



**NIWA**  
Taihoro Nukurangi

# KINA

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WHAT DOES SCIENCE TELL US ABOUT  
THE NEW ZEALAND SEA URCHIN?

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# TAONGA SPECIES SERIES

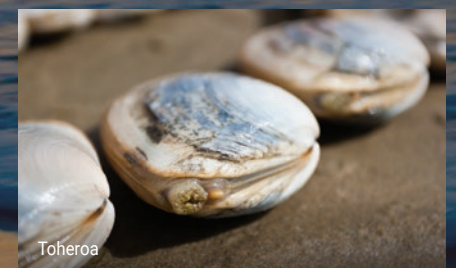
Taonga species such as tuangi, toheroa, and kina are central to the identity and wellbeing of many Māori communities.

For generations these species have sustained communities and helped transfer customary practices and knowledge from one generation to the next. However, many communities are reporting that the abundance and size of these taonga are declining.

Te Kūwaha, NIWA's National Centre for Māori Environmental Research, has been working with whānau, hapū and iwi for more than a decade to co-develop methods for the protection and restoration of taonga species.

A series of booklets has been developed, sharing science knowledge to support species management strategy.

The Taonga Species Series includes tuna, kākahi, īnanga, kōura (freshwater and marine), piharau, kanae, tuangi, toheroa and pātiki. Find out more about the series at [niwa.co.nz/taonga-species](http://niwa.co.nz/taonga-species)



Cover photo: Kina (*Evechinus chloroticus*), photographed in Taputeranga Marine Reserve (Lana Young, NIWA)

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## WHAT IS A KINA AND WHERE CAN YOU FIND IT?

Kina (*Evechinus chloroticus*) is a type of sea urchin (also known as a sea egg), only found in Aotearoa-New Zealand.



There are about 110 sea urchin species in Aotearoa (out of around 1,000 species worldwide). Kina are echinoderms (Phylum Echinodermata) which also includes starfish, feather stars, brittle stars and sea cucumbers.

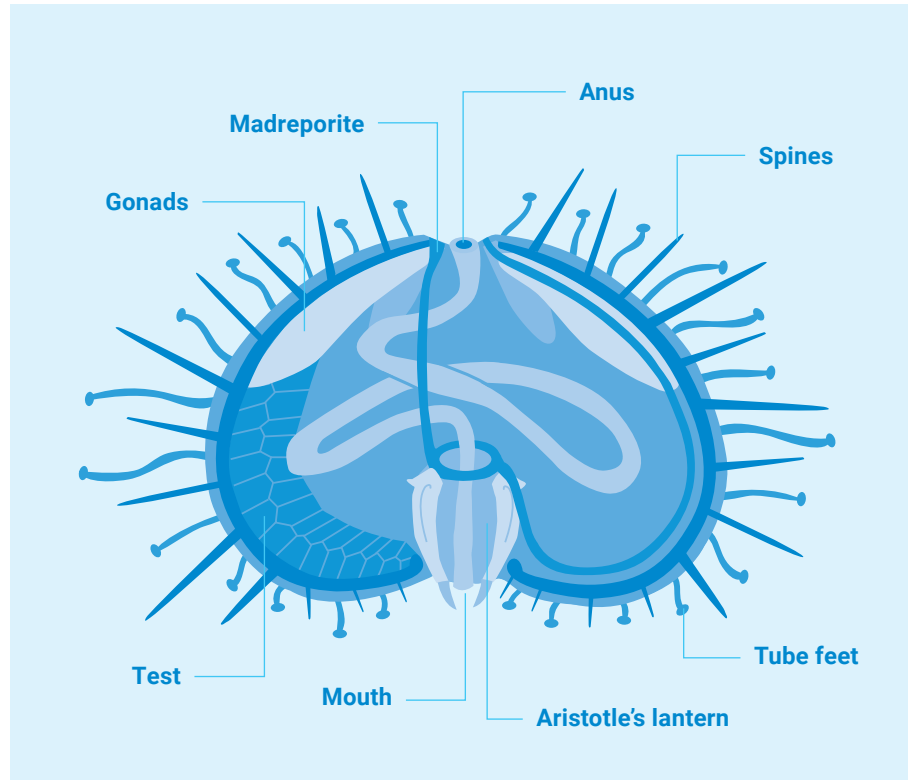
Kina are the most common species of sea urchin found in shallow coastal waters surrounding Aotearoa and its offshore islands. Like all the species in their group, their body is covered in sharp spikes and has the appearance of a curled-up hedgehog.

