

**New Zealand Association of Science Educators
Teacher Application - 3 Year Term**

**Application for Ethical Review of a School Investigation/Project Involving Live
Animals**

Name of Supervising Teacher: Joshua Helice

Additional Teachers: Amy Crassa

School name: Mud Flats College

School address: 123 Pincer St, Boontown

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Year level of students: Year 13 Biology

Number of students: 20 - 30

Purpose of Project: Level 3 NCEA assessment (A.S. 3.1)

Date of Application for Ethical Approval: 16/11/2005

Intended start and finish dates of investigation period (month and year):

February - April 2006, February - April 2007, February - April 2008

1 Investigation's Title: Mudcrab study

2 Investigation's Aims: What do I expect students to find out from doing it?

Students will investigate an aspect of the niche of the mudcrab. They will each plan, carry out and write up their own, independent investigation.

Signature of Applicant(s)

Date

*If emailing this form to NZASE you still required to send a signed copy by post to the
Animal Ethics Committee Secretary, P O Box 598 Wellington.*

Statistics Return: You will need to download the Animal Use Statistics form to report to the NZASE
Animal Ethics Committee on the condition of your animals at the end of each year of your
investigation.

For NZASE AEC use only

Approval Granted / Provisional / Declined

Signature **Designation**

Date of Approval: / / 200 **Period of approval:** years

Investigation Completed: / 200

Animal Statistics Return Form Completed..... / 200

3 Scientific Background of Investigations: What students will know about this before they start:

Students will have researched the study animal, and will have observed and handled the crabs before carrying out their own investigations. They will have visited an estuary. They will have planned their investigation and discussed their written plan with their teacher before carrying it out. It will have been approved by the teacher.

4 Type and Number of Animals we will use: species of animal and number of each species.

The species of crab is the burrowing mudcrab, Helice crassa. Number of animals is difficult to estimate as this will depend on the type of investigations chosen by the students. Typically, if a student is doing an investigation which involves manipulating a factor, such as an osmoregulation or feeding preference experiment then the student would use up to 50 crabs for their investigation. If doing a field-based study, it would depend on the numbers of crabs present in the environment.

5 Teacher's experience: Briefly describe the teachers experience in handling these animals in the classroom and field.

Both teachers mentioned in this application are experienced classroom teachers. We have used the mudcrab as a study animal for some years and both have experience in handling and caring for the animals, and in working with students studying the burrowing mudcrab. We have sought and been given advice on handling and caring for the animals from the NZ Marine Studies Centre at Portobello, and have successfully studied these animals for a number of years.

6 Source: We will get these animals from:

- animals to be kept in classroom aquarium prior to our fieldtrip are usually obtained from the Anderson's Bay Inlet, or from the shore at Waitati
- experimental animals are obtained from the estuary at Karitane

7 Location: We will keep the animals:

- at school, in a classroom during Biology periods, and in an adjacent, chemical-free preproom at other times
- at the outdoor centre at Karitane

8 On separate pages please outline each investigation students propose to carry out with these animals. Outline common procedures then the details.

Fill in the following:

- How animals will be obtained/collected
- How animals will be transported
- How animals will be contained/caged
- How investigations will be carried out
- Risks to the health or well-being of the animals as a result of the investigations will be identified
- Risks to the health or well-being of the animals will be minimized or avoided

- How animals will be cared for, including housing, feeding, cleaning and weekend care
- How animals will be dealt with at the end of the investigation eg. returned to their original environment, returned to a similar environment or kept in captivity. With certain species it may be inappropriate to release them from captivity; in this case the animals will need to be humanely killed. The method proposed for achieving this **MUST** be included, plus the name of the person who will do this and their experience with the procedure.

9 Students will keep a detailed logbook of their investigation YES

Mud Flats College Application for Ethics Approval

For 2006 there will be one class of Year 13 biologists, numbering 23 students in total, who propose to undertake investigations about the burrowing mudcrab (Helice crassa). We typically have 1-2 classes of students at this level. Although numbers of students vary from year to year, we would anticipate a similar number of students each year over the three year period covered by this application.

