ārahi - "me tatari i konei mō ngā hoa, ā, kia tae mai rātau me toene ki konei"
- Ka whakaatu ngā whakahiatonga toene i tētahi whanonga rapu i mua i tā rātau toene - te āhua nei e hia ngā kuhunga atu me te 'whakamātautau' i ngā māheuheu i mua i te toene

# TE WĀHI e toene ana ngā inanga

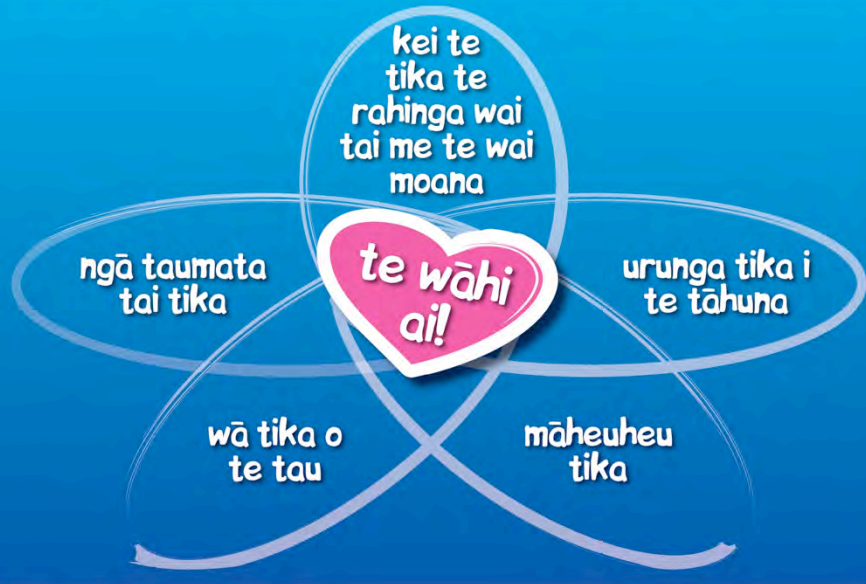


Diagram © EOS Ecology

## *TE WĀHI e toene ana ngā inanga*



*te tawhiti tika mai i  
te moana:*

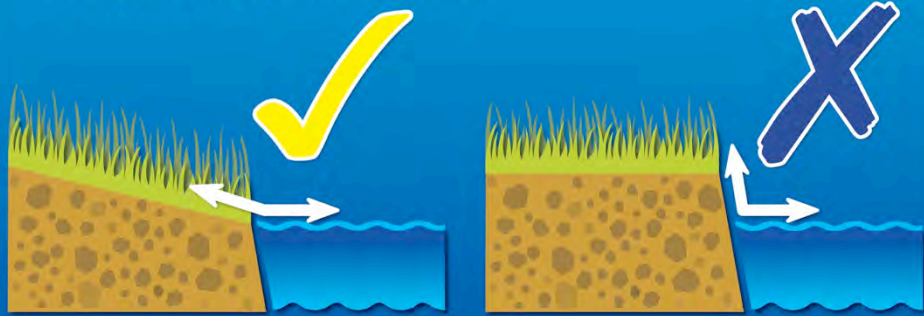
- e tae atu ai ngā tai pari teka*
- kāore i te tino tote te wai*
- ko te tikanga kei roto i te 200 m mai i  
te taha wai moana*

## TE WĀHI e toene ana ngā inanga



he tāhuna rōnaki:

– ka taea māmātia mō te  
whakawhānau hua



©iNgem © EOS Ecology

- He nui ake te wāhi o ngā tāhuna rōnaki i waenga i te tohu tai teitei me te tai pāpaku mō te toene



- Ko ngā māheuheu tauwharewhare, tāhuna hoki ka noho pēnei i te hamarara i te awatea me te paraikete i te pō
- Me noho mātao me te mākū tonu ngā hua inanga i te wā kei waho i te wai
- Kei te noho tino mōrearea ngā pakeke ki ngā kaikonihini ina kuhu rātau ki ngā wai pāpaku toene ai - kāore e taea te nekeneke - nō reira ka āhua tiakina rātau e ngā māheuheu kua puea ake mai i ngā tuna hiakai me ngā manu noho awa

*Kei te heke haere te  
maha o ngā  
INANGA*



- Kei te heke haere ngā taupori ika māori i Aotearoa
- He pai ake ngā inanga i te nuinga i te mea he whānui ō rātau hiahia - he tuwhera rātau ki ngā wāhi noho mō rātau me ā rātau kai





- E tino ngākaunui ana ngā tāngata o Aotearoa ki te hao me te kai kaeaea
- Engari, kei te kore haere pea te kaeaea e ngākaunuitia ana e tātau
- Ko tētahi mate ko tā tātau tūkinu i ngā nōhanga toene o ngā momo e 90% o ngā kaeaea e haohia ana e tātau
- Heoi, ko te nōhanga e hiahia ana kia ora ai ngā hua kua kitea kei te kino, kua kore rānei

## HEI AHA mā tātau!



ka iti ake ngā hua inanga  
= ka iti ake ngā inanga = ka iti ake ngā



- Kore hua = kore kaeaea
- Ki te hiahia tātau ki te tiaki i ngā mahinga kaeaea, me tiaki, me whakaora rānei e tātau ngā nōhanga toene. Engari i mua i tērā, me rapu e tātau ngā wāhi toene inanga maha atu

# HEI AHA mā tātau!



koiora-kanorau nui = pūnaha rauropi hauora  
...he nui ngā kai mā te KATOAA!

ehara pea i te tika!?

ngā ika ririki reka!!!

mēnā kei roto i taku waha kei te kaininga e au!

*inanga*

all photos © ECSI Ecology

**HE AHA TE TAKE kei te heke haere**



**he nui ake ngā KAIKONIHI o tāwāhi**

*kai hua ngā  
putoko*



*kai hua ngā  
kioreiti*



*kai kaeaea me te  
inanga ngā ika*



- He kaha te kai a ngā kaikonihī o tāwāhi (te taraute te mea kaha) i ngā pākeke me te huri i tō rātau whanonga e kore nei e taea e rātau te rapu kai (me waiho pea mō te kiriata o muri)



## HE AHA TE TAKE kei te heke haere

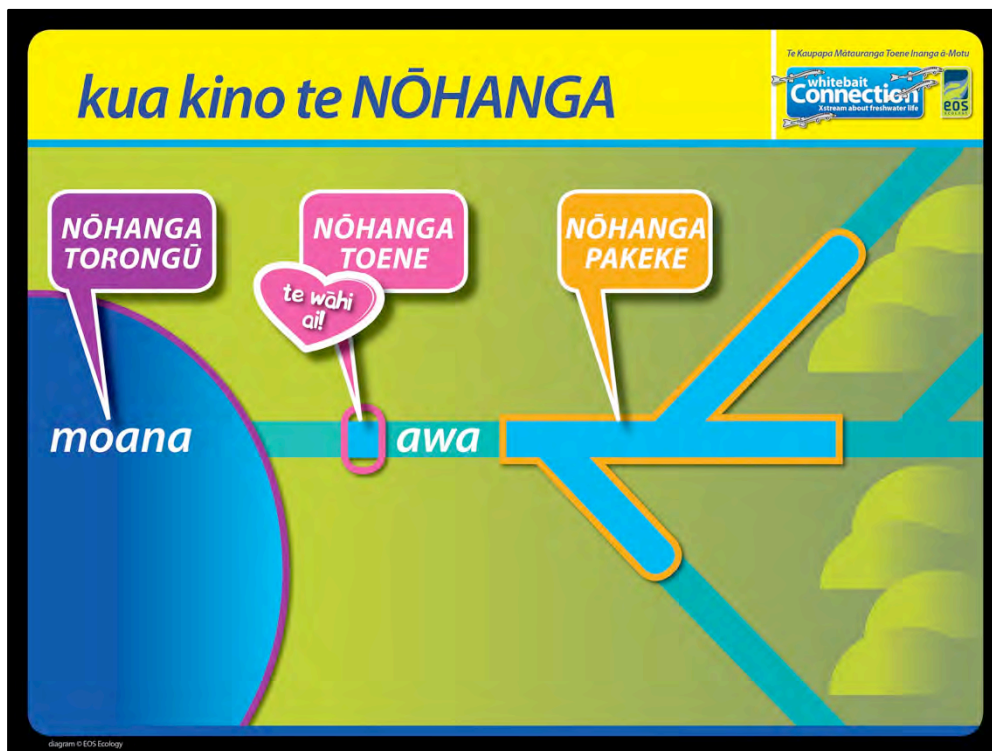


*kua kino te NŌHANGA toene...tae atu ki:*

- ngā tāhuna 'pai' iti ake*
- ka iti ake ngā tipu taumarumaruru  
= ka iti ake ngā wāhi haumaruru*

*ngā rerekētanga ki ngā NŌHANGA kaeaea me  
ngā inanga...tae atu ki:*

- he iti ake ngā nōhanga 'pai'*
- he uaua ake te neke whakarunga i te awa –  
ngā ārai*



- Me nekeneke haere pai rātau i te awa me te kore aukatia mai e ngā puni/karawata/ahuriri, ētahi atu ārai rānei



## *ngā huringa nōhanga toene*



### *te tūkinohia a ngā kararehe ki ngā tāhuna*



- Ka tino hiahia ngā kararehe ki te kai i ngā māheuheu e tūtata ana ki ngā awa i te mea he matomato ake ngā otaota i reira
- Kāore e pau noa i ngā kararehe ko ngā otaota o ngā taumarumarū māheuheu anake, engari ka tūkinohia anō ngā pakiaka o ngā māheuheu, te āhua o te tāhuna me te pakari o te oneone
- Ka piki i ēnei hurihanga te tūpono ki ngā horonga me te whakatūpou i ngā tāhuna e kore nei e hiahiatia hei wāhi toene
- He tino kino ake ngā kau i ngā hipi nā tō rātau nui
- He uaua, he nui hoki te utu ki te taiapa i ngā tāhuna awa me te noho taiapa



- me āta kōrero atu pea nā te mōreareatanga ka toene ngā inanga i ngā wāhi kāore nei i te tino pai (hei tauira, kirikiri) engari ka maroke ngā hua, ā, he tokoiti ka ora



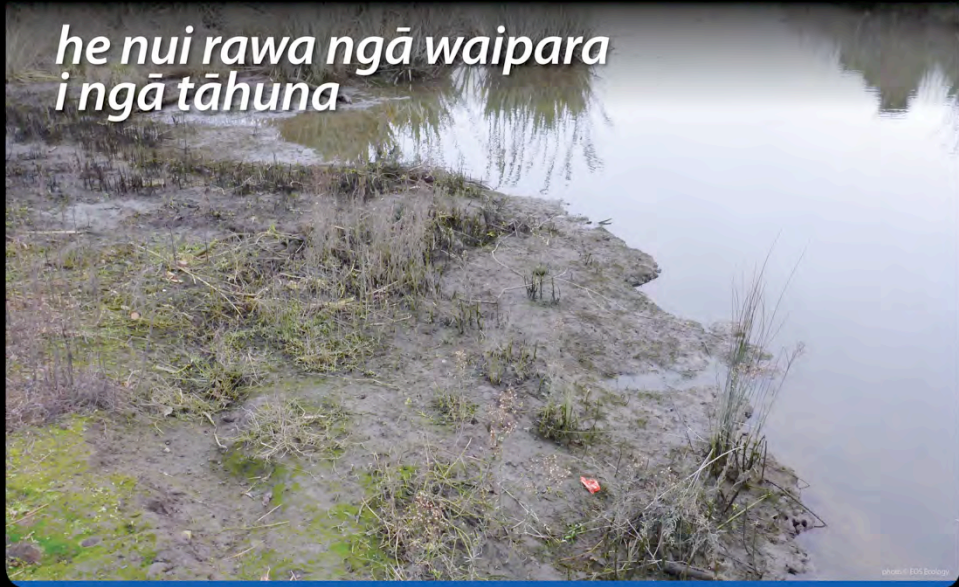
- ka tapahia ana ngā otaota o ngā tāhuna ka poto ngā māheuheu, engari ka raru anō ko ngā pakiaka
- ehara te tapahi otaota i te raruraru mēnā ka mahia i te wā tika, engari he 2-3 marama te roa e tino hoki mai anō ngā māheuheu i te pito o te raumati/ tīmatanga o te ngahuru



## *ngā huringa nōhanga toene*



*he nui rawa ngā waipara  
i ngā tāhuna*



- ngā pānga hāngai o ngā hua i tanua ki ngā waipara, engari ko ngā pānga tītaha o ngā waipara e purupuru ana i ngā māheuheu tāhuna me ngā pakiaka
- ka whakaiti ngā purupuru i te rahi me te kounga o te nōhanga toene

## *ngā huringa nōhanga toene*



*ngā ārai i te urunga o ngā  
inanga ki ngā wāhi toene*



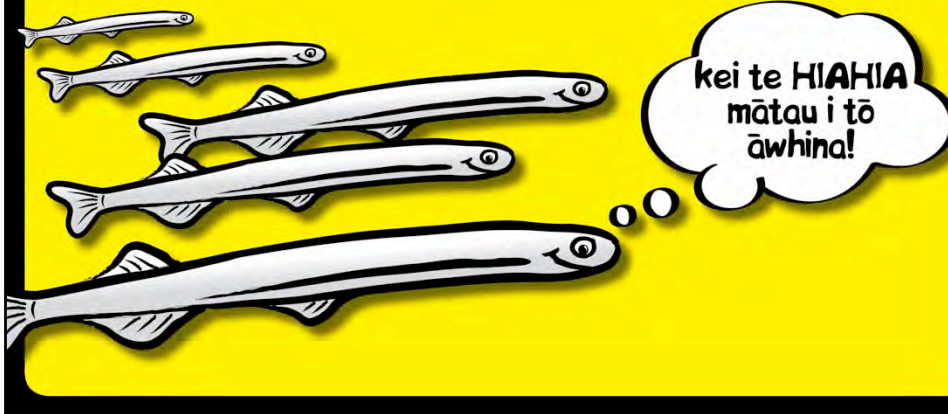
- he uaua ki a rātau te kau i ngā wāhanga torotika roa o ngā wai e kaha ana te rere
- he uaua ki a rātau te piki, te peke rānei i ngā 'wairere' paku
- ka raru tā rātau anga whakamua i ngā kēti tai - me tatari rātau i te tai pāpaku kia tuwhera te kēti
- ka noho haere noa ngā kaikonihī i ngā kēti tai ka kai i ngā inanga i a rātau e tatari ana ki te puta



- Me nekeneke haere pai rātau i te awa me te kore aukatia e ngā puni/karawata/ahuriri, tētahi atu ārai rānei



# *ME PĒHEA tā mātau āwhina i te inanga!*



**ME PĒHEA tā mātau āwhina i te inanga!**



**WĀ-POTO:**  
*whakauru i tētahi nōhanga toene rangitahi*



- he pōturi te hoki mai anō o ngā māheuheu tāhuna me ngā nōhanga toene inanga mai i te tūkinotanga
- ka hokihoki tonu mai te inanga ki te wāhi kotahi i te awa ki te toene, nō reira ka hoki mai rātau ki ngā wāhi tūkinō me te toene engari ka mate ā rātau hua
- ka taea e tātau rātau te āwhina mā te whakauru mai ngā nōhanga waihanga e ōrite nei ki ngā nōhanga toene kounga tūturu
- ko te wāhi i waenga i ngā pēra hei he mātao, he marumarū, he mākū hoki - he tino rawe mō te whakatipu hua inanga

**ME PĒHEA tā mātau āwhina i te inanga!**

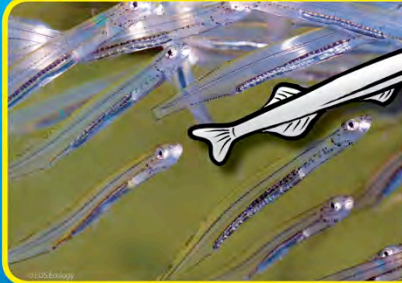


**WĀ-ROA:**

- taiapa atu i ngā kararehe*
- whakatinana i te mahere whakatipu i ngā tāhuna*
- whakatenatena i ngā mana ki te arotake i ngā rautaki whakapai i ngā tāhuna*
- tangohia ngā kēti tai*
- whakatika ārai kia piki whakauta ngā inanga*

- he mauroa ngā mahi tūkino a ngā kararehe ki ngā tāhuna awa me ngā wāhi toene
- mā te taiapa i ngā tāhuna wai (otirā i ngā wāhi toene) ka tino whaihua mō te mauri o te wai, te hanganga tāhuna, māheuheu, toene me te ora o ngā hua
- he maha ngā kaupapa matua a ngā mana ā-rohe mō te tiaki tāhuna awa
- i te nuinga o te wā he nui ake te mana o te whakapaipai me te whakahaere waipuke i te tiaki i ngā nōhanga
- kei te whakatenatena mātau i ngā mana ā-rohe ki te whakataurite i ēnei kaupapa matua me te whakamahi i ō mātau mōhio mō te toene inanga kia kore ai e tukituki ki tēnei

Te Kaupapa Mātauranga Toene Inanga ā-Motu



# Inanga

He aha • Kei hea • Te take • He pēhea

He mea tuku e:



Kei te tautokona te Kaupapa Mātauranga Toene Inanga ā-Motu e...



