

Best Practice Guidelines for removal of Northern Pacific Seastar (*Asterias amurensis*) In Port Phillip Bay

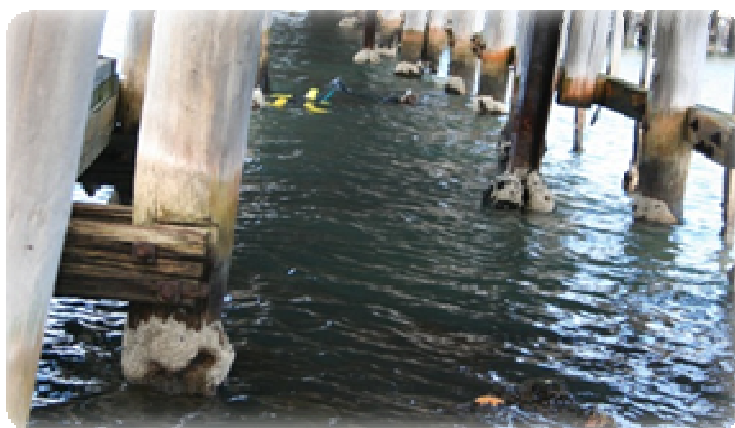


Prepared June 2013 by
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Important Disclaimer

The contents of this document have been gathered from research of a number of sources, which are referenced throughout. Guidelines written by Industry Professionals such as the Australian Activity Standards include information which may not be in this report, and may need to be read in order to fully comprehend this Guide.

The best attempt has been made to ensure all information is accurate. However, this document should be used only as a guideline for best practice and holds no legal obligations. Each *Asterias Amurensis* pest collection site has to be assessed individually to eliminate all risk associated with loss or injury to participants. Organisations in partnership with this project are not responsible for any personal loss, damage or consequence from unforeseeable incidents not mentioned in this Guide.



Foreword:

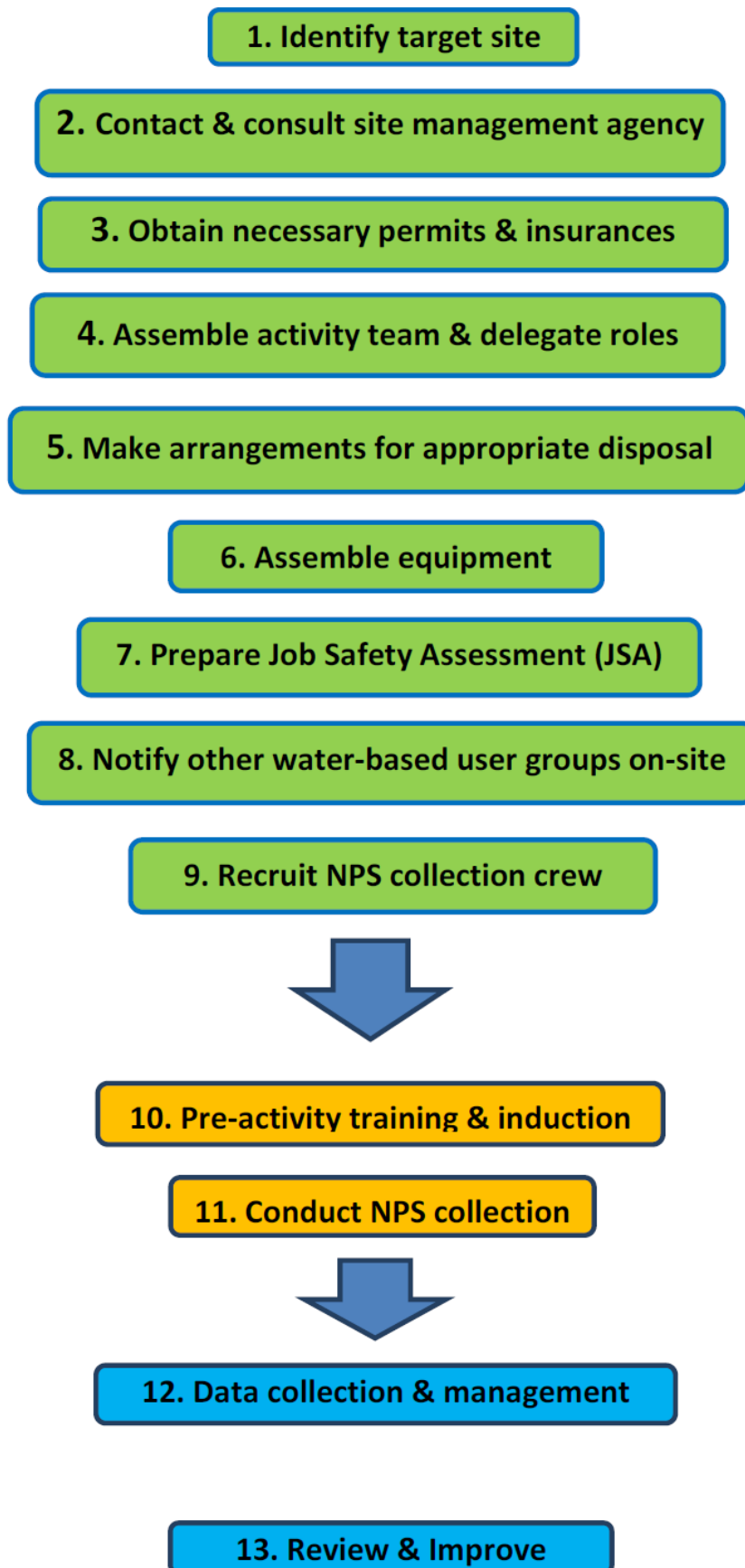
This **Best Practice Guide for removal of Northern Pacific Seastars** has been made possible with funding from the Federal Government 'Caring for Country' program. The project draws largely on the ongoing efforts of Earthcare St Kilda to remove North Pacific Seastars from St Kilda Harbour since 2004. The project has involved liaison and collaborations with numerous stakeholders including Earthcare St Kilda, Parks Victoria, Victorian Department of Environment & Primary Industries, Deakin University, Reef Watch and Polperro Dolphin Swims, as well as community members and marine researchers.