This proposal includes the setting up of observation tanks in our school and the carrying out of investigative work by students both in the field and at the Outdoor Centre at Karitane. The Outdoor Centre is an old school now owned and operated by the local marae. It has been converted and has a classroom with tables for students to work at with mobile trays and lab equipment, a kitchen area with running water, and toilet and bathroom facilities. All work is done inside protected from sun and other climate changes.

GENERAL FEATURES

Method for collecting and transporting crabs:

- All experimental crabs would be dug up using a trowel, by carefully excavating an area behind the burrow entrance. This method will be demonstrated for students before they begin their studies. Students will be directed to different areas on the shore to avoid taking too many crabs from any one area.
- As each crab is uncovered, or as they move out of their burrow, they will be carefully picked up and placed in a large bucket containing at least 5 cm of wet mud from the collection site. Only healthy crabs with dark colour and a hard carapace will be used in investigations. Any crabs in berry will not be used in investigations.
- No more than 15 crabs would be placed in a single bucket of 20 litres with a 35 cm diameter base, allowing each crab some room to move. This process would be carried out as quickly as possible, to reduce stress on the crabs.
- If necessary the crabs would then be transported to the school or outdoor centre in a vehicle. The buckets will be made secure between seats and held in place by students' feet and legs. The bucket(s) of crabs would be observed throughout the journey by a person (other than the driver), to ensure that the buckets would not be tipped over. They will also be protected from sunlight during travel with a newspaper cover. The vehicle will be ventilated with open windows.
- Students will wash their hands after collecting crabs at the shore. They will rinse well ensuring as much soap/detergent is removed from their skin before drying their hands.

Positioning of tanks or experimental containers:

- Both at school and at the outdoor centre site the tanks or containers would be positioned in an area where the range of temperature and exposure to direct sunlight would not exceed that found in the natural habitat of the crabs.

Recognizing and responding to signs of stress:

- Any crabs observed to be displaying signs of stress or poor health (bubbling at the mouth, unusual body posture, reduction in activity) would be immediately removed from the tank or experimental container to a separate container containing 5cm of wet mud. These animals would be returned to the estuary or to a similar habitat as soon as possible.

Returning the experimental animals to their natural habitat:

- At the end of these investigations the crabs would be carefully removed from the observation tanks and experimental containers and returned to a large bucket containing at least 5 cm of wet mud from the estuary.
- If the crabs had burrowed or were beneath the surface of the substrate in the container, they would be carefully dug up using a trowel.
- No more than 30 crabs would be placed in each bucket, to avoid overcrowding and reduce stress to the animals.
- These buckets of crabs would be transported as soon as possible by vehicle to the shore, where they would be released.
- All substrates used would also be returned to the shore.
- Where practical, crabs would be returned to the same area on the same shore from which they were obtained. If this were not possible the crabs would be released into a similar estuarine habitat.

1. Observation Tanks

As an introduction to the mudcrab we propose setting up an observation tank (760 mm x 310 mm x 310 mm) in our school, to enable students to observe the animals and to learn and practice appropriate and safe handling techniques before going to the shore.

- By setting up the tank in a classroom, the crabs will have the opportunity to burrow and establish territories without disturbance. Each tank of crabs would be used by a class for observation for no more than one class period each day, and the crabs would be handled for no more than a total of 30 minutes each day. The classroom is fitted with an air conditioning system which maintains the air temperature in the lab at around 15-17 °C.
- Twenty crabs would be collected from the estuary (Anderson's Bay or Waitati). Two large buckets of substrate from the estuary would also be collected, along with a large container of seawater. An aquarium bubbler will be used to aerate the water in the lab.

The tank would be set up as shown in the following diagram:

- The tanks would be checked daily (including weekends) and crab activity noted.
- Every three days two large, fresh, opened mussels would be placed into the tank in order to feed the crabs. These would be left in the tank throughout the day and overnight to allow the crabs sufficient time to feed. The mussel shells would then be removed and disposed of.
- If the mud appeared to be drying out or the water depth in the tank dropped below 3 cm then water would be added to the tank from the large container of seawater.

The tank would be maintained for up to one week. If there was a further need to keep a tank of crabs set up, then the crabs and substrate in the tank would be carefully removed from the tank and replaced with a further 20 crabs and fresh substrate obtained from the estuary. The original crabs would be returned to the estuary.