All photos & diagrams in this presentation are the © of EOS Ecology unless otherwise specified & cannot be used by any other party without written consent.

Kiriata whakamutunga



# Inanga

He aha • Kei hea • Te take • He pēhea



## HE AHA te inanga:

Ko te 'kaeaea' te ingoa whānui mō te wāhanga pūhou o ngā momo e rima o Aotearoa o te whānau ika e kīia ana ko Galaxiidae. Ko te 'inanga' te ingoa o te wāhanga pakeke o tētahi momo kaeaea 1 o ngā mea e 5 Galaxias maculatus.

Ko te inanga te mea iti rawa o ā tātau momo kaeaea, kāore e roa ake te tipu i te 110 mm.

Koinei anake te momo kāore e taea te piki ārai – arā ko te tikanga he āhuatanga ahurei ōna mō tōna oranga.

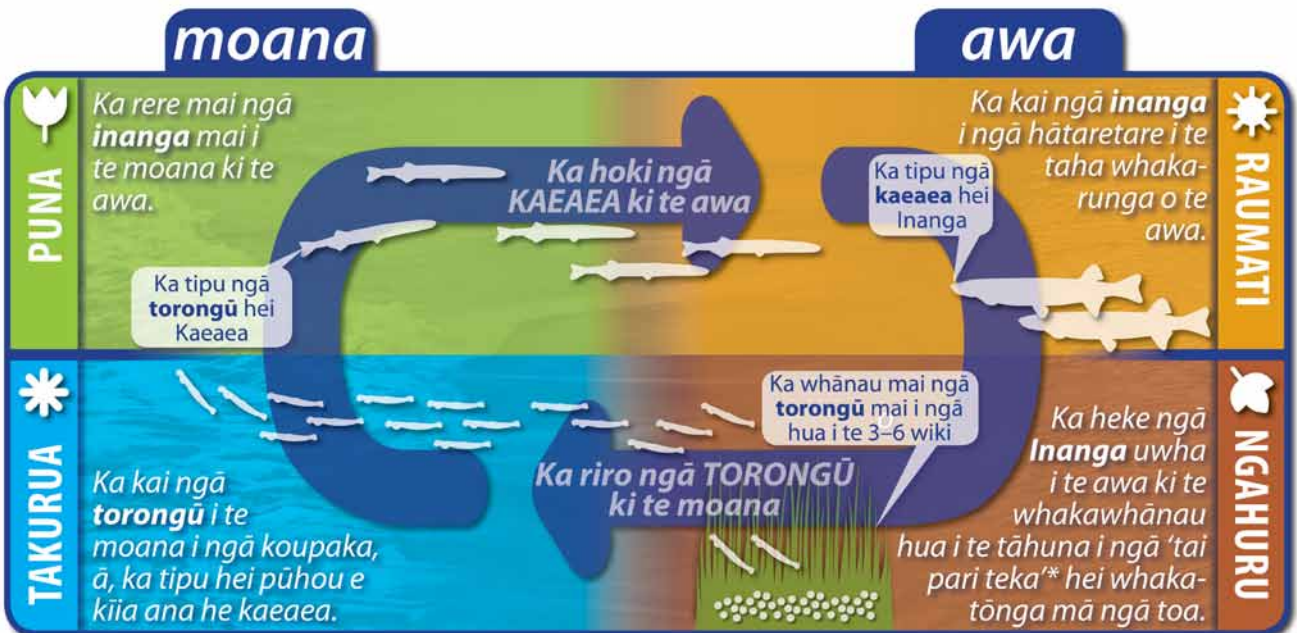
He diadromous rātau – ko te tikanga o tēnei ka noho rātau i ngā wāhi wai moana me te wai māori.



kaeaea  
torongū

inanga  
ngā hua

## Inanga lifecycle



\* TAI TEKA – he tai i muri tonu mai i te kōwhiti, rākaunui rānei, i te wā e tino nui rawa te rerekē i waenga i te wai teitei me te wai pāpaku.

I tō rātau wā toene i te pito o te raumati/ngahuru, 1,500–3,000 ngā hua ka whakawhānauhia e ngā inanga. He moroiti – e 0.8–1.25 mm te rahi o ia hua.

I te ekenaga o te kotahi marama ka paopao mai hei torongū 7 mm te roa. Mō te wiki tuatahi ka kai rātau mai i tō rātau poi ioka e tāpiritia ana, kātahi ka tīmata ki te kai i ngā tipu me ngā kararehe iti. Ka puta rātau ki te moana mō te wā atu ki te ono marama. Ko te whai torongū maha rawa ko te ritenga o te inanga ki te "kaua e raua katoatia ō hua ki te kete kotahi", arā, ki te tino raruraru kāore e ngaro te katoa.

Ka rapu haere ngā pūhou (ka kīia ināianei he 'kaeaea') i te ara ki ngā awa i roto rōpū nui/pīranga mā te hongihongi i te wai māori. Ka piki whakarunga, engari he ngoikore ki te kau, ka mutu kāore e taea ngā ārai te piki, hei tauira, ngā tāheke/wairere/ahuriri/karawata, aha atu, aha atu. Ko te nuinga o ngā kaeaea kāore e ora i tēnei haerenga i te mea ka matekai, ka kainga e ngā kaikonihī, ka mau rānei i ngā kaihao.

Ka tipu hei pakeke i te awa mō te takiwā pea o te ono marama. Kua reri rātau ki te hoki whakararo me te whakawhānau i ā rātau ake hua (toene) i te kotahi tau.

## Ā mātau momo inanga e 5

**TĒ** taea e te inanga te piki ārai... hāunga ētahi atu o ngā momo e 4

korehāhā	
mōrea i te motu	tūpono mōrea
	tata te korehāhā
	mōrearea
pūmate	heke haere
	ora haere mai
	mōrehu kei taiao kē
	waraki noa
kāore i te noho mōrearea	



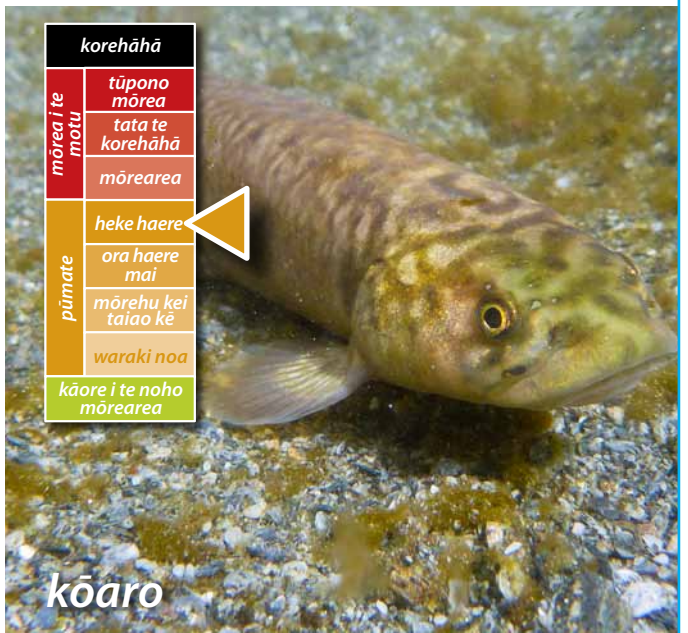
*inanga*

korehāhā	
mōrea i te motu	tūpono mōrea
	tata te korehāhā
	mōrearea
pūmate	heke haere
	ora haere mai
	mōrehu kei taiao kē
	waraki noa
kāore i te noho mōrearea	



*shortjaw kōkopu*

korehāhā	
mōrea i te motu	tūpono mōrea
	tata te korehāhā
	mōrearea
pūmate	heke haere
	ora haere mai
	mōrehu kei taiao kē
	waraki noa
kāore i te noho mōrearea	



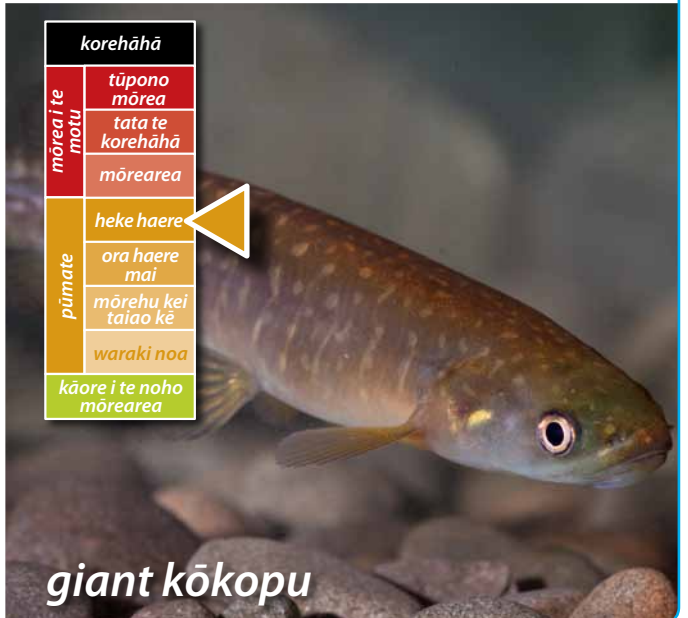
*kōaro*

korehāhā	
mōrea i te motu	tūpono mōrea
	tata te korehāhā
	mōrearea
pūmate	heke haere
	ora haere mai
	mōrehu kei taiao kē
	waraki noa
kāore i te noho mōrearea	



*banded kōkopu*

korehāhā	
mōrea i te motu	tūpono mōrea
	tata te korehāhā
	mōrearea
pūmate	heke haere
	ora haere mai
	mōrehu kei taiao kē
	waraki noa
kāore i te noho mōrearea	



*giant kōkopu*

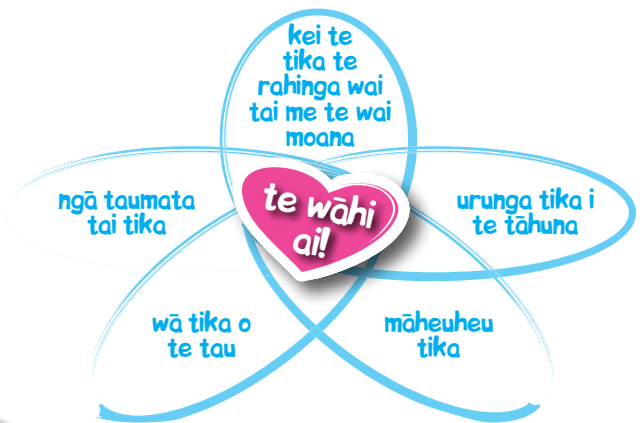


# KEI HEA rātau e noho ana, ā, e whakawhānau i ā rātau hua:



## Ko te whai i te nōhanga toene tika - 'te wāhi ai' – he whakatauritenga uaua o ngā āhuatanga maha.

Ko ngā raruraru ko te noho mōrearea o ngā pakeke ki ngā kaikonihī ina kuhu rātau ki ngā wai pāpaku toene ai - nō reira ka āhua tiakina rātau e ngā māheuheu e puea ake ana mai i ngā tuna hiakai me ngā manu noho awa. Me noho mātao me te mākū tonu ngā hua inanga i te wā kei waho i te wai. Ko ngā māheuheu tauwharewhare, tāhuna hoki e taumarumau ana i ngā hua ka noho pēnei i te hamarara i te awatea me te paraikete i te pō.



## NGĀ NŌHANGA TOENE PAI MŌ NGĀ INANGA

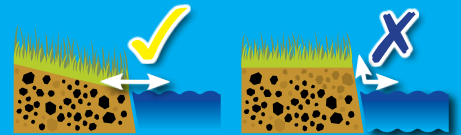
### Te tawhiti tika mai i te moana



Ko ētahi wāhanga o tēnei wai he tino pai rawa hei toene inanga nā te tūtata ki te moana. Ka toene ai i ngā wāhi e taea ai ngā tai teka teitei, engari kāore i te tino totetote te wai. I te wā o ngā tai teka ka taea e ngā inanga ā rātau hua te whakawhānau i ngā māheuheu kei runga ake i ngā tāhuna, i runga ake i te teitei rerenga noa o te awa.

### He tāhuna rōnaki

Ko te mea pai kia rōnaki te tāhuna, kia kua he taha tūpou. Ko te tikanga he nui ake ngā wāhi o te tāhuna ka taea mō te whakawhānau a ngā inanga i ā rātau hua i te wā o te tai teka teitei.

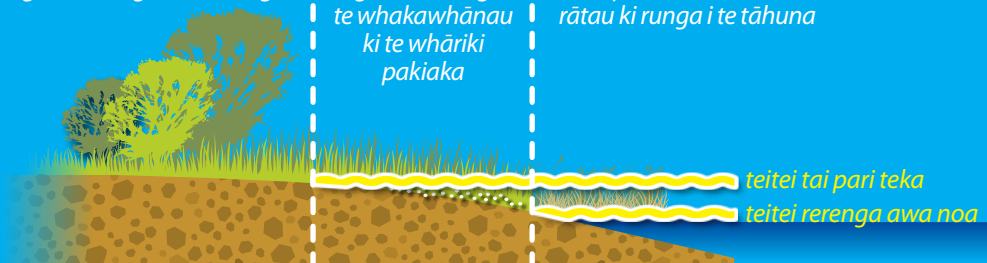


## Kei te tipuria te tāhuna e te māhuehue

Ngā whakamarumarū rākau/mauwha māori – he whakarato marumarū mō ngā hua me te kore o te ngahoro o ngā rau ki runga

Otaota mātotoru roa – kia taea ngā hua inanga te whakawhānau ki te whāriki pakiaka

Ngā tipu e puea ake ana i te wai – hei huna i ngā inanga kia tae mai te tai pari teitei hei whakahoki i ā rātau ki runga i te tāhuna



# TE TAKE e itiiti haere ana ngā inanga me te take e whakamate atu ana mātau:

Kei hea koutou?



## Kei te heke haere ngā taupori ika māori o Aotearoa.

He pai ake ngā inanga i te nuinga i te mea he whānui ō rātau hiahia, arā he tuwhera rātau ki ngā wāhi noho mō rātau me ā rātau kai. Ko tētahi mate ko tā tātau tūkinu i ngā nōhanga toene o ngā momo e 90% o ngā kaeaea e haohia ana e tātau.

Heoi, ko te nōhanga e hiahia ana kia ora ai ngā hua kei te kino, kua kore rānei.

## Iti iho ngā hua = iti iho ngā inanga!

Ka mutu, he kaha te kai a ngā kaikonihī o tāwāhi (te taraute te mea kaha) i ngā pākeke me te huri i tō rātau whanonga e kore nei e taea e ngā inanga te rapu kai.

## Koiora-kanorau nui = pūnaha rauropi hauora ...he nui ngā kai mā te KATO!



## Ko te tūkinu i ngā nōhanga inanga, kāore e whāiti ki ēnei....

### Nōhanga toene:

- Tūkinu a ngā kararehe pāmu.
- Ngā huringa ā-tangata ki ngā hanganga tāhuna tūturu.
- Te tapahi i ngā māheuheu roa o ngā tāhuna i te wā toene.
- He nui rawa ngā waipara i ngā tāhuna, e tāmia ana ngā māheuheu.
- Te whakatū ārai e aukati ana i ngā urunga o ngā inanga ki ngā wāhi toene, hei tauira ngā kēti tai.