Kina usually inhabit rocky reefs in coastal environments, at shallow depths from about the low tide mark to at least 20 metres. They prefer kelp forests and encrusting coralline algae habitats, with moderate current and wave action.



A kina and a sea cucumber in a crevice.

# KINA ANATOMY



Kina have a hard, round, protective exoskeleton called a **test** made from calcium carbonate. The exterior is covered in numerous movable **spines** and **tube feet** that are used for defense, movement and respiration. Kina also use their tube feet to move food to their mouth.

Kina have a set of five self-sharpening teeth connected to a unique feeding apparatus called the **Aristotle's lantern** that they use to chew and ingest food. Kina have very sharp teeth; sharp enough to eat through plastic.

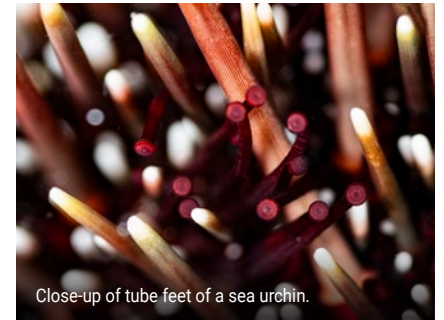
Kina have a small sieve plate on the top of their shell, called a **madreporite**, that controls the flow of seawater in and out of their body like a hydraulic pump. They have minimal internal organs, as most of the internal test space is used for gonad development.

The **gonads** are the reproductive organs producing either sperm or eggs. Male and female kina look the same until you open them. You may be able to tell the sex by looking at the gonads. Male gonads can often be paler in colour compared to female gonads and may have a milky substance, depending on local conditions.

Kina gonads can vary in shades from dark brown to bright golden yellow. However, many environmental conditions affect kina gonad colour and quality, such as diet, season, habitat, and location.



**Kina hold significant culinary importance in Māori tradition. When they are ripe and in season their gonads swell. This is the best time to eat them.**



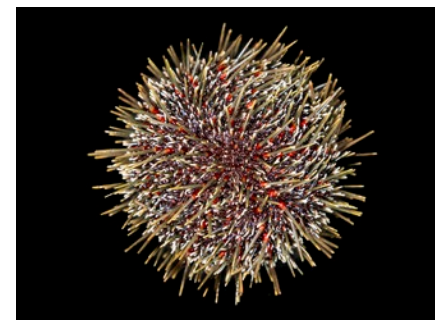
Close-up of tube feet of a sea urchin.



Submerged sea urchin stretching out its tube feet.



Ventral view of a sea urchin, showing its mouth.



# LIFE CYCLE

The life cycle of kina begins with spawning, where eggs and sperm are released into the water in response to environmental cues.

## Spawning

Adult kina spawn annually by releasing eggs and sperm into the water column simultaneously during the warmer months of spring and summer. The eggs are fertilised by the male sperm and develop into larvae.