The observation tanks would be set up for a maximum period of two weeks, with no individual crab being kept in the school for longer than one week. NZ Marine Studies Center staff have advised us that there should be no permanent harm to the crabs' natural biological rhythms if they are kept in the lab for only one week, and they will quickly be entrained on return to their natural habitat.

2. Student Investigations

Student investigations would all be carried out during a one day fieldtrip to the estuary at Karitane. Prior to this investigation day students would have the opportunity to observe and handle the crabs in the school observation tank, and would also have undertaken a short trip to a nearby estuary.

Possible investigations:

1. Burrowing and moisture content of substrate

This investigation involves each student setting up 4-5 containers of substrate from the natural environment of the crabs, and adding varying amounts of seawater to each container. This would be done prior to the collection of the experimental animals, in order to reduce the "waiting time" for the crabs. The substrate and seawater used would be sourced from the environment of the experimental crabs.

- Each student would then collect 40-50 crabs from the estuary.
- On arrival at the centre 10 crabs would be selected from the bucket and these crabs would be introduced into one of the previously set-up experimental containers. This process would be repeated until each container held a total of 10 crabs.
- Any unused crabs would be returned to a separate container, for return to the shore as soon as possible. This "return container" would contain at least 5 cm of wet mud. The return container would be taken to the shore and its occupants carefully replaced onto the shore as required during the day, with individual crabs spending no more than 1 hour in the return container. The container (a large tote tray or 20L bucket) would contain no more than 15-20 crabs at any one time.
- Each experimental container would be observed and checked at 15 minute intervals over a period of no longer than 3 hours, with any crabs observed to be displaying signs of stress or discomfort immediately being removed from the experimental container and placed in the return container.

An effort would be made to disturb the crabs as little as possible during the investigation, both to ensure a reduction in stress to the crabs and to ensure that the behaviour of the crabs would be as natural as possible.

2. Food choice

This investigation involves each student setting up 4-5 containers of substrate from the natural environment of the crabs, and placing different types of food into each container (e.g. seaweed, mussels, fish, red meat, chicken). The containers would be filled with substrate prior to the collection of the experimental animals, in order to reduce the “waiting time” for the crabs. The substrate used would be sourced from the environment of the experimental crabs.

- Each student would then collect 40 crabs from the estuary.
- On arrival at the centre one type of food would be placed into one of the previously set-up experimental containers. 10 crabs would be selected from the bucket and these crabs would be introduced into the container.
- The experimental container would be observed for no longer than 30 minutes, after which the experimental crabs would be removed from the experimental container as described previously.
- Any animals showing stress or discomfort during the investigation would be removed from the investigation as previously described.
- Crabs not being used would be kept in a large bucket containing at least 5 cm of wet sand. These animals would be checked regularly.

3. Osmoregulation

This investigation involves each student setting up 40-50 containers, each containing a seawater solution. The concentrations of these solutions would range between 0% to 110% seawater (a range previously shown in published studies to be well within the limits of tolerance of these animals).

- Each student would then collect 40-50 crabs from the estuary.
- On arrival at the centre, each crab would be individually washed in seawater from the environment, before being dried gently with a paper towel.
- It would then be weighed in a paper cup on an electronic balance.
- After being weighed each crab would be placed in one of the containers of seawater solution previously set up.
- The crabs would be fully immersed in the solution for a period of no more than 4 hours. During this time the crabs would be regularly checked and animals showing stress or discomfort would be removed from the investigation as previously described.
- At the end of the time period each crab would be removed from the solution, dried and reweighed before being placed into a large bucket containing at least 5 cm of wet mud for return to the shore.

4. Burrowing and substrate type

This investigation involves each student working in the field to sample different areas of the shore.

- Students would select areas on the shore, which had different types of substrate present.
- Quadrats would then be used to sample the different areas.
- The burrows found within each quadrat sample would be excavated in order to accurately count the number of crabs, as the number of burrows alone is not an accurate indicator of the actual number of crabs present.
- Crabs might also be sexed by observing their abdominal surface.
- Measurements of the carapace width of the crabs might also be taken using calipers or a plastic ruler.

Crabs would be placed into a large bucket containing at least 5 cm of wet mud until all crabs within the quadrat had been dug up, sexed and measured. They would then be immediately released into the environment.

These are investigations typical of those carried out by students in the past.