### Nōhanga pakeke:

- Te whakatū ārai e aukati ana i te piki whakarunga o ngā inanga ki te kai, hei tauira, ngā kēti tai, ngā ahuriri, karawata, aha atu, aha atu.



te tūkinu a ngā kararehe ki ngā tāhuna



ngā huringa ā-tangata ki ngā tāhuna tūturu



te tope otaota i ngā tāhuna i te wā toene



he nui rawa ngā waipara i ngā tāhuna



ngā ārai i te urunga o ngā inanga ki ngā wāhi toene



## ME PĒHEA tā tātau āwhina:

**He pōturi te hoki mai anō o ngā māheuheu tāhuna me ngā nōhanga toene inanga mai i te tūkinotanga.**

Ka hokihoki tonu mai te inanga ki te wāhi kotahi i te awa ki te toene, nō reira ka hoki mai rātau ki ngā wāhi tūkinō ka whakamātau ki te toene...engari ka mate ā rātau hua. Nō reira he mea nui rawa kia tiakina e tātau ō rātau wāhi toene pai kei te toe, me te whakapai/whakaora i ērā kua tūkinotia.

## Ko ngā mea ka taea e tātau te āwhina...

### I te wā poto:

- Te whakauru mai i ngā pēra hei nōhanga toene. Ko ngā wāhi mākūkū, mātao i waenga i ngā pērā he wāhi rangitahi pai rawa hei toene kia tika rā anō mai ngā rongoā wā roa.

### I te wā roa:

- Taiapa atu i ngā kararehe.
- Whakatinana i te mahere whakatipu i ngā tāhuna.
- Whakatenatena i ngā mana kia arotaketia ngā rautaki whakapai i ngā tāhuna.
- Whakakore i ngā kēti tai me ētahi atu ārai e aukati ana i te piki o ngā inanga i te awa.
- He tino puiaki ngā hua inanga. Ko ngā whakamarutanga anake kia kaua rātau e kainga e ngā kaikonihī, ko ngā māheuheu e tipu nei rātau i roto. Ka hunaiā ngā hua e ngā māheuheu tāroa, mātotoru, ā, ka uua te taea e ngā kaikonihī. Mēnā ka taea e koe ngā māheuheu te tiaki, te whakaora rānei ka iti ake te whakararuraru a ngā kīrearea.

### HEI PĀNUI ANŌ ME

### NGĀ RAUEMI ATU ANŌ:

- McDowall, R. M. (1984). *The New Zealand Whitebait Book*. Wellington, Reed.
- Mitchell, C. P. and G. A. Eldon (1991). *How to locate and protect whitebait spawning grounds*. Rotorua, Freshwater Fisheries Centre.
- Richardson, J. and M. J. Taylor (2002). *A guide to restoring inanga habitat*. NIWA Science and Technology Series 50: 1–29.

whakauru i tētahi nōhanga toene rangitahi



titiro hoki hua i roto i te noho rangitahi



hua i roto i te noho rangitahi



Kei te tautokona te Kaupapa Mātauranga Toene Inanga ā-Motu e...



AQUATIC SCIENCE & VISUAL COMMUNICATION





# Inanga/Whitebait

## Te tautuhi i ngā pākeke me ngā hua



shoaling inanga © EOS Ecology

He māmā te tautuhi i ngā inanga pakeke mai i ētahi atu momo ika i te mea he iti noa ka noho i ngā wāhi ōrite, he ōrite rānei te noho.

Ka pōturi te haere pīranga o ngā inanga i ngā wāhi pāpaku o ngā wai, ā, he pōturi te neke i te kōeaea, te auā rānei.

Kāore e nui te tipu o ngā inanga. Ko te tikanga ka nui ake ngā uwaha i ngā toa, engari ko ngā uwaha tino nui he iti ake i te 120 mm te roa.



### Te mōhio mēnā he uwaha, he toa rānei

He uaua te kite mēnā he uwaha, he toa rānei i te nuinga o te wā, engari he māmā ina reri ana ki te toene. Ka kite koe i ngā hua kōura nui i roto i ngā uwaha mā ngā taha o te puku, ā, he maheni, he kōmā tō ngā toa.

uwaha...ka kite koe i ngā hua mā ngā taha o te puku



toa...puku maheni, kōmā





## Hua inanga ✓

He iti ngā hua inanga (0.8–1.2 mm te whitianga), he poi puata. Ina eke ki te rua wiki te pakeke ka kitea ngā karu kukune inanga i roto, e rua ngā ira pango iti.

0.8–1.2 mm

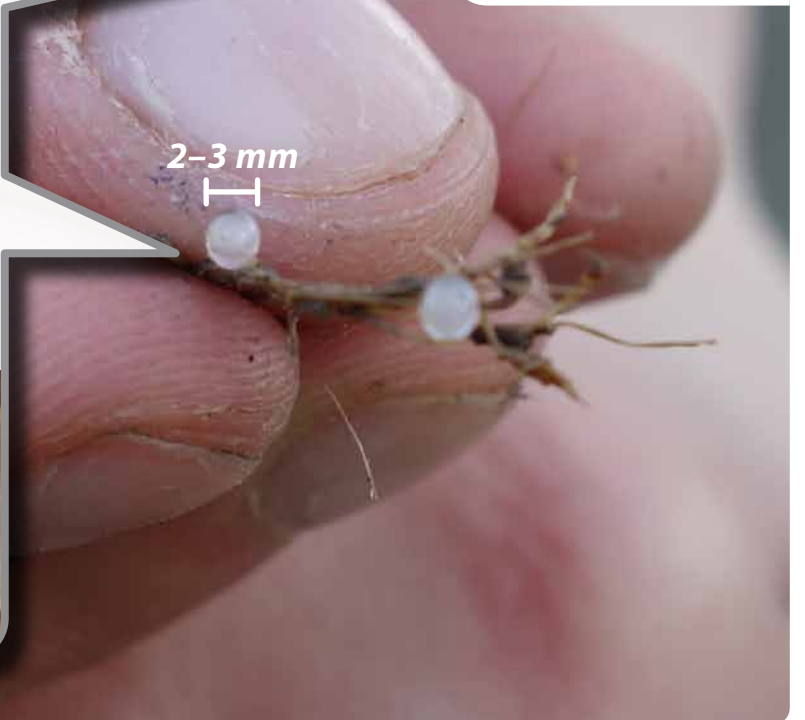


© EOS Ecology

## Hua putoko ✖

He nui ake ngā hua putoko i ngā hua inanga, he 2–3 mm te whitianga. He tino mā te tae, ka mutu he rite ki te hua heihei te āhua. Whakawhānau ai ngā putoko i ā rātau hua i ngā wāhi ōrite nei ki ō ngā inanga, ā, tērā pea ka pau i a rātau ētahi hua inanga iti nei te kai.

2–3 mm



© EOS Ecology

Kei te tautokona te Kaupapa Mātauranga Toene Inanga ā-Motu e...



AQUATIC SCIENCE & VISUAL COMMUNICATION

WE ♥ WHITEBAIT WHAKA INAKA - CAUSING WHITEBAIT



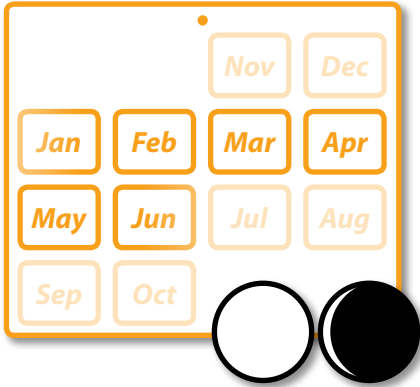
All photos & diagrams are © of EOS Ecology unless otherwise specified & cannot be used by any other party without written consent.

[www.whitebaitconnection.co.nz](http://www.whitebaitconnection.co.nz)



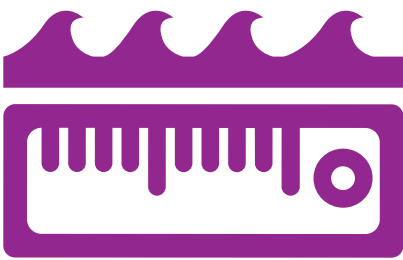
# Inanga

Te rapu i ngā wāhi toene tūturu



## MŌ ĀHEA KIMI AI:

**Ka toene ai ngā inanga mai i te paunga o Kohitātea-tīmatanga o Pipiri** (taumata tiketike i te Paenga-whāwhā). Ka whakawhānau ai ngā hua i ngā rā maha i muri tonu mai i te marama kōwhiti, rākaunui rānei (ngā mea e rua i ētahi wā). He teitei ake ngā tai i ēnei wā (e kīia ana he tai teka), ā, ka 2–3 rā ngā mahi toene i muri i ngā tai teka teitei rawa. Ka taea e koe tētahi maramataka wā marama te whakamahi me ngā papatau tai ā-rohe hei whakarite āhea ngā wā toene. I mua i tō kimi i ngā hua, he pai tonu te haere ki tētahi kōawa i te wā tai teka teitei hei tohu i te taumata wai o te wai tai teitei ki ngā tāhuna o te awa (i te nuinga o te wā he tino teitei ake ki tāu i mōhio ai) – kimihia ngā hua i te tai pāpaku.

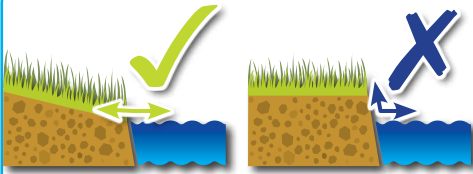


## ME KIMI KI HEA:

### 1. Te tawhiti mai i te moana

Ko te tikanga ka toene ngā inanga i ngā wāhi tūtata ki te taha whakarunga o te urunga mai o te wai tai - i te nuinga o te wā he tino rerekē tēnei ki te tepenga o te whakaawenga o te tai. Ka taea tēnei te whakarite mā te aromatawai i te wai o raro i te wāhanga hōhonu rawa o te hawai o te awa i te tai teitei mā tētahi ine totetote. Me mōhio koe ka tino rerekē haere te whānuitanga o te urunga mai o te wai tai i ia rā, ko te nui ake o te tai, ko te tawhiti rawa atu o te piki whakarunga o te wai tai.





## 2. Urunga ki te tāhuna

**Kimihia ngā rōnaki tūturu e taea e te tai teka te kapi.**

## 3. Ngā māheuheu o ngā tāhuna



**Kimihia te tepenga whakaurunga rawa o ngā tipu rata ki te wai tai ka rapu whakarunga mai i tēnei wāhi...** Ka urupare anō ngā māheuheu ki te urunga o te wai tai – ko te tipu o ngā tipu rata ki te wai tai he tohu hoki he tototote rawa pea te wāhi. He tino rerekē ki te kitea he hua i waenga i ngā *Cotula coronopifolia* (bachelor's button), *Juncus kraussii* (sea rush), *Apodasmia similis* (jointed wire rush), *Schoenoplectus pungens* (three-square) rānei.



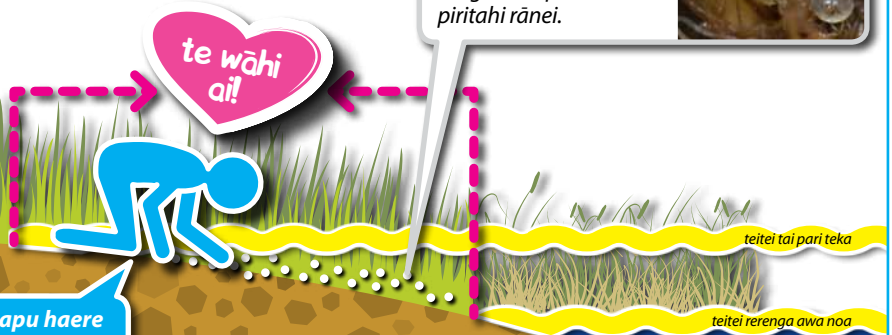
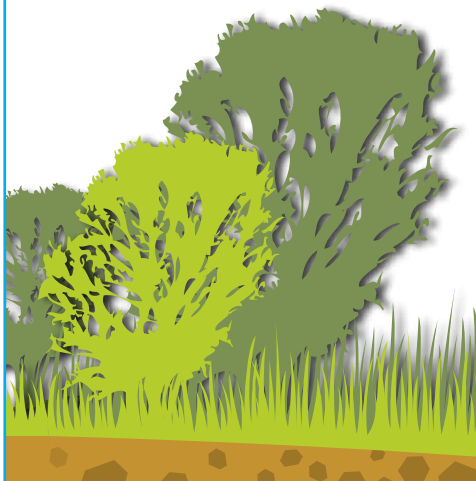
**Me aro ki ngā uru māheuheu tāroa rawa, kiato rawa, ko te tikanga koinei ngā tino wāhi ka whai hua...** Me noho mākūkū ngā hua inanga kia uru ai te hāora ki te kiri o waho o te hua, ā, ka taea e te kukune te whakahā i roto. Hiahia ai ngā pākeke ki te toene i ngā māheuheu tāroa rawa, kiato rawa e pākaha ana i te pāmahana me ngā tāupetanga takawai me te tiaki i ngā hua kei te tipu mai i te parawhiti hihī katinga. Nā te mātotoru o ō rātau whāriki pakiaka, ngā tātā hoki/rānei, ka kitea noatia ngā hua inanga i waenga *Schedonorus phoenix* (fescue tāroa), *Agrostis stolonifera* (creeping bent), *Juncus edgariae* (Edgar's rush) rānei.



**Mēnā he maroke, he kirikiri rawa rānei te oneone kāore e kitea e koe he hua inanga...** Ko tētahi āwhina mō te kimi hua inanga ko te mākūkū. Me kimi i te wāhi marumaru rawa o te tāhuna o te kōawa i te tuatahi, he matomato ake ngā māheuheu, ā, he mākūkū te oneone i raro.

### NGĀ MEA HEI KIMI:

He moroiti ngā hua inanga – he 0.8–1.2 mm noa iho te whitianga, he tīrake me te puata. He hāpiripiri nō reira ka piri ki ngā tātā/pakiaka, ka piritahi rānei.



**ME PĒHEA TE KIMI:** Me tau ki raro rawa ka rapu haere i te whenua. Kāore e kitea māmātia ngā wāhi huna o ngā hua inanga. Me tūturi ki raro, ā, kia kaha tonu te wehewehe i ngā māheuheu...me kuhu atu koe!

### HEI PĀNUI ANŌ ME NGĀ RAUEMI ATU ANŌ:

- Ka kitea he maramataka wā marama i [www.moonconnection.com](http://www.moonconnection.com)
- Kimihia ngā papatau tai ā-rohe i [www.linz.govt.nz/hydro](http://www.linz.govt.nz/hydro)
- McDowall, R. M. (1984). *The New Zealand Whitebait Book*. Wellington, Reed.
- Mitchell, C. P. and G. A. Eldon (1991). *How to locate and protect whitebait spawning grounds*. Rotorua, Freshwater Fisheries Centre.
- Richardson, J. and M. J. Taylor (2002). *A guide to restoring inanga habitat*. NIWA Science and Technology Series 50: 1–29.

Kei te tautokona te Kaupapa Mātauranga Toene Inanga ā-Motu e...



AQUATIC SCIENCE & VISUAL COMMUNICATION



# Inanga

## Kimihia te urunga wai tai



He uaua te kimi i ngā wāhi toene inanga, engari ki te kitea e koe te **taha whakarunga o te taha wai tai** ka āwhina ki te whakawhāiti mai i tō rapu.

Ko te urunga wai tai te wāhi e tūtaki ai te wai tai o te moana ki te wai māori o te awa. He kiato ake/he taumaha ake te wai tai i te wai māori nā ngā ōpapa i roto, nō reira ka noho ki te kūkūpango, ā, ka rewa ake te wai māori ki runga ake. Ka noho mai ko tētahi wāhi mākahi te āhua o te wai tai i raro i te wai māori – e kīia ana tēnei he 'saltwater wedge'.

### He aha te totetote (salinity) o te wai?



Ka whakaatu tēnei i te papatipu o ngā tote kua memeha ki te wai – ka kīia ko ngā wāhanga i te mano (parts per thousand (ppt)) – he 35 ppt pea te totetote o te wai moana i Aotearoa.



Tata ki te 90% o ngā tote memeha he konutai pūhaumāota (tote tēpu), ko ētahi atu o ngā tote ka ahū mai i te hau māota, konutai, pūngāwhā, konupūmā me te konurehu.



He 0.5 ppt te totetote o te wai māori.

Hei kimi i te taha whakarunga o te urunga wai tai me whakamātau te totetote o te wai i raro o te awa (kūkūpango).