## Adults

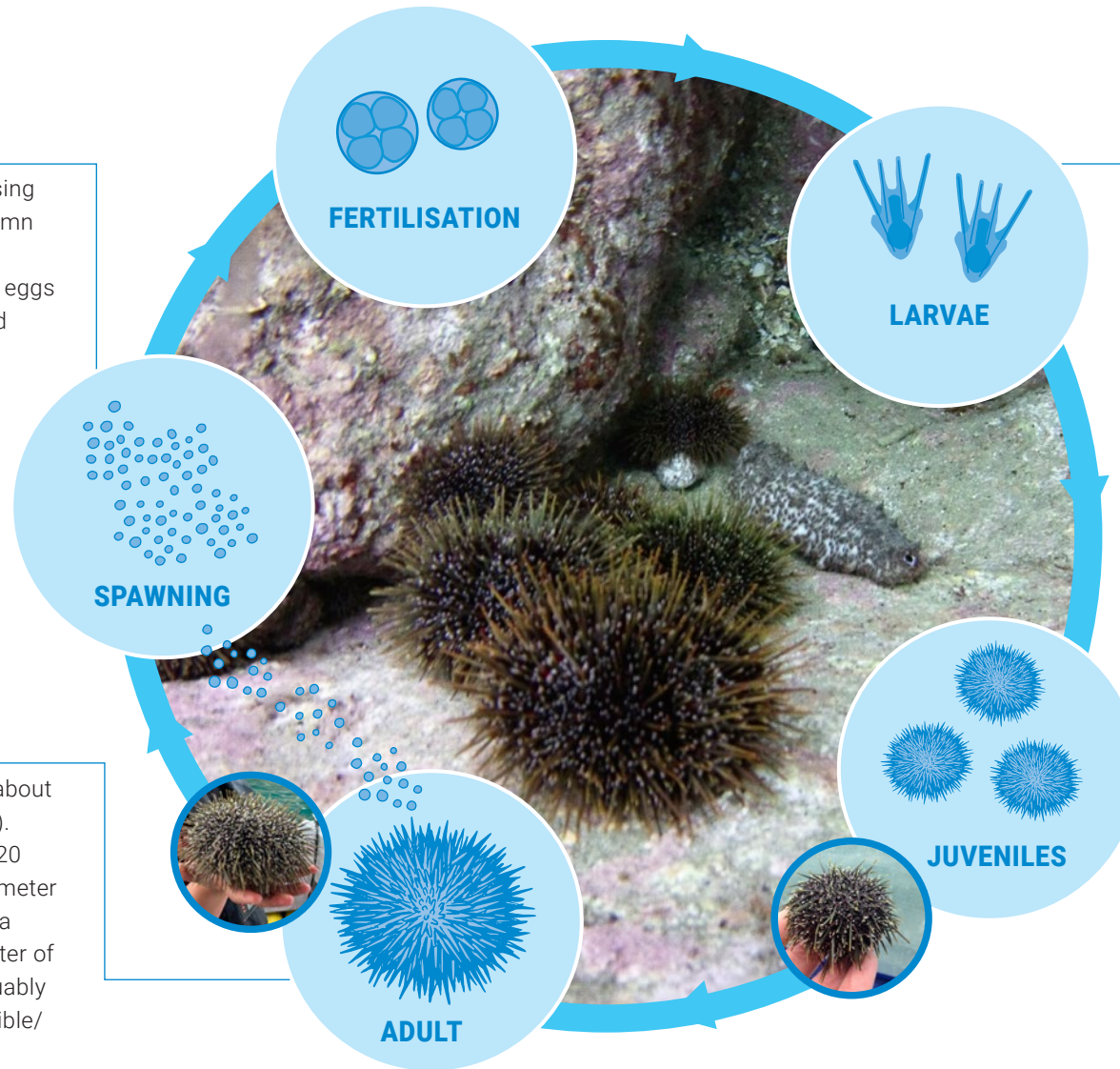
Kina mature and begin to breed at about three or four years of age (>30 mm). Adult kina are thought to live up to 20 years and grow to 150-200 mm diameter depending on location and diet. Kina have the potential to reach a diameter of 190 mm (a small dinner plate), arguably making them the world's largest edible/commercial species.

## Larvae

Fertilised eggs develop through multiple larval stages. The larvae float around the ocean feeding on plankton. Larvae settle after approximately 3-4 weeks on coral habitats, where they transform into juveniles.

## Juveniles

Juveniles grow rapidly over the first 2-3 years. They are very cryptic, hiding under rocks until they are around 40 mm when they venture out into the open.



# WHAT DO KINA EAT?



Intertidal coralline algae near the mouth of the Ohau Stream, north of Kaikoura.