### Hei mahi i tēnei me whai koe:



**ine totetote** (he taura/pou mō te ine, he tikanga kohi rānei i te wai mai i ngā wai hōhonu ake)

Ka taea ngā ine totetote te tiki mai i NIWA Instrument Systems, Envco, ētahi atu kaiwhakarato taputapu ōrite rānei. Tērā rānei, me whakapā atu ki tō Kaunihera ā-Tāone, ā-Rohe rānei ka pātai atu mēnā ka āwhinahia koe.



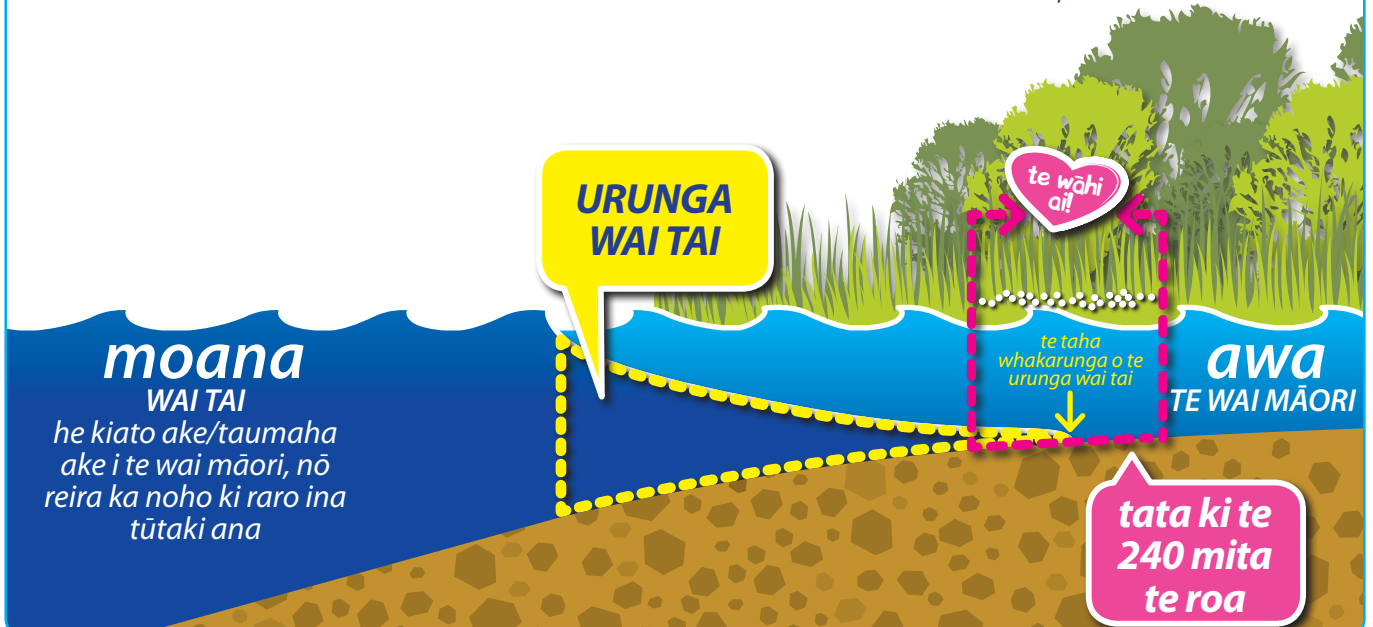
### pūrere GPS

**ngā utauta tuhipoka** (he pepa tuhi raraunga rānei, tirohia te whārangi whai ake mō tētahi taurira)



### waka

(he pai pea mō ngā awa hōhonu/whānui)  
Me whakarite koe ka whai koe i ngā tikanga hauora me te haumaruru pai rawa ina whakamahia ana i ngā waka, hei taurira, te whakamahia i ngā kaiako waka rēhita, te whakarite kia rua kōrua i te iti rawa mō te tūpono tikoki.



## Tikanga mō te aromatawai i te totetote:

**Upane 1.** Kimi āhea te tai teka teitei whai ake mai i tō papatau tai ā-rohe. I konei ka aromatawai koe.

**Upane 2. RĀ 1**  
Haere ki te taha whakararo o te awa i mua noa atu i te wā i whakaritea mō te tai teka teitei.

**Upane 3.** Tukuna te haurapa ine totetote kia tau ki te papa o te wāhi hōhonu rawa o te awa, ka tatari kia taurite te pānui ka tuhi i te totetote/wā/tauwāhi GPS – me mātua tuhi ko te totetote 'ōraro'.

**Upane 4.** Hikina mai te haurapa ine totetote ki te mata o te wai i taua wāhi anō, ka tatari kia taurite te pānui ka tuhi i te totetote/wā/wāhi GPS – me mātua tuhi ko te totetote 'ōrunga'.

**Upane 5.** Me paku te neke whakarunga ka mahi anō i ngā upane 3 me te 4. Mēnā he ōrite ngā pānui ki tō wāhi tuatahi me huarua te tawhiti ki tō wāhi whai ake i runga ake ka mahi anō i ngā upane 3 me te 4.

**Upane 6.** Me mahi anō i te upane 5 kia heke haere ngā pānui toteote, kātahi ka whakaheke i te tawhiti i waenga i ngā wāhi.

**Upane 7.** Ina heke te totetote 'ōraro' i raro i te 0.5 ppt ka tohua te wāhi O MUA AKE i aromatawaihia i raro hei 'taha urunga whakarunga o te urunga wai tai' o tēnei rā.

**Upane 8. TE/NGĀ RĀ O MURI MAI**  
ME MAHI ANŌ ko ngā upane 1–7, engari me whakarite i tō taenga atu ki tō wāhi 'taha urunga whakarunga o te urunga wai tai' o nanahi ki te tai teitei.

## Ētahi atu awhina:



Me whakarite kei te tōkarikari te ine totetote - raua te haurapa ki te moana, ā, ko te tikanga ka tata ki te 35 ppt tana pānui, me rau ki tētahi karāhe wai, ko te tikanga ko tana pānui he iti ake i te 0.5 ppt.



Whakamahia ngā piriti hei tango pānui i waenga o te awa



Me mātua horoi te haurapa ki te kōrere wai i te mutunga o te rā.



Me tūpato i ngā hanganga i te awa (hei tauira, ngā kēti tai/ahuriri) e aukati ana i te rerenga whakarunga o te wai tai.



He wā roa ka tae atu te wai tai ki runga ake. Ka nekeneke whakarunga haere pea te urunga wai tai i muri rā anō i te wā i tohua ka teitei te tai i te wahapū o te awa, tauranga tūtata rānei.



Ko te tai e uru mai ana ki tētahi awa ka noho pēnei i te puni me te pei atu i te ia o te awa. Ka puritia pea te wai māori ki runga rawa atu mai i te taha o te urunga wai taha.



Ka pāngia te wāhi o te urunga wai tai e te nui o te tai i taua rā (tirohia te kōrero e whai ake) me te rere o te awa i taua rā - nō reira me whakatoharite koe i tana wāhi i roto i ngā rā maha.



Ka tohutohu ngā papatau i a koe mō te wā me te nui o te tai teitei mō taua rā, engari kei te āhua kē o ngā tohu huarere me te pēhanga hau te āhua ake o te tai teitei – ka taea e te pēhanga hau me ngā hau moana kia tino iti ake te tai ki tērā i matapaetia i ngā hōtaka tai.

### HEI PĀNUI ANŌ ME NGĀ RAUEMI ATU ANŌ:

- Find a moon phase calendar at [www.moonconnection.com](http://www.moonconnection.com)
- Find local tide tables at [www.linz.govt.nz/hydro](http://www.linz.govt.nz/hydro)

Kei te tautokona te Kaupapa Mātauranga Toene Inanga ā-Motu e...



AQUATIC SCIENCE & VISUAL COMMUNICATION





# Rangahau Tepe Wai Tai

RARAUNGAMETA	
Ingoa kōawa:	Ingoa riu awa:
Rā (RR/MM/TT):	Ingoa o ngā kaitirotiro:
Herenga kaupuke tūtata rawa:	Wā matapae o te tai pari (HH:MM):
Pēhanga kōhauhau o te rohe (hPa):	Wā o te tai pari i kitea (HH:MM):
He ārai anō i te rere o te tai (mēnā āe, homai ngā taipitopito) Tē mōhiotia / Kāo / Āe:	Āhua o te rere:  Pāpaku / Hāngai / Teitei / Tē Mōhiotia

RARAUNGA TIROTIRO		
I rapua e tēnei rangahau ngā taunakitanga mō te toene inanga:    Āe / Kāo		
He aha ngā mea i kitea?  Toene / Ngā Hua / Ngā Mea e Rua / Kore	He tuhinga toene anō mō tēnei wāhi?  Āe / Kāo / Tē Mōhiotia	Mō te taha ki te wāhi toene, ko te tepe wai tai  Kei Runga Ake / Kei Raro Ake / Kei Te Hāngai / Tē Mōhiotia

RARAUNGA TOTE WAI									
I tirotirohia te wāhi tepe wai tai:		Rāwhiti (NZTM):			Raki (NZTM):				
#	Wāhitū	Wā (HH:MM)	Rāwhiti (NZTM)	Raki (NZTM)	Hawai Maui Pono/ Waenga/Matau Pono	Hōhonu (m)	Takere	Tote wai (ppt)	
								Waenga o te wai	Mata o te wai
1									
2									
3									
4									
5									
6									
7									
8									
9									
10									
11									
12									
13									
14									
15									
16									
17									
18									
19									
20									

Ngā tuhinga tautoko
Ngā ingoakōnae whakaahua:



## Tātuhinga o te wāhi

Me uru ki te tātuhinga te whānui o te rangahau, ngā wāhi toene, ngā tauārai i te rerenga/ara, tepe wai tote, ngā momo māheuheu, whakamahinga whenua, ngā tūwāhi whakaahua, ngā taunga GPS

## NGĀ WHAKAMĀRAMA MĀ NGĀ KAITIROIRO

### RARAUNGAMETA

**Ingoa kōawa:** ingoa o te kōawa i rangahautia

**Ingoa awa:** i roto i te Catchments of New Zealand (1956)

**Rā:** rā i tutuki te wāhanga mahi takiwā o te rangahau

**Ngā ingoa kaitiroiro:** hei whakamana i ngā otinga rangahau

**Tauranga Tūtata Whai Matapaenga Tai (Tuarua rānei):** tirohia [www.linz.govt.nz](http://www.linz.govt.nz) mō ngā rārangi o ngā tauranga Whai Matapaenga Tai, ngā mea pāhono Tuarua hoki

**Te wā matapae o ngā tai pari i te tauranga tūtata:** tirohia [www.linz.govt.nz](http://www.linz.govt.nz) mō ngā matapae i te tauranga tūtata rawa

**Ngā pēhanga kōhauhau tūtata o nāianei:** ka taea e te pēhanga hau kōhauhau te tino whakarerekē i te teitei o ngā tai o te rohe

**Te wā o te wai teitei i kitea i te wāhi rangahau:** te wā i kite koe e tino teitei ana te wai i te wāhi rangahau

**Ngā tauārai i te rerenga tai:** he karawata, kēti tai, pae kirikiri, aha atu, aha atu, ka taea te ārai i te rerenga tai?

**Ngā āhuatanga rerenga:** kei runga ake, kei raro iho rānei te kōawa i ngā āhuatanga rerenga noa?

### RARAUNGA TIROIRO

**I rapua e tēnei rangahau ngā taunakitanga mō te toene inanga?**

I āta kimi koe i ngā hua, i kite rānei koe i te toene?

**He aha ngā mea i kitea?**

I kitea ngā hua, i kitea te toene, ngā mea e rua, kore rānei

**Kua tuhia ngā kōrero mō ngā mahi toene i tēnei wai i mua?**

He tuhinga kōrero anō mō ngā mahi toene i mua i tēnei kōawa?

### RARAUNGA TOTE WAI

**Tepe wai tote i tiroirohia i te wāhi:**

Mai i ngā raraunga i kohia, kei te tepe whakarunga o te wai tote?

**Mō ia wāhi e inea ai te wai tote, tāurua ngā raraunga e whai ake:**

Wā: te wā i inea

Rāwhiti: te ahopou o te wāhi ine mai i te GPS e whakamahi ana i te pūnaha taunga NZTM

Raki: te ahopae o te wāhi ine mai i te GPS e whakamahi ana i te pūnaha taunga NZTM

Hawai: tohua i te hawai te wāhi i tangohia ai te ine wai tote - mauī, waenga, matau rānei

Hōhonu: e hia te hōhonu o te wai i te wāhi i tangohia ai te ine tote wai?

Waitote: e hia te tote wai i raro, i waenga o te wai, i te mata o te wai anō hoki?

# Inanga

## Te aromatawai i te nōhanga toene

Te Kaupapa Mātauranga Toene Inanga ā-Motu



Kotahi anake te whai wāhi o te nuinga o ngā inanga uwaha ki te toene. Ki te kitea e ia he nōhanga toene tino kounga ko te tikanga e 80% o aua hua ka ora, ā, ka tīmata tō rātau puta hei kaeaea – engari ki te kore e kitea he nōhanga tino kounga ka mate katoa pea ngā kaeaea.

### Nōhanga toene tawhito

I te wā i nohohia a Aotearoa e te Pākehā, ko ngā māheuheu i ngā tāhuna i ngā wāhi toene inanga i whakaawetia e ngā tai tērā pea he ngahere teitei whakamarumarū, mauwha hoki (hei tauira, kōwhai (*Sophora spp.*), patē (*Schefflera digitata*), manatu (*Plagianthus regius*), kahikatea (*Podocarpus dacrydioides*), me te tī kouka (*Cordyline australis*), me ngā momo wī roroa (hei tauira, harakeke (*Phormium tenax*), ngā momo mātā (*Carex secta*, *C. virgata*), me te wīwī (*Juncus edgariae*)).

I whakamarutia, i taumarutia hoki e ēnei uru rākau ngā tāhuna, me te hāpai i ngā uru māheuheu o ngā momo toetoe, ngā otaota me ngā pūkohukohu.

I roto i ngā uru pakiaka o ēnei momo toetoe, otaota, me ngā tipu maha hāngai, i toene ngā inanga.

### Nōhanga toene hou

Ko te nuinga o ngā rohe tāhuna i Aotearoa, me ō rātau wāhi toene inanga hāngai, kei te pokea e ngā otaota tauhou maha.

Kei te rite te piri o ngā hua inanga ki te pouaka roa (*Schedonorus phoenix*) me te creeping bent (*Agrostis stolonifera*) me te Yorkshire fog (*Holcus lanatus*), ā, ko te tikanga he iti rawa ake ngā rahinga.

Ko ngā otaota tauhou e hiahia ana hei wāhi toene ko te korowa (*Trifolium spp.*), monkey musk (*Mimulus guttatus*) me te kawariki (*Rununculus sp.*), engari kāore e tino pokea e ēnei tipu te kohinga tipu tāhuna.

## ME PĒHEA TĀU AKE AROMATAWAI I TE NŌHANGA PAI

Mēnā kei te kimi koe i ngā wāhi toene tūturu, te whakarite rānei ki te whakauru i ētahi nōhanga toene rangitahi, he mea nui te mōhio ki te mea e kimihia ana e koe.

I ngā whārangi e rua e whai ake ka kite koe i tētahi 'puka aromatawai nōhanga toene o ngā inanga' hei āwhina i a koe me tēnei mahi. Kia kotahi te puka aromatawai mō ia wāhi.

Ina whakakāia e koe ngā kōrero o tō wāhi i runga, he aratohu kei reira hei āwhina i a koe ki te aromatawai i tō wāhi. He kōrero mō ngā whakaritenga huanga rerekē tekau mā rua me te āwhina i a koe ki te tuku tohutohu mō te āhua onāiane i o tō wāhi.



© EOS Ecology

Kei te tautokona te Kaupapa Mātauranga Toene Inanga ā-Motu e...



AQUATIC SCIENCE &amp; VISUAL COMMUNICATION



# Pepa aromatawai nōhanga toene inanga

Rā: \_\_\_\_\_ Wā: \_\_\_\_\_ Tangata: \_\_\_\_\_

Whakahaere (hei taurira, ingoa kura, aha atu, aha atu.): \_\_\_\_\_

Ingoa awa: \_\_\_\_\_ Parenga awa (porohitatia tētahi): **matau pono**<sup>1</sup> / **maui pono**<sup>1</sup>

Wāhi i te awa: (tohua he wāhi pūmau i te awa hei tūtohu wāhi pūmau, hei taurira, he piriti)

**Whakarunga / whakararo** (porohitatia tētahi) ko te pito o te wāhi he \_\_\_\_\_ mita,  
**whakarunga / whakararo** (porohitatia tētahi) o te (ingoa o te tūtohu wāhi) \_\_\_\_\_

Ngā taunga GPS whakararo: Raki: \_\_\_\_\_ Rāwhiti: \_\_\_\_\_

Roa o te rangahau (mita): \_\_\_\_\_

- Rārangi arowhai i mua i te tīmatanga:
- Kua arotakehia e au ngā mōrea katoa o te wāhi me te whakarite i ngā take haiora me te haumaruru
  - Kua tirohia e au ngā raruraru urunga wai tai/ika i raro
  - Kei roto au i 'te wāhi ai' (arā, te whānui o te toene) mō tēnei awa<sup>2</sup>
  - Kei te mōhio au ki te 'tohu wai teitei' i taku wāhi<sup>2</sup>
  - Kei te arotake au i te wāhi i te wā tika o te tau<sup>2</sup> (arā, i te wā toene)

Kei roto taku wāhi i te (porohitatia tētahi):  
**wāhi taiao / wāhi taiwhenua / wāhi tāone / tētahi atu** (whakamāramahia) \_\_\_\_\_

AROMATAWAI NŌHANGA (tohua kia KOTAHI te māka mō ia take rārangi, arā, he 0, 5, 10 māka rānei – ka tuhi ai i te māka ki te tiwai i te taha matau)

Tatau: →	0 māka = KĀORE E PAI	5 māka = ĀHUA PAI	10 māka = PAI	Ō māka: tuhia ia māka huanga ki konei
<b>Ngā huanga:</b> ↓	kāore i te pai mō te toene, ki te toene kāore e ora ngā hua	ka toene engari mēnā ka whakapaihia ka piki te toene me te ora o ngā hua	He pai te toene me te ora o ngā hua	↓
<b>urunga mō ngā ika</b> <i>Tirohia te awa i waenga i tō wāhi toene me te moana kia mōhio mēnā kei te aukatia te piki whakarunga o ngā inanga</i>	ngā kēti tai, ngā ahuriri, ētahi atu ārai nui e aukatia ana i te piki whakarunga o te inanga	he karawata iti, he wāhanga o tētahi kōawa paipa, he kēti tai kei te āhua huaki rānei	kāore he ārai	
<b>urunga wai tai</b> <i>Tirohia te awa i waenga i tō wāhi toene me te moana kia mōhio mēnā kei te aukatia te piki whakarunga o te wai tai.</i>	ngā kēti tai, ngā ahuriri, ētahi atu aukati nui i te wai tai	he karawata iti, he wāhanga o tētahi kōawa paipa, he kēti tai kei te āhua huaki rānei	kāore he ārai	
<b>koki parenga</b> <i>Tangohia te koki parenga toharite mō te tahei 1 m te whānui e kapi ai te tohu tai teka teitei. Whakatakotohia he pou/rūri kotahi mita te roa ki te papa (kia hāngai te takoto ki te taha o te wai) ka ine i tō koki mai i tērā. Tohua he wāhi i roto i tō wāhi toene e hāngai ana, tuhia rānei ngā ine maha ka tuhi mai i tētahi toharite mai i ērā.</i>	iti ake i te koki 7° TĒRĀ RĀNEI neke atu i te koki 35°	i waenga i te 21–35° te koki	i waenga i te 7–20° te koki	

<sup>1</sup> Te taha mauī me te matau ina titiro whakararo.

...kei te whārangi whai ake...

<sup>2</sup> Tirohia te pepa whakamārama 'Inanga - Te rapu i ngā wāhi toene tūturu mō ētahi atu kōrero.

AROMATAWAI NŌHANGA (tohua kia KOTAHI te māka mō ia take rārangi, arā, he 0, 5, 10 māka rānei – ka tuhi ai i te māka ki te tiwai i te taha matau)

Tatau →	0 māka = KĀORE E PAI	5 māka = PAI	10 māka = PAI	Ō māka: tuhia ia māka huanga ki konei ↓
<b>Ngā huanga:</b> ↓	kāore i te pai mō te toene, ki te toene kāore e ora ngā hua	ka toene engari mēnā ka whakapaihia ka piki te toene me te ora o ngā hua	He pai te toene me te ora o ngā hua	
<b>papanga tāhuna</b> He āha te papanga NUI rava (pararopi-kore) o te parenga? Aromatawaihia tēnei mā te tāhei 1 m te whānui e kapi ai te tohu tai nui.	ngā toka tōkau maha, ngā kōhatu pāwhati, tuakirikiri, kirikiri, paru, raima, rākau rānei	he oneone te nuinga, engari he nui atu ngā mea kei roto	he oneone	
<b>taumarumarū māheuheu</b> E hia te nui o te papa kua kapi i te māheuheu (arā, e hia te nui o te papa e hunaia ana e ngā tipu e tipu ana). Aromatawaihia tēnei mā te tāhei 1 m te whānui e kapi ai te tohu tai nui.	Iti ake i te 50%	i waenga i te 50–75%	nui atu i te 75%	
<b>teitei o ngā māheuheu</b> Tangohia te toharite o te māheuheu matua/NUI i te wāhi. Waiho ngā uru tipu tū motuhake o ngā māheuheu nui ake. Aromatawaihia tēnei mā te tāhei 1 m te whānui e kapi ai te tohu tai nui. Inea atu ki runga o te wāhi e pau haere nei ngā tipu, arā, kua e aro ki ngā kauru tāroaroa ake.	iti ake i te 10 cm (he poto rawa ngā tipu, ā, kāore e taea te whakahaukū i te papa) neke atu i te 50 cm (ko te tikanga he nui rawa ngā tipu mō te nōhanga toene)	i waenga i te 10–20 cm	i waenga i te 21–50 cm	
<b>momo māheuheu</b> Tipakohia te momo māheuheu NUI i taua tāhei. Aromatawaihia tēnei mā te tāhei 1 m te whānui e kapi ai te tohu tai nui.	ngā tipu rākau nui (ngā rākau, kōti, parakipere, mauwha), tiwha, amiami	raupō, harakeke, pūrekireki	karāhe/wiwī ko ngā momo pai ake mō te toene ko ngā pouaka roa (Schedonorus phoenix), karāhe kōtuke (Agrostis stolonifera), me te pūrekireki Edgar (Juncus edgariae)	
<b>mātotoru o te whāriki pakiaka</b> Whakamahia ō ringa ki te wehewehe i ngā māheuheu kia kite atu ai koe i te papa. E hia te mātotoru o ngā māheuheu me ngā pakiaka i te papa? Aromatawaihia tēnei mā te tāhei 1 m te whānui e kapi ai te tohu tai nui.	He tino māmā te wehewehe i te māheuheu, kāore he pakiaka kua puta ki runga ake i te papa, he iti te kiato o ngā tātā o ngā tipu, kei te kitea ētahi wāhanga o te papa i mua i tō kumekume i ngā tipu.	Ina timata koe ki te kume- kume mai i ngā tātā tipu ka kitea e koe te oneone. (arā, he iti te kapinga o ngā whāriki pakiaka i te papa)	He uaua te kumekume i ngā māheuheu. He nui ngā pakiaka/tātā i te papa. (arā, he uaua te tae ki te oneone i raro i ngā whāriki pakiaka)	
<b>haukū o te papa</b> Tirohia te whenua i te take o ngā māheuheu kia kitea te kaha o te haukū. Aromatawaihia tēnei mā te tāhei 1 m te whānui e kapi ai te tohu tai nui.	tino maroke, puehu hoki	maroke i ētahi wāhi	haukū, mākū rānei	
<b>taumarumarū mō ngā ika</b> Hūhū ai ngā ika pakeke i mua i te wā toene, ā, kia nui tonu ngā taumarumarū hei tiaki i ngā ika mai i ngā kaikonihī tūturu. Tirohia te wāhi i waenga i tō tāhei 1 m, ā, ki raro atu ki te wai i te parenga. He māheuheu kei reira e tipu ana, he tipu rānei kei te tauwharewhare i ngā parenga, ngā poro rākau nui, toka nui rānei kei te wai hei tāwharau i ngā ika pakeke?		KĀORE he taumarumarū mā ngā ika, KOTAHI anake rānei o tētahi e whai ake: – ngā tipu roa ka puta i te tai pari – ngā tipu nui e tauwhare- whare ana i te wai – ngā tipu wai kei rō wai – ngā rākau, ngā toka nui rānei roto i te wai	Kia RUA o ēnei i te iti rawa: – ngā tipu roa ka puta i te tai teitei – ngā tipu nui e tauwhare- whare ana i te wai – ngā tipu wai kei rō wai – ngā rākau, ngā toka nui rānei kei roto i te wai	
<b>tiaki i te parenga</b> Kei te tapahia auautia ngā tāhuna kia poto ai ngā karāhe i ngā wā katoa i tō wāhi toene?	kei te tapahia auautia ngā parenga, ā, kei te poto ngā karāhe		itiiti noa te tapahia o ngā parenga, ka tapahia i te 2 marama i mua o te wā toene o te inanga	
<b>te ārai kararehe (mō ngā wāhi taiwhenua anake)</b> Kei te taiapatia tō wāhi toene hei ārai i te urunga mai o ngā kararehe?	Kāore he taiapa; ka uru noa ngā kararehe ki ngā parenga. Kua mahue ngā tohu tūkinō o nā tata nei mai i te urunga o ngā kararehe.	He taiapa rangitahi kua whakatūhia, engari ehara i te mea tūturu (arā, he waea hiko, pou rangitahi rānei) TĒRĀ RĀNEI he taiapa kei reira engari kua tūkinohia, he kēti kei te huaki e uru atu ai ngā kararehe ki te wāhi (ka uru atu ngā kararehe)	He taiapa pūmau e ārai ana i te urunga o ngā kararehe ki te wāhi i ngā wā katoa. Kua mahue ngā tohu tūkinō o nā tata nei mai i te urunga o ngā kararehe.	

TATAUHIA Ō MĀKA HUANGA KATOA MAI I NGĀ WHĀRANGI E RUA KI KONEI →

- E tohu ana ngā tataau 90–120 he pai te wāhi nōhanga mō te toene!
- E tohu ana ngā tataau 55–90 he āhua pai te nōhanga toene, engari ka pai ake mēnā ka whakapaihia.
- Mēnā he 0 mō TĒTAHI o ngā huanga KĀORE PEA e toene – me whakapaipai.





# Inanga

## Te tatau hua – mahinga aromatawai tōene



He tikanga pai rawa te tatau e hia ngā hua inanga kua whānau ki 'te wāhi ai' i tētahi wāhanga tōene hei aromatawai i ngā mahi tōene, me te whakataurite mahinga i roto i te wā.

Ka whakamahia he tikanga pūtaiao māmā e kīa ana ko te 'tipako papanga matapōkere' (random stratified sampling) hei 'ine rahi' i te maha o ngā hua i ia wāhi. Ehara i te mea me whakamātau koe ki te tatau i ia hua inanga kei te tāhuna, kei te nōhanga pēra hei i whakaurua kētia mai e koe! Ka tere ake te tunganga, ā, ka ōrite i waenga wāhi.

### Ine rahi i ngā hua i te NŌHANGA TŪTURU:

Kua kitea e koe 'te Wāhi Ai' (nō reira, kei te mōhio koe ki te wāhanga o te awa ka tino kitea e koe he hua), he tai timu, ā, kua rite koe ki te aruaru hua inanga.

**Me tautuhi koe i te WĀHI** o ngā hua 'āpure'. He maha ngā 'haupū' iti ake ka taea pea i tētahi āpure hua. Mēna he iti iho ngā haupū i te 1 m te wehenga ka kīa nō te āpure kotahi.

Ka oti ana tō ine i te roa o te āpure, ā, kei te mōhio koe ki te whānui toharite o ngā haupū hua katoa i te āpure, ka taea e koe te tātai te HORAHANGA o te hōkaitanga hua mā tēnei whārite:

**HORAHANGA** ( $m^2$  o te āpure hua) =  
roanga āpure × whānui haupū toharite\*\*

**I muri mai, whakatau tatatia te TAPEKE O NGĀ HUA** kei te āpure katoa mā ngā tatau tipako tōtika o ngā hua takitahi i roto i tētahi wāhi iti. Ka whakarahi ake i ēnei tatau tipako iti ā muri ake.

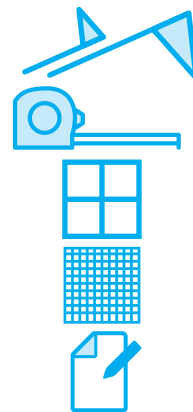
I roto i tō āpure me MATAPŌKERE (kaua e āta kimi i ngā hua) te whakatakoto i tētahi waea kōpure tapawhā rite 10×10 cm. Mēnā he iti ake ngā hua i te 200 i roto i te wāhi kōpure tapawhā rite katoa, tatauria katoatia – engari, mēnā he nui ake, whakamahia te kōpure tapawhā rite 10×10 waea me

ngā tapawhā rite tukutuku 1 cm, ka tatau i ngā hua katoa i roto i ngā tapawhā rite matapōkere e 5 (arā, te 5 i roto i ngā tapawhā rite 100 o te tukutuku) ka whakarea mā te 20. Mēnā kāore he hua i roto i tētahi tapawhā me tuhi kore.

**KIATO** (ngā hua mō ia  $m^2$  kei ia āpure) =  
tau toharite o ngā hua katoa i roto i ngā tatau kōpure tapawhā rite katoa\*\*\* × 100

**WHAKAPUTARANGA** (maha o ngā āpure hua) =  
HORAHANGA × KIATO

### Ngā utauta aroturuki e hiahitia ana:



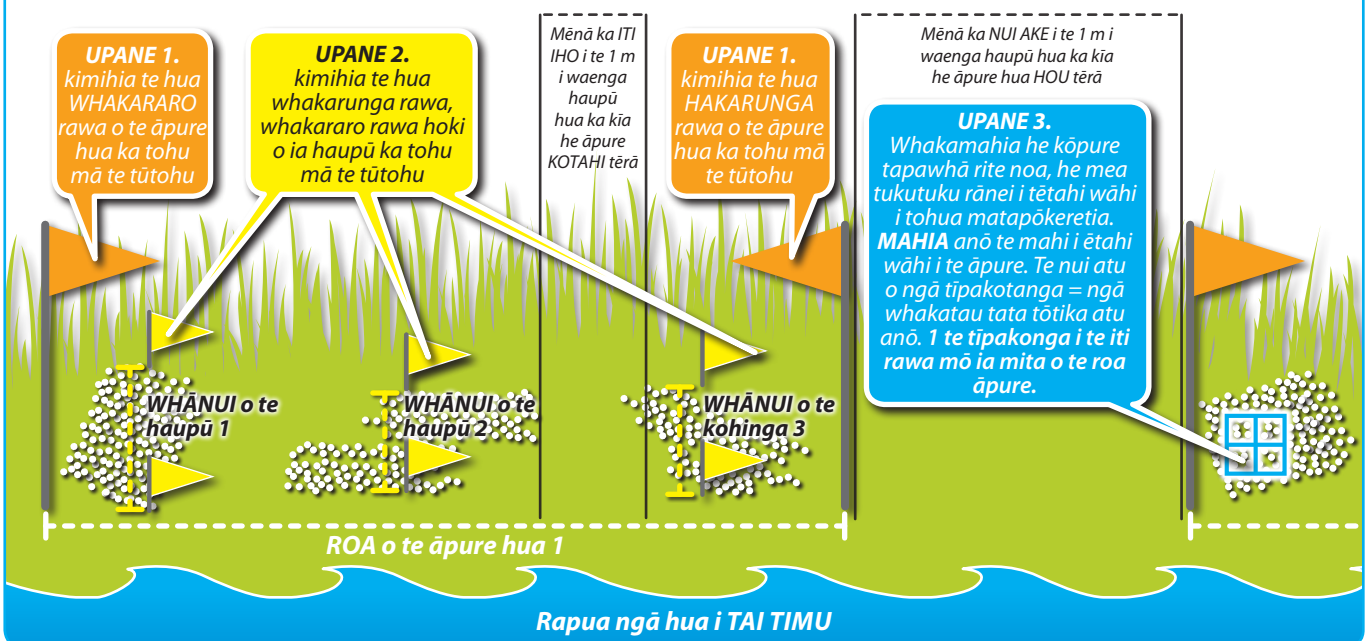
ngā tūtohu/whakapiri tūtohu

ine ripene

10×1 kōpure tapawhā rite waea 10 cm

10×1 kōpure tapawhā rite waea 10 cm  
me ngā tapawhā rite tukutuku 1 cm

utauta hei tuhi raraunga



\* tirohia anō te 'Hei pānui anō me ngā rauemi' mēnā kāore koe i te mōhio/kei hea 'te Wāhi Ai'.