## Kina serve as significant grazers in kelp forests.

They are mainly herbivorous, grazing on their favourite brown seaweeds and coralline algae. They have also been known to eat sponges and sea squirts if food is scarce.

They play a significant role in ecosystem balance by regulating the population of algae, preventing the overgrowth of underwater plant communities and ensuring stability and diversity of the marine ecosystem.

## OUTNUMBERED – KINA BARREN

Fishing pressure on kina predators such as snapper, blue cod and crayfish may have contributed to the over-abundance of kina in some areas. Swarms may strip a reef of its kelp, creating an open space known as a kina barren.

These barren areas can wreak havoc on entire coastlines. In the absence of kelp, there is no habitat for fish breeding or shelter for juvenile fish and crustaceans. This results in a desolate landscape of barren rock.



**Kina can regenerate spines if broken.**



## HOW DO KINA BEHAVE?

Kina are nocturnal, feeding mostly during dusk and dawn to avoid predators.

Kina do not move far and usually return to a home crevasse if predators such as blue cod, snapper, starfish and crayfish are present. They can also live in very dense groups.

When kina die it loses its spines, revealing a captivating green globe-like shell. The empty shell shows an incredible arrangement of symmetrical dots called tubercles where the spines were attached.



The empty kina shell shows an beautiful arrangement of symmetrical dots where the kina spines were attached

## WHAT ARE THE THREATS TO KINA AND HOW CAN WE HELP?

Kina face pressures from changes to their habitat and competition from other species:

- Pollution
- Habitat degradation, e.g., sedimentation effects on kina food sources
- Overfishing of key predators (e.g. snapper, blue cod and crayfish) leading to kina barrens
- Climate change effects such as:
  - marine heat waves
  - ocean warming and acidification
  - extreme weather events such as storms
- Competition from the long-spined subtropical sea urchin *Centrostephanus rodgersii*.
- Increased sea temperature has expanded the range of *Centrostephanus* to areas where historically only kina were found (currently Poor Knights to east coast). As it is quite different to kina and not endemic to Aotearoa but classed as a native that comes on the current from South Australia.

### How can we help kina?

Restore habitats and maintain a balanced ecosystem



Avoid overfishing key predators of kina to prevent overpopulation



Protect and restore kina ecosystems and their habitat. Get involved in initiatives like riparian planting and coastal reforestation to help limit sediment input into the coastal environment.

# KINA FISHERY

The commercial fishery harvest is by free diving only within the quota allowance.

Recreational daily catch is 25-50 per person by scuba or free diving, depending on the region. There is no legal size to harvest kina; most roe is sold commercially on the New Zealand domestic market.

It is important to stay up to date on fishing regulations. Please check the regulations in your area regularly.

Kina contribute to the traditional Māori concept of “kaimoana”, which refers to seafood as a significant food resource. The harvesting of kina supports cultural practices and provides a valuable food source.

**Note: Regulations as at September 2024**



NIWA diver volunteering during kina removal

Photo credits: Lana Young, Kate Neill, Steve Mercer, Irene Middleton, Owen Anderson and Dave Allen.



NIWA's Mel Hayden helping on a kina abundance survey in Tory Channel in December 2022

## NIWA

National Institute of Water & Atmospheric Research Ltd (NIWA) is New Zealand's leading provider of climate, freshwater and marine science. We deliver the science that supports economic growth, enhances human wellbeing and safety, and enables good stewardship of our natural environment.

## Te Kūwaha o Taihoro Nukurangi

Te Kūwaha, NIWA's National Centre for Māori Environmental Research, strives to deliver on Māori research aspirations in a way that reflects Māori values and respects both Māori and scientific knowledge systems. We are working with whānau, hapū and iwi across Aotearoa.

We recognise that whānau and hapū across Aotearoa have an extensive range of names for their taonga species. In this resource we have drawn on the most commonly used names, but please check with your local hapū for the te reo Māori that is relevant to your area.



For more on kina or other taonga species visit  
[niwa.co.nz/taonga-species](http://niwa.co.nz/taonga-species)

Climate, Freshwater & Marine Science



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