\*\* whānui haupū toharite = ka tāpirihia ngā whānui haupū katoa me te whakawehe mā te tau o ngā haupū

\*\*\* tau toharite o ngā hua = ka tāpirihia ngā tapeke kōpure tapawhā rite katoa mō taua āpure me te whakawehe mā te tau o ngā kōpure tapawhā rite katoa i tatau hua

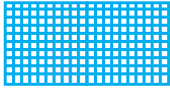
## Te ine rahi i ngā hua i roto i te NŌHANGA PĒRA RANGITAHU:

Mēnā kua whakaurua e koe ngā nōhanga pēra rangitahi i mua ki tō kōawa, me whakamahi i taua tikanga anō mō te ine rahi i te HORAHANGA o te hōkaitanga hua, me te KIATO o te hōkaitanga hua pēra anō i te taiao tūturu – pēra i te tikanga pūnahanaha e whakamāramatia mai i konei...

### Ngā utauta aroturuki e hiahiatia ana:



hamarara



tukutuku HORAHANGA 1x0.5 m me ngā tapawhā rite tukutuku 5x5 cm



KIATO pūrua 10x10 cm



kōpure tapawhā rite 10x10 cm me ngā tapawhā rite 1x1cm



utauta hei tuhi raraunga

Me whakamahi e koe ngā utauta katoa hei whakawātea me te whakakapi i ngā pēra ina hiahiatia ana. Tirohia 'Hei pānui anō me ngā rauemi atu anō'.

### TIKANGA RANGAHAU (te raupapa hei mahi):

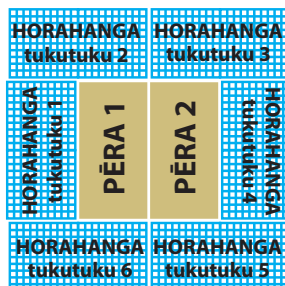


I mua i tō timata – Me whakarite kei raro i te marumaru ngā pēra i NGĀ WĀ KATOĀ. Ka maroke ngā hua, ā, ka tere mate i raro i te rā.

Te whakamahi i tētahi hamarara hei tiaki i ngā hua ka kitea me te tiroiro i te paenga papa 0.5 cm huri noa i ngā pēra.

### Mata 1: Tuatahi, tirohia te paenga 0.5 cm o te papa huri noa i ngā pēra mō ngā hua.

- KI TE KORE E KITEA E KOE HE HUA me tuhi kore ki tō pepa raraunga ka haere ki te mata 2.
- MĒNĀ KA KITEA E KOE HE HUA – me whai i te 1) HORAHANGA, ā, ko te 2) Tikanga tatau KIATO ka whakamāramahia i te whārangi whai ake. Mō tēnei kia 6 ngā whakatakotoranga o te tukutuku 1x0.5 m te nui kua whai tapawhā rite tukutuku 5x5 cm hei whakakapi i te paenga katoa. Ina oti i a koe ngā tatau horahanga me te kiato me neke ki te mata 2.



**Mata 2: I muri ake, me tiroiro ngā mata i rō pēra mō ngā hua.** Ko ngā mata i roto ko ngā taha e pā tahi ai ngā pēra tētahi ki tētahi i waenganui.

- KI TE KORE E KITEA E KOE HE HUA me tuhi kore ki tō pepa raraunga ka haere ki te mata 3.
- MĒNĀ KA KITEA E KOE HE HUA – me whai i te 1) HORAHANGA, ā, ko te 2) Tikanga tatau KIATO ka whakamāramahia i te whārangi whai ake. Mō tēnei kia 2 ngā whakatakotoranga o te tukutuku 1x0.5 m te nui kua whai tapawhā rite tukutuku 5x5 cm – kotahi te whakatakotoranga ki ia pēra.



Te tiroiro i ngā mata rō pēra mō ngā hua

Kia tūpato ina rōra i ngā pēra hei whakarite kāore e pakaru/tūkino i ngā hua.

### Mata 3: Hei whakamutunga, tiroirohia te papa i raro o ngā pēra mō ngā hua.

- MĒNĀ KĀORE E KITEA E KOE HE HUA me tuhi kore ki tō pepa raraunga, ā, kua mutu koe mō tēnei wāhi.
- MĒNĀ KA KITEA E KOE HE HUA – me whai i te 1) HORAHANGA, ā, ko te 2) Tikanga tatau KIATO ka whakamāramahia i te whārangi whai ake. Mō tēnei kia 2 ngā whakatakotoranga o te tukutuku 1x0.5 m te nui kua whai tapawhā rite tukutuku 5x5 cm – kotahi te whakatakotoranga ki ia pēra. Mēnā he kua piri, kua whakawhānau rānei ngā hua ki raro i te pēra kua ki te papa, me whakamahi kē a raro o te pēra KAUA te papa i raro i te pēra. Me tatau kia kotahi o ēnei – kua ngā mea e rua.



Te tiroiro i te papa i raro i ngā pēra mō ngā hua.



**NGĀ TIKANGA TATAU HORAHANGA ME TE KIATO INA KITEA E KOE HE HUA:**

Ina kitea HE me whakamahi ō kōpure tapawhā rite hei tatau i te 1) HORAHANGA me te 2) KIATO . Mā ēnei tatau ka taea e koe te whakatau tata te:

- HORAHANGA o te kapinga hua = m<sup>2</sup> o te huinga pēra me ngā hua
- KIATO o ngā hua = hua mō ia m<sup>2</sup> o ia huinga pēra
- WHAKAPUTARANGA hua = tapeke o nga hua o ia huinga pēra

Te tatau KIATO me te kōpure tapawhā rite 10x10 me ngā tapawhā rite 1x1 cm ki te mata i roto i tētahi pēra.



**1) TAUTUHI HORAHANGA (tatau tapawhā tukutuku):** tukutuku wāhi nui 1x0.5 m me ngā tapawhā rite 5x5 cm



Mā te whakamahi i te tukutuku HORAHANGA nui kei te papa huri noa i ngā pēra.



Whakamahia te tukutuku HORAHANGA nui kei rō mata pēra.

Ki te kitea e koe he hua – me whakahāngai te tukutuku HORAHANGA nui ki te wāhi i kitea e koe... 1) ngā otaota e pae ana i ngā pēra, 2) ngā mata o roto o ngā pēra, me 3) te papa i raro i ngā pēra (e ai ki te Tikanga Rangahau i te whārangi tōmua). Tatauhia te maha o ngā tapawhā rite tukutuku 5x5 cm he hua kei roto. Kia 6 ō tukuruatanga ki te otaota (hei whakakapi i te katoa o te paenga), kia kotahi ki ia mata o roto i ngā pēra e rua, ā, kia kotahi hoki i raro i ngā pēra e rua. Ka taea e koe te tatau...

**HORAHANGA = te tau o ngā tapawhā rite tukutuku kua whai hua × 0.0025**

**2) TAUTUHI KIATO (tatau hua):** Whakamahia kia KOTAHI o ēnei tikanga hei whakaoti i tētahi tatau hua tōtika. Kia 3 ngā tukuruatanga mō ia mata i ngā wāhi matapōkere rerekē. Tuhia ngā tapeke o ō tatau kōpure tapawhā rite katoa. Mēnā kāore he hua i roto i tētahi kōpure tapawhā rite/tapawhā rite me tuhi kore ki tō pepa raraunga.

**mēnā ka iti ake i te 200 ngā hua** whakamahia te kōpure tapawhā rite 10x10 cm



Tatauhia ngā hua katoa i roto i te kōpure tapawhā rite katoa (arā, ngā tapawhā rite e 4 katoa). Ka whiwhi koe i te tatau katoa mō tēnei kōpure tapawhā rite.

**RĀNEI**

**mēnā NEKE atu i ngā hua 200** whakamahia te kōpure tapawhā rite 10x10 cm me ngā tapawhā rite 1x1 cm



Tatauria ngā hua katoa i ngā tapawhā rite tukutuku matapōkere e 5, ka whakarea i taua tau mā te 20. Ka whiwhi koe i te tatau katoa mō tēnei kōpure tapawhā rite.

Ina oti i a koe ngā tatau kōpure tapawhā rite iti tōtika katoa, ā, ka kitea ō toharite\* ka taea e koe te tata te...

**KIATO = tau toharite\* o ngā hua katoa i roto i ngā tatau kōpure tapawhā rite × 100**  
**WHAKAPUTARANGA = HORAHANGA × KIATO**

\* Tau toharite o ngā hua = ka tāpirihia ngā tapeke kōpure tapawhā rite katoa mō taua huinga pēra me te whakawehe mā te tau o ngā kōpure tapawhā rite katoa i tatauhia

**HEI PĀNUI ANŌ ME NGĀ RAUEMI ATU**

- Hei kimi i ngā tohutohu me pēhea te kimi i "te wāhi ai" tirohia te Whitebait Connection (WBC) National Inanga Spawning Education Programme (NISP) rauemi 2a: Te whakauru i tētahi nōhanga toene rangitahi.
- Mō tētahi rārangi o ngā utauta e hiahiaatia ana ina nekehia ana ngā pēra tirohia te rauemi 3a.
- Kimihia te papataua tai ā-rohe i [www.linz.govt.nz/hydro](http://www.linz.govt.nz/hydro)

Kei te tautokona te Kaupapa Mātauranga Toene Inanga ā-Motu e...







# Inanga

Te whakauru i tētahi nōhanga toene rangitahi



E kaha ana te hono o te toene inanga me te oranga o ngā hua ki te wātea mai o ngā nōhanga toene tino kounga. Mēnā kei te tūkinohia ngā māheuheu tūturu i ngā tāhuna, kei te tipu haere tonu mai rānei, he tino pai ngā kakau witi/pēra hei nōhanga toene rangitahi mō tētahi wā.



Ko te tikanga o tēnei ka whakatakotohia ana ngā pēra kakau witi (me whakarara ngā taha roa) ka wātea mai he wāhi i waenga kia:

- āhei atu hei toene inanga
- marumarutia mai i te rā
- mākūkū me te mātao

= HE NŌHANGA TOENE INANGA RANGITAHĪ TINO RAWE!

**He aha te pai o te kakau witi/pēra hei?** He pai te kakau witi, kakau pāre, pēra hei rānei i te mea he pakari, he pōpopo, iti te utu me te āhuatanga tōtika wā poto hei whakakapi i te māheuheu tūturu o ngā tāhuna. Ko te mea pai, ka whakatakotohia mai ngā pēra maha i ngā wāhi maha puta noa i te wāhi toene e mōhiotia/whakaarohia ana. Me tiki tohutohu mātanga mō tō kaupapa i mua i tō tīmatanga mēnā kei te hiahiatia.

**I mua i tō tīmatanga...** he mea nui kia mōhio kei te wāhi tika o te awa koe me te teitei tika i te tāhuna mō ngā tai teka. (tirohia anō te wāhanga Hei pānui anō me ngā rauemi)

Me whakarite anō kei te whai whakaetanga koe mai i ngā mana ā-rohe tika me ngā ariki whenua mō tō kaupapa i mua i tō tīmata i ngā mahi.

## E hiahiatia ana ngā taputapu hei whakauru mai:



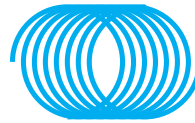
2x kakau witi/pēra hei mō ia huinga



2x 1.5 m ngā pou maitai (waratahs) mō ia huinga



2x ngā taupoki pou haumarū mō ia huinga



3–4 m o te 4 mm waea mō ia huinga



1x tapanga wāhi mō ia huinga



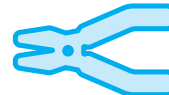
3x 30 cm ngā taura here mō ia huinga



1x 45 cm pou rākau mō ia huinga



kuru/hama/paopao mō ngā pou maitai



kutiwaea/kūmau



ngā utauta haumarū noa



ngā kaiāwhina kaingākau!

Kei te tautokona te Kaupapa Mātauranga Toene Inanga ā-Motu e...



AQUATIC SCIENCE & VISUAL COMMUNICATION

WE ♥ WHITEBAIT  
WHAKA INAKA - CAUSING WHITEBAIT



## Tikanga whakauru:

1. Me maha te hāereere ake ki te wāhi i ngā wā o te tai teka teitei ka tohu i te tūwāhi teitei rawa ka tae te wai ki te tāhuna (**tohu wai teitei**) mā te **pou rākau**. Me mahi tēnei i roto i ētahi rā i te mea ka huri pea te taumata o te wai mai i tētahi rangi ki tētahi.
2. Ina tohua ngā wāhi katoa, me haere i ngā wā tai pāpaku ki te whakatakoto i ngā pēra. Me mātua whakarite ka mahia i ngā wiki e rua i mua i te tai teka toene kia 'taunga' haere mai ngā pēra.
3. Whakatakotohia mai ngā pēra ki te tāhuna i raro i te **tohu wai teitei**, engari i runga ake i te **teitei rerenga awa noa**. Me whakatakoto ko ngā taha roa tētahi ki tētahi, ki ngā koki katau ki te awa (kei te ahu whakararo te āputa). Me waiho he āputa o te 50 mm i waenga i ngā pēra. Mā tēnei ka uru te tai ki ngā āputa i waenga i ngā pēra.

**i kaha te hamahamahia o ngā pou maitai ki te weherua o te taha roa o ngā pēra – me te mau o ngā taupoki haumaruru mā ngā here taura**



**pou rākau e tohu ana i te wāhi wai teitei**

**kei te piri tata ngā pēra tētahi ki tētahi me te āputa i waenga o te 50 mm e anga whakararo ana ki te wai**

- HE ĀWHINA: Me pupuri ko ngā tuwaina e RUA o ngā pēra ina kawea e koe kia kore ai e pakaru mai.
4. Me titi ngā pou maitai i te weherua o te taha roa o ngā pēra e rua kia piri ai i te taha o waho, ka paopaohia mai kia tino pūmau ai. Me whakamātau kia uru he kōhao waea ki te pou maitai ki ia pēra, kia tautika ki te teitei o runga o te pēra.
  5. Tapahia mai he waea e 2.5m te whakarea ake i te roa o te tawhiti i waenga i ngā pou maitai e rua i poua.
  6. Mahia he koropiko whita ki tētahi pito o te waea ka whakakuhu i tētahi atu pito torotika o te waea mā te kōhao ki te pou maitai e ōrite ai te tautika ki te taha runga o ngā pēra. Me kukume mai kia noho rā anō te koropiko i waenga i ngā pēra e rua.
  7. Me whakapiko te waea ki te kōhao o te pou maitai kia noho pūmau. Me whakakuhu te pito torotika mā tētahi atu pou maitai ka here mā te whakapiko anō, kātahi ka whakakuhu atu mā te koropiko tuatahi i waenganui.
  8. Me here te waea whakamutunga mā te koropiko anō, ka titi atu ngā pito kei te toe ki roto i te pēra.
  9. Paopaotia ngā pou maitai kia hōhonu ake ki te papa hei whakakiki i ngā waea me te whakarite kei te pūmau ngā pēra ki te papa mō te wā e uru mai ai ngā tai teka. Ko te tikanga kāore e nekeneke ki te whanaia e koe.
  10. Whakamaua ngā taupoki haumaruru pūahoaho me te tapanga wāhi ki runga o ngā pou maitai mā ngā here taura.

tohu wai teitei

rerenga awa teitei noa



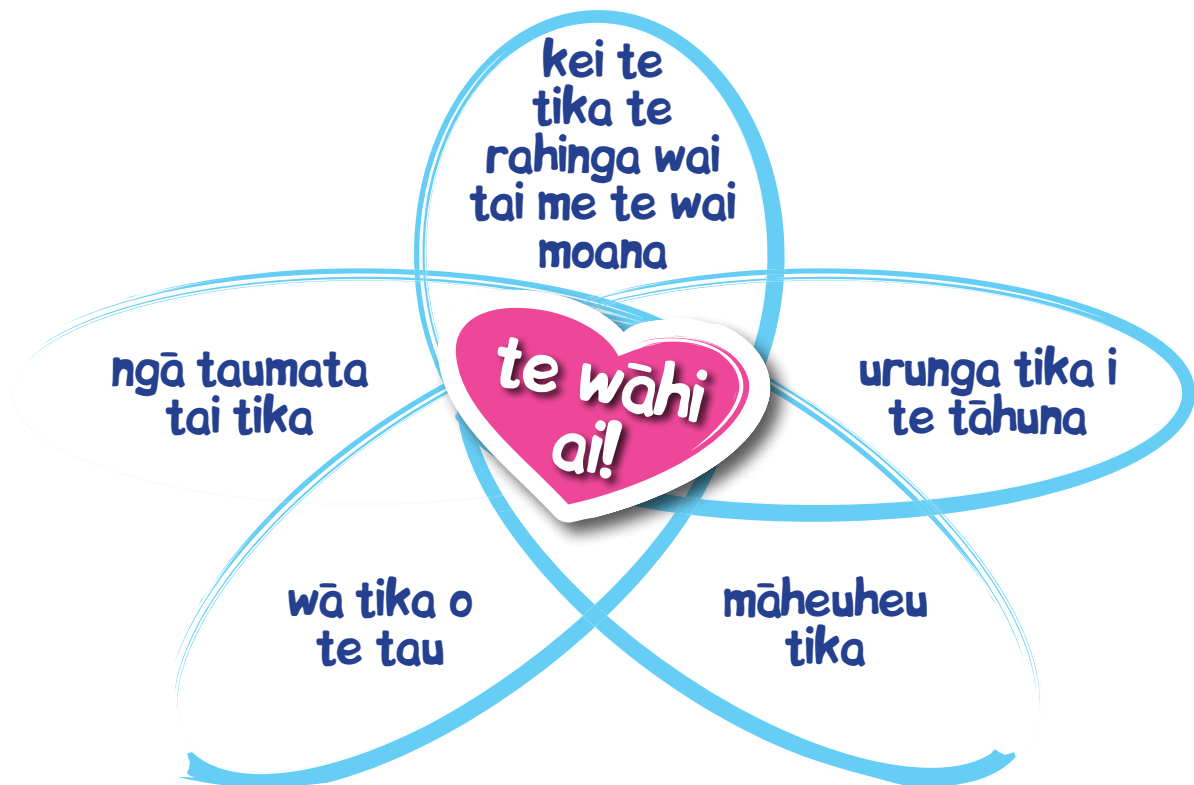


# Inanga

## Te tiaki/manaaki i tētahi wāhi



He whāiti pū ngā āhuatanga e tika ana hei waihanga i tētahi nōhanga toene pai mō ngā inanga. Ina puta ēnei āhuatanga he mea nui kia whakapau kaha tātau kia noho pūmau ai. Ki te rerekē, heke rānei tētahi o ēnei āhuatanga takitahi ka heke, ka kore pea rānei te toene me te ora o ngā hua.



## HE AHA NGĀ MEA WHAKAKINO I NGĀ WĀHI?

### Kai kararehe

Ki te uru mai rātau, ka hiahia ngā kararehe ki te kai i ngā māheuheu o ngā tāhuna i te mea he nui ake te mākūkū ki ā rātau kai o te taiapa.

Ko te mutunga atu:

- ka korekore, ka potopoto hoki ngā māheuheu o ngā tāhuna e puta ai ngā pakiaka, ā, ka mate
- ka tāpokopoko, ka takatakahia - he 400-500 kg te taumaha o ngā kau, ka hārautia e ō rātau maikuku te oneone (tapoko) me te tīhae/tāpuke i ngā māheuheu o ngā tāhuna



- i ngā oneone maroke ake ka takatakahia te papa e ngā maikuku – ka whakapiki tēnei i te tūpono waipuke o te oneone me ngā āhuatanga hāora-kore e aukati nei i te tipu o ngā tipu
- ka puta anō i te takatakahi ko te tūpou o te tāhuna/horo.



### Ko ngā rongoā he...

- whakamahi taiapa hei aukati i ngā kararehe (kau) nui katoa i ngā wā katoa
- me tuku anake ko ngā kararehe paku (hipi) ki te taha o ngā awa i te mea he iti ake ngā pānga wā roa, engari me whakamutu i te 3 marama i mua i te tīmatanga o te wā toene kia whai wā ngā māheuheu o ngā tāhuna ki te tipu anō.

### Te tapahi otaota i ngā wāhi toene

Ko ngā mahi tiaki i te tāhuna awa - te tapahi i ngā otaota roa - he whakapoto/whakakorekore i ngā māheuheu o ngā tāhuna.

Ko te mutunga atu:

- i te wā poto, he whakaiti i te kiato o ngā tipu o ngā tāhuna (engari i te wā roa ka taea ngā tipu te hāpai kia matomato anō)
- kei te puta ngā pakiaka kia tuwhera ki ngā hihi o te rā, ā, ka mate
- ka whakaitihia te teitei/kiato o ngā māheuheu ka iti ake te toene, ā, ka iti ake te ora o ngā hua.



### Ko ngā rongoā he...

- tapahi i ngā otaota i te wā tika o te tau hei āwhina ki te tiaki i ngā māheuheu tino kounga o ngā tāhuna, engari he roa ake te wā tipu mai anō o te kiato o ngā māheuheu i muri i te tapahitanga ki tērā o te teitei o te māheuheu.

Ko ngā nōhanga toene pai mō te inanga he māheuheu kiato tāroa - engari ka katia mai, ka puritia hoki e ngā māheuheu kiato tāroa ngā waipara kei roto i te wai. Ko te tikanga ka taka mai ngā para i te wai i ngā wāhi toene inanga nā te rite o te tai ki te pāpuni, arā, ka whakapōturitia te ia, ā, ka noho ngā waipara ki ngā tāhuna.

Ko te mutunga atu:

- he purupuru i ngā pakiaka/tātā o ngā māheuheu o ngā tāhuna
- ka tāmia ngā hua, ka huria ngā tohu huarere kia kore ai e ora ngā hua.



### Ko ngā rongoā he...

- whakaiti i te tope ngahere me te whakapiki i ngā māheuheu o ngā tāhuna puta noa i ngā awa hei tātari atu i ngā waipara whenua i mua i te urunga ki te awa
- he whakawhanake i tētahi mahere awa whānui hei whakaiti i te uru o ngā waipara ki ngā awa i te tuatahi.

### Ngā kaikonihī

He tino puia ki ngā hua inanga. Ko ngā whakamarutanga anake kia kaua rātau e kainga e ngā kaikonihī, ko ngā māheuheu e tipu nei rātau i roto. Ka hunaia ngā hua e ngā māheuheu tāroa, mātotoru, ā, ka uaua te taea e ngā kaikonihī. Mēnā ka taea e koe ngā māheuheu te tiaki, te whakaora rānei ka iti ake te whakararuraru a ngā kīrearea.



he tāhuna  
kua kaha  
rawa te topea

photo © EOS Ecology



ngā waipara  
e tāmi ana i te  
tāhuna toene

photo © EOS Ecology

Kei te tautokona te Kaupapa Mātauranga Toene Inanga ā-Motu e...



AQUATIC SCIENCE &  
VISUAL COMMUNICATION



# Inanga

## He whakaoranga wā roa i te nōhanga



Mēnā kua tirotirohia e koe ō nōhanga toene o ngā inanga i tō rohe, ā, me te kite kāore nei i te tino pai mō te toene, anei ētahi mahi hei whakaaro māu mō te whakapai ā tōna wā.

Mēnā kua whakamahia e koe tā mātau 'puka aromatawai nōhanga toene o ngā inanga' ka mōhio koe tekau mā rua ngā huanga e hiahiatia ana mō tētahi wāhi toene pai. Anei ētahi rongoā whakaoranga wā roa hei whakatinana māu mō ia huanga nei ki te tūpono pā mai ngā raruraru toene.



### Urunga mō ngā ika:

Ka pau he wāhanga o te ao o ngā inanga i te haere moana me te heke ki ngā wai māori hei kaeaea. Ki te aukatia tā rātau piki i te awa kāore e taea e rātau te uru ki ngā awa kia eke ai rātau ki tō rātau pakeketanga.

**Rongoā** – Me tango/whakatika te ārai (hei tauira, tukuna te karawata, ahuriri) kia taea e ngā inanga.



### Urunga ki te wai tai:

Me whai wai tai ngā inanga ki rō wai kia mōhio ai rātau me toene. Ki te kore, kāore rātau e mōhio ki te wā me te wāhi hei toene.

**Rongoā** – Me tango/whakatika te ārai wai tai (hei tauira, tukuna ngā kēti tai, ahuriri) kia taea e ngā inanga te toene.



### Koki o te tāhuna:

Kei te tāhuna pai tētahi nōhanga tūturu pai ki te tāhuna ka taea te whakamahi mō te toene. Kāore e whakamahia ngā tāhuna tūpou rawa. Ko ngā tāhuna papatahi rawa ka raru i te huri o te teitei o te tai (nō reira mēnā he tai pāpaku ake, teitei ake rānei, ka rumakina te tāhuna, ka puta rānei i te wai).

**Rongoā** – Me karikari mai ki tētahi koki 7°–25°.



### Rawa tāhuna:

Me pakari ngā rawa o te tāhuna hei hāpai i te tipu matomato o ngā tipu me te pupuri i te wai kia ora ai ngā hua.

**Rongoā** – Me tāpiri he nōhanga toene hori ki te tāhuna, me karikari anō, me huaki anō mai rānei ngā tāhuna.



### Taumarumarū māheuheu:

Me pai te taumarumarū o ngā māheuheu i te tāhuna hei whakamaru me te noho mākūkū o ngā hua. Ki te kore e rawaka te taumarumarū ka maroke haere ngā hua inanga, ā, ka mate.

**Rongoā** – Me rapu i te take he aha i kore ai e pai te tipu o ngā tipu, ā, ka whakarite ai i tērā raruraru.

- Raruraru whakapai, arā, he maha rawa nō ngā wā e tapahia ana ngā tipu – arotake i te rautaki whakapai.
- Raruraru urunga kararehe, arā, kei te kai ngā kararehe i ngā tipu, kei te tūkinu rānei i ngā tāhuna – taiapatia atu ngā kararehe.
- Raruraru o te rōnaki o te tāhuna – me karikari anō te rōnaki o te tāhuna.
- Raruraru marumarū, arā, kei te aukatia te tipu o ngā tipu e te marumarū hāngai – topea ngā tipu/rākau marumarū.
- Kei te tāmia ngā tipu e te ngahoro o ngā rau o ngā rākau tauhou – whakawāteahia ngā rākau tauhou ka whakakapi ki ngā rākau tūturu, me whakawātea atu rānei ko ngā rau i mua i te wā toene.



## Te teitei o ngā māheuheu

Me tika te teitei o ngā māheuheu kia ora pai ai ngā hua mō te marama kei waho rātau i te wai. Mēnā he poto rawa ngā māheuheu kāore e eke te mātatoru e tika ana hei whāriki mō ngā pakiaka, mēnā he tāroa rawa ka whāiti rawa i te papa, ā, kāore e tika te pururua kia ora ai ngā hua.

**Rongoā** – Mēnā he poto rawa ngā māheuheu, he roa rawa rānei me tiro anō ki te huri i ngā rautaki whakapai hei hāpai i te teitei pai rawa mō ngā tipu.



## Momo māheuheu

He pai ētahi māheuheu mō te toene, ā, ko ētahi anō kāore i te pai. Heoi, he pai ētahi kanorautanga (ko ngā ururua o ngā tipu nui ake ka taumaruru i ngā ika i te wā e toene ana, aha atu, aha atu.) - nō reira kua ngā tipu nui katoa e whakawāteahia mai i tētahi wāhi, engari anō mēnā he tarukino.

**Rongoā** – Me whakawātea ēnei tipu tarukino/kino ka whakakapi ki ngā momo e tika ana mō te toene. He taru kino te yellow flag iris, ā, kāore e pai mō te toene. He tino uaua te whakakore nō reira me mātua whakangaro tonu i tō kitenga tuatahitanga i tō wāhi!



## Te mātotoru o te whāriki pakiaka:

Me whai whāriki pakiaka tipu pai, mātotoru hoki ngā inanga i te papa kia puritia e ngā māheuheu te mākū, hei taumarumaru hoki i ngā hua. Kei te āhuatanga o ngā mahi whakapai te kaha mō tēnei – mēnā ka topea/he nui rawa ngā tapahitanga kāore e eke te mātotoru tika o te whāriki/para/tātā.

**Rongoā** – Me arotake te rautaki whakapai/whakawātea i ngā kararehe mai i te wāhi.



## Mākūkū o te whenua

Ka maroke haere ngā hua inanga, ā, ka mate ki te kore e noho mākūkū. Ko ngā pūtaka pea mō te maroke o te whenua i tētahi wāhi toene ko ngā rawa o te tāhuna pea, ko ngā momo/taumarumaru māheuheu.

**Rongoā** – Me whai ki te whakarerekē i ngā momo rawa o te tāhuna (mēnā ehara ko te oneone), tirohia ō rautaki whakapai/kararehe hoki/rānei i te mea ka tere maroke haere te papa ki te poto ngā otaota.



## Taumarumaru mō ngā ika

Ka huihui mai ngā inanga pākeke i mua i te toene, nō reira me nui ngā taumarutanga (hei tauira, ngā tipu tauwharewhare/e pihi ake, ngā poro rākau, toka, aha atu, aha atu) hei tiaki i a rātau mai i ngā kaikonihī.

**Rongoā** – Kei te āhua o tō kōawa ka taea e koe te whakauru tūporo/toka ki te wai hei taumarumaru. Me tiroiro anō ki te whakatō wīwī ki te wai i te tai pāpāku hei taumarumaru anō.



## Mahi whakapai tāhuna

Mēnā ka tapahia haeretia ngā otaota o ngā tāhuna kāore e tipu ngā māheuheu ki te teitei/mātotoru e hiahiatia ana hei tiaki i ngā hua inanga.

**Rongoā** – Me kōrero ki ngā tāngata/mana ā-rohe e whakapai ana i ngā tāhuna mēnā ka huria e rātau tā rātau rautaki whakapai hei āwhina kia pai ake ngā āhuatanga toene. Tirohia ngā huanga o mua mō ngā kōrero atu anō mō ngā mea e whakaruruhia ana pea e te rautaki whakapai onāiane.



## Te ārai kararehe

Ki te uru ngā kararehe ki te nōhanga toene ka tūkinohia e rātau ngā tāhuna me te noho poto o ngā otaota, ā, kua kore e taea ngā hua te tiaki. Ka taea anō ngā hua te tāmi mēnā ka uru mai ki te wāhi i te wā o te wāhanga toene.

**Rongoā** – Me kōrero ki te ariki whenua mō te whakatū i tētahi taiapa pūmau. He pūtea ā te nuinga o ngā Kaunihera ā-Rohe hei āwhina i tēnei.



## Ngā kaikonihī hua

He tino puiki ngā hua inanga. Ko ngā whakamarutanga anake kia kua rātau e kainga e ngā kiore me ngā putoko, aha atu, aha atu, ko ngā māheuheu e tipu nei rātau i roto.

**Rongoā** – Ka hunia ngā hua e ngā māheuheu tāroa, mātotoru, ā, ka uaua te taea e ngā kaikonihī. Mēnā ka taea e koe ngā māheuheu te tiaki, te whakaora rānei ka iti ake te whakararururu a ngā kīrearea.

Kei te tautokona te Kaupapa Mātauranga Toene Inanga ā-Motu e...



AQUATIC SCIENCE & VISUAL COMMUNICATION





# I ahu mai ēnei pēra i te kaupapa hāpai ki te whakaora i te toene inanga/kaeaea. Me waiho toitū noa ngā pāera.



Kua whakanohotia ēnei pēra hei ki ngā tāhuna, ā, ka tiroirohia haeretia kia mutu rā anō te wā toene. I tua atu i te whakapai ake i te momoho o te toene ka mōhio anō tātau kei hea ngā inanga e toene ana. Ka āwhina tēnei i a tātau ki te tautuhi i ngā wāhi pai rawa mō ngā mahi whakaoranga wā roa o tō rātau nōhanga toene. He mea taketake tēnei i te mea kei te heke te tokomaha o ngā kaeaea, ā, ko te whakatau mō te Inanga 'Kei te Noho Mōrea'.

He tino mai ngā pēra hei hei nōhanga toene hori pai rawa mō ngā inanga. Ka koiri ngā inanga i waenga i ngā pēra ki te whakawhānau i ā rātau hua i te wā o ngā tei teka teitei\*. Ka tiakina ngā hua kia puta rā anō te tai teka whai ake ina paopao ana kua heria atu ngā torongū ki te moana kia tipu ai hei inanga pūhou, e kīia ana he 'kaeaea'.

\* TAI TEKA – he tai i muri tonu mai i te kōwhiri, rākau nui rānei, i te wā e tino nui rawa te rerekē i waenga i te wai teitei me te wai papaku.



photo © EOS Ecology

Kei te tautokona te Kaupapa Mātauranga Toene Inanga ā-Motu e...



AQUATIC SCIENCE & VISUAL COMMUNICATION

E tautokona ana i te rohe nei e...



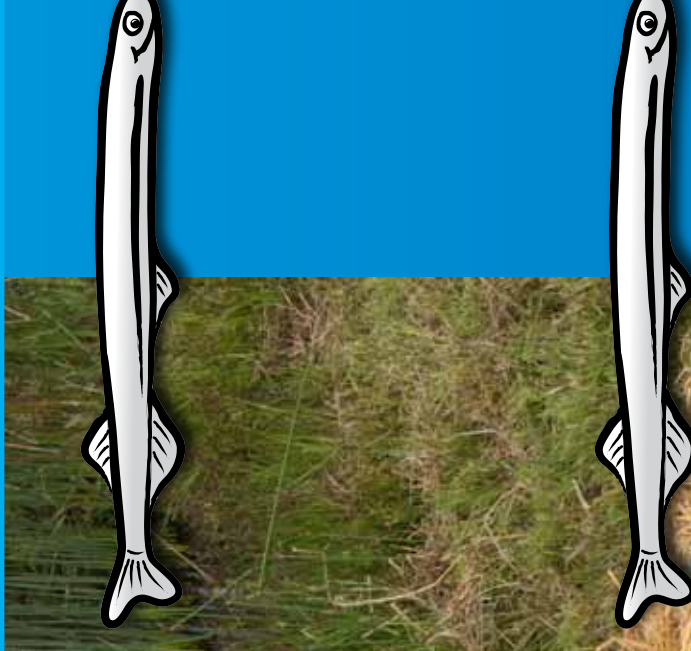
Me rapu mōhio anō mai i te whārangī pukapuka "Whitebait Connection". Me whakamōhio mai mēnā kua tūkinohia ngā pēra. Whakapā mai ki: [info@whitebaitconnection.co.nz](mailto:info@whitebaitconnection.co.nz)



WE ♥ WHITEBAIT  
WHAKA INAKA - CAUSING WHITEBAIT



# Te kaupapa whakaora toene inanga/kaeaea



Kua kite pea koe i ngā pēra hei i ngā tāhuna o tēnei awa i ngā marama o te raumati/ngahuru. I ahu mai ēnei pēra i tētahi kaupapa mō te aukati i te heke o te tokomaha o te inanga/kaeaea.

Ko tētahi o ngā pūtake nui mō te heke o te maha o te inanga ko te ngaro o ngā nōhanga pai i ngā tāhuna mō te whakawhānau hua. He wāhi rangitahi ngā pēra kia toene ai ngā inanga i ngā wāhi e kore nei e ora ngā hua i mua. He āwhina tēnei ki te tautuhi i ēnei wāhi e hiahia ana i ngā mahi whakaora/whakapai wā roa i ngā tāhuna mō ngā reanga inanga e haere mai ana.

## NGĀ NŌHANGA TOENE PAI MŌ NGĀ INANGA:

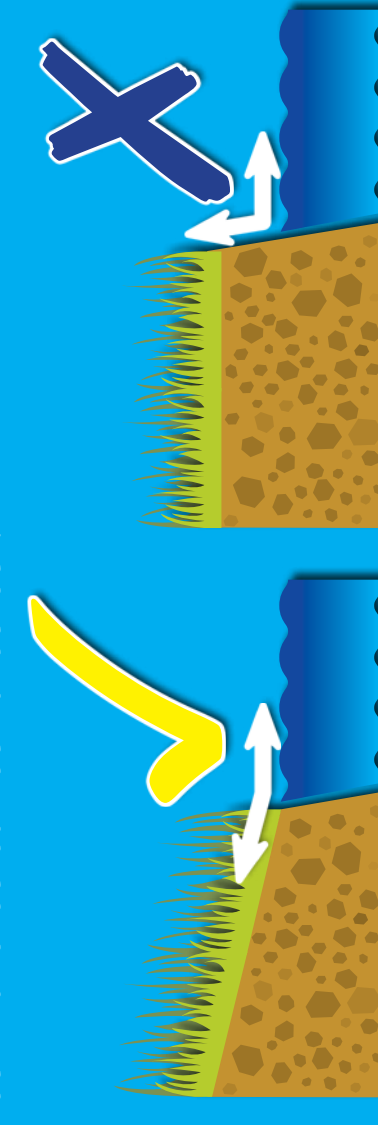
### Te tawhiti tika mai i te wahapū/moana

**Te tawhiti tika mai i te wahapū/moana**  
 Ko ētahi wāhanga o tēnei wai he tino pai rawa hei toene inanga nā te tūtata ki te moana. Ko te toene ka mahia i ngā wāhi e taea ai ngā tai teka teitei\*, engari kāore i te tino tototote te wai. I te wā o ngā tai teka ka taea e ngā inanga ā rātau hua te whakawhānau i ngā māheuheu kei runga ake i ngā tāhuna, i runga ake i te teitei rerenga noa o te awa.

\* TAI TEKA – he tai i muri tonu mai i te kōwhiri, rākaunui rānei, i te wā e tino nui rawa te rerekē i waenga i te wai teitei me te wai pāpaku.

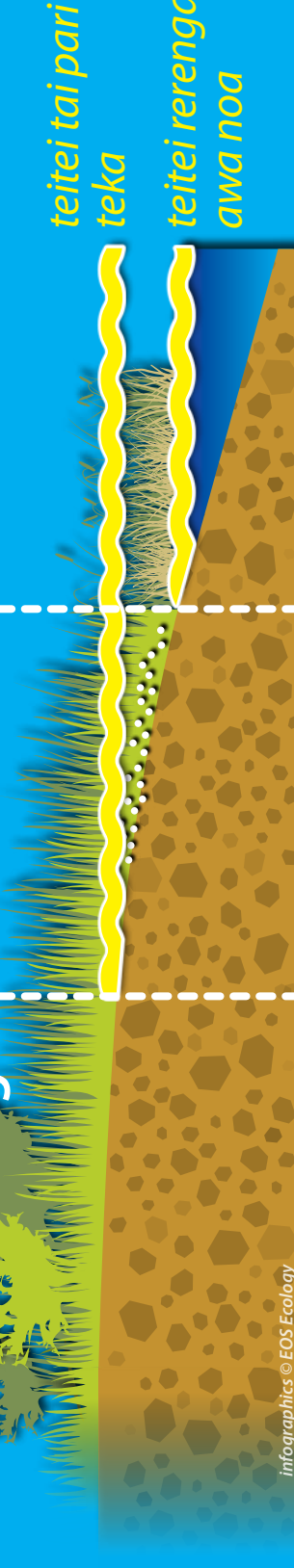
### He tāhuna rōnaki

Ko te mea pai kia rōnaki te tāhuna, kia kawa he taha tūpou. Ko te tikanga he nui ake ngā wāhi o te tāhuna ka taea mō te whakawhānau a ngā inanga i ā rātau hua i te wā o te tai teka teitei.



### Kei te tipuria te tāhuna e te māheuheu

Ngā whakamarumaruru rākau tūturu/mauwaha – he whakarato marumaruru mō ngā hua me te kōpe o te ngahoro o ngā rau ki runga



Otaota mātotoru roa – kia taea ngā hua inanga te

Ngā tipu e puea ake ana i te wai - hei huna i ngā inanga kia tae mai te tai pari teitei hei whakahoki i a rātau ki runga i te tāhuna



E noho mōrearea ana ngā hua inanga ki ngā kirearea matekai



### Kāore he kaikonihī No pollution

Kei te tautokona te Kaupapa Mātauranga Toene Inanga ā-Motu e...



E tautokona ana i te rohe nei e...

**Me rapu mōhio anō mai i tē whārangi pukapuka "Whitebait Connection".** Me whakamōhio mai menā kua tukinohia ngā pēra. **Whakapā mai ki: info@whitebaitconnection.co.nz**





# Nōhanga inanga

## Me pēhea te aroturuki i ngā mahi a te kīrearea



Ka taea e ngā kīrearea whāngote iti te whakamōrea ngā nōhanga taketake me te tino whakaiti i ngā taupori momo taketake. He tika tēnei mō ngā inanga – he tino rawe ki ngā kīrearea pēnei i ngā kiore-iti, kiore, tuatata hoki ngā hua inanga, otirā ina kitea te tini huhua i ngā tāhuna.

I mua i te patu/hopu kīrearea, he mea nui kia mōhio koe he aha ngā kīrearea kei reira, ā, ko hea ngā wāhi e tino haerehia ana e ngā kīrearea. Mā tēnei ka taea e koe ngā tikanga patu/hopu kīrearea pai rawa mō ngā kīrearea kei a koe, me te whakamahi i ngā wāhi e tika ana – kia kore ai e moumou wā, moni hoki. Ahakoa kāore koe i te whakarite kaupapa whakahaere patu kīrearea ā kō ake nei, he mea nui kia mōhio koe ki ngā āhuatanga i tō takiwā toene inanga.

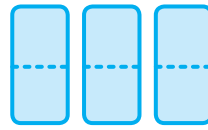
Mā te whakatinana i tētahi kaupapa aroturuki kīrearea ka taea te kōhi raraunga me te mōhio haere ki ngā kīrearea kei tō taiao. (Me aroturuki haere koe i ngā kīrearea i te wā o tō kaupapa patu/hopu kīrearea hei tātari i tōna whaitake.)

He maha ngā tikanga\* mō te aroturuki i ngā mahi i ngā kīrearea whāngote iti, engari e taunaki ana mātau kia whakamahia ngā kāri ngaungau whakaatu kīrearea hei tikanga tūkino-kore hei tīmata i te tukanga. Ko te pai o tēnei tikanga he ngāwari, he iti te utu, ā, ka taea e ngā rōpū kura, tamariki kura kōhungahunga, rōpū hapori, whānau rānei te mahi. Mahi ai ngā kāri whakaatu mā te whakamahi maimoa tāoke-kore ka taea te kai i roto i te kāri ka timotimohia e ngā kīrearea, e mahue ana ko ngā tohu ngaungau whakaaturanga.



He tauira o tētahi kāri whakaatu kīrearea Goodnature, kua whakakāia ki te pani pīnati-pata tāoke-kore reka.

### Ngā utauta whakatū e hiahiatia ana:



ngā kāri whakaatu kīrearea



1x tumu rākau mō ia wāhi kāri whakaaturanga



pene māka pūmau



kuru (hei paopao i ngā tumu rākau)



ngā kōwiri



wiri/hōrete

**Hei whakamau...** Tohua ki hea waiho ai i ō kāri whakaatu i te wāhi o te nōhanga toene inanga. Me mātua tiro tiro mō ngā pūmate. (Kei te āhua o ngā moni/wā, he pai ake kia iti noa ngā wāhi, ka aroturuki haere i ēnei i roto i te wā kia whiwhi tipakotanga pai rawa mō ngā kīrearea kei te kaikai haere i te wāhi.)

Me whai i ngā tohutohu i tukua mai me ō kāri whakaatu. Ko te tikanga ka tākai koe i te kāri kia haurua kia papī haere mai te mounu maimoa. Me wiri atu ki te tumu rākau, ka paopao atu kia mau ki te whenua i te wāhi i tohua e koe. (Me mōhio ki te tawhiti whakamutunga o te kāri i runga ake o te whenua. Ko te tikanga he 8 cm te mea pai kia taea e ngā kīrearea.)

Mēnā kei te mahia e koe ētahi wāhi atu anō, me whakamahi he pene māka pūmau ki te tumu.

E taunaki ana mātau kia waiho atu ia kāri mō te 3–7 rā, kātahi ka tirohia ka whakakapi me tētahi mea hou. (Tirohia ngā tohutohu aroturuki whānui kei te whārangi whai ake.)

\* Ko ētahi atu tikanga aroturuki kīrearea whāngote iti ko te: whai haere i ngā arapoka, tautuhi hamuti, rama me ngā kāmera hopu nekehanga. Tirohia anō te 'Hei Pānui Atu Anō me Ngā Rauemi' kei te whārangi whai ake mō ngā huatau whakarato.

Mēnā kei te hiahia koe kia nui tonu ngā whakaaturanga o ngā kīrearea i tō nōhanga inanga, ko te tūtohu ki a koe kia aroturuki haere puta noa i te wā toene.

## TIKANGA AROTURUKI

**Upane 1. I te taenga atu ki te wāhi, tirohia te wāhi whānui mō ngā pūmae.**

**Upane 2. Me whakaahua te kāri whakaatu e mau ana ki te tumu.** Me mātua tuhi te nama whakaahua/wā whakaahua kia pai ai te tūhono mai anō ki te wāhi ina hoki atu koe. Kia pātata tonu te whakaahua, engari me mau ki roto i te whakaahua ko ngā tuhituhi kei te tumu rākau i te mea he whakaatu tēnei i te nama wāhi.

**Upane 3. Me āta tirotiro i te kāri whakaatu i mua i te tango mai i te tumu.** HKua ngaungautia/kainga? Mēnā kāore he māka, i te tāwewē mai tonu te maimoa i raro?

**Upane 4. angohia te kāri whakaatu kīrearea mai i te tumu mā te wiri/hōrete rānei.** Mēnā kua ngaungauhia te kāri me kimi ngā wāhi i timoa mai ka kōhi mai anō i ērā.

**Upane 5. Raua tō kāri me ngā wāhi i timoa mai ki te pēke kirihou.** Whakamahia tō pene māka pūmau hei tuhi i te wāhi/rā ki te pēke.

**Upane 6. Whakakapia te kāri whakaatu kīrearea ki tētahi mea hou.** Me wiri ki taua puare anō mēnā ka taea.

**Upane 7. Me tautuhi ō kīrearea o tō takiwā** mā te whakataurite i ō kāri whakaatu kua ngaua ki tētahi tūtohi whakaaturanga i whakaratohia e tō kaihanga kāri.

**Upane 8. Tuhia ō kitenga** mēnā kei te aroturuki koe i ngā wāhi maha mō ngā rauna kāri whakaaturanga. Me waiho ō kāri kīrearea ki ngā pēke kirihou hei tirotiro, whakataurite hoki ā muri ake.

**Upane 9.** Me mahi anō mō ia rauna aroturuki.

## Ngā utauta aroturuki e hiahiatia ana:



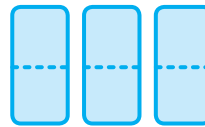
**kāmera** (hei whakaahua i ngā kāri whakaatu kua whakamahia ki te tumu, me te nama wāhi ki te whakaahua, mēnā ka nui ake i te kotahi ngā rauna aroturuki)



**pēke kirihou kakati/maukati** (hei pupuri i ngā kāri whakaatu kua whakamahia)



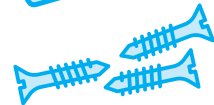
**pene māka pūmau**



**ngā kāri whakaatu whakakapi** (mēnā ka nui ake i te kotahi ngā rauna aroturuki)



**kuru** (mō te paopao anō i ngā tumu mēnā e hiahiatia ana)



**ngā kōwiri whakakapi ki te hiahiatia**



**wiri/hōrete**

## He tauira o ngā whakaaturanga timotimo kīrearea



kiore



kioreiti



tuatete

**HEI PĀNUI ATU ANŌ ME NGĀ RAUEMI:**

- [www.goodnature.co.nz/products/accessories](http://www.goodnature.co.nz/products/accessories)
- [www.traps.co.nz/chew-card-unloaded](http://www.traps.co.nz/chew-card-unloaded)
- [www.connovation.co.nz/pest-monitoring](http://www.connovation.co.nz/pest-monitoring)
- [www.eosecology.co.nz/files/2016\\_Whakalnaka\\_PestMonitoring\\_ReportCard.pdf](http://www.eosecology.co.nz/files/2016_Whakalnaka_PestMonitoring_ReportCard.pdf)

Kei te tautokona te Kaupapa Mātauranga Toene Inanga ā-Motu e...



AQUATIC SCIENCE & VISUAL COMMUNICATION