Compiled by: (Dean Bird BaExsc, DipEd) and Neil Blake with thanks to Julianne Stuart, Wendy Albury, Emily Verey, Judy Muir, Jason Strugarek, Jeremy Willcox, John Tornatora and Jill Robinson

Purpose:

This **Guide** has been written to enable local communities to take action to protect local habitats of native species where infestation has already occurred. The principles and practical steps in this guide may be adopted and applied in a community or industry setting. [See Appendix 1 for brief history of Northern Pacific Seastars in Port Phillip Bay.](#)

Best Practice Guidelines flowchart



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Getting started: planning & preparation

Identify target site and relevant decision-makers / stakeholders

Once you've noticed an abundance of *A. amurensis* in a particular habitat and decided you want to take action to protect the area for native species, you'll need to communicate with a range of organisations to enable an effective removal campaign.

Site management Agencies

Consult the management agency responsible for the site to ensure you are fully aware of any relevant regulations. They may also be able to assist in providing equipment, advice or even volunteer insurance cover (See Occupational Health and Safety section).

- Is it a Marine National Park? For example: Ricketts Point Marine Sanctuary, Beaumaris.
- Are there any dive/research boundaries or regulations to prevent your activity from happening? Relevant authorities need to be alerted prior to each activity; and correspondence maintained after each activity. Authorities may be for example: Parks Victoria, Department of Environment and Primary Industries (DEP), or Environmental Protection Agency (EPA)

Getting the right permits and approvals

It is essential to obtain the appropriate permit from relative authorities and site managers.

- **NOXIOUS SPECIES handling permits: your group is required by law to have a Department of Primary Industries permit to catch and remove pests from Victorian waters (See Appendix 2).** Please READ:
 - <http://www.dpi.vic.gov.au/fisheries/pests-weeds-diseases/noxious-aquatic-species/noxious-aquatic-species-permits-policy-statement>
 - To find out how to apply and for a list of contacts, please see attached Appendix

Other local groups

It is in your best interest to notify other local groups, especially those that use the waters in the area in which you chose to dive. This is primarily for safety reasons, but also to help raise awareness of the project and the issues of pest species in Australian waters.

You may even recruit people to help. For example, Royal Melbourne Yacht Squadron and Brighton Sea Baths have offered hot showers to participants of Earthcare Northern Pacific Seastar culls. Other groups who may help in some way are local marine care groups, dive clubs, universities, schools, fishermen, local Sports Clubs and Local Councils.

Volunteers & Health & Safety

Volunteer insurance and Public Indemnity

Volunteer insurance is essential to protect you, and your volunteers, in the case of any loss and/or injury resulting from the activity. Without such cover injured volunteers would be unable to claim compensation and individuals responsible for organising the activity may be held personally liable.

Some management agencies (such as Parks Victoria) provide public liability cover for volunteers working in their area, provided that a thorough Job Safety Assessment has been prepared and all volunteers are briefed on safety and sign an attendance register before starting the activity.

Volunteer Insurance is readily available from any online insurance agency, but be sure to read the 'fine print', as many policies have restrictions – such as age (volunteer under 18) or types of volunteer (e.g. Student/ work placement), that could impact your/ volunteer cover.

Please read the Victorian Government endorsed '**Volunteer Protection Legislation**' which provides information about the necessary safeguarding of volunteers.

http://www.dpcd.vic.gov.au/_data/assets/pdf_file/0004/39172/volunteerprotection.pdf (visited 27/05/13)

Another great resource for managing volunteers is:

<http://www.volunteer.vic.gov.au/toolkit-for-volunteer-organisations/manage-your-organisation/risk-safety-and-insurance/insurance> (visited 27/05/13)

Job Safety Assessment

A Job Safety Assessment involves considering all aspects of the activity, identifying any associated hazards and suitable measures to eliminate those hazards. For legal and practical reasons, each site needs to have a Job Safety Assessment to be signed off by the local management agency before any activity occurs.

See **Appendix 3** for an example Job Safety Assessment.



Seastar removal dive buddies

Measures to manage risks associated with diving activities are essential to maintain a viable activity into the future. Both organisers and participants must take some responsibility for this. Pairing up divers and snorkelers as 'dive buddies' who keep an eye out for each other is an essential step to ensure safety in the water.

Getting started: form your team

Assemble your coordinating team

To ensure volunteers are well briefed and a successful and risk free activity is achieved it is important to have a coordinating team with clearly understood responsibilities. Don't expect any one person to take responsibility for more tasks than they can reasonably achieve. Your organising team will ideally comprise at least 4 people to cover the following:

1. Overall activity coordinator
2. Safety Observer
3. Data collection researcher
4. Public relations and volunteer amenity

See Appendix 4 for role descriptions for each of the above.

All members of the organising team should read and understand their role description and the Job Safety Assessment. SA, and where appropriate,

Induction & training of volunteers

In an ideal world all participants in pest seastar removals would be given a comprehensive presentation of the activity, with the opportunity for discussion and question time some time before the day of the activity. The reality is that many people hear about the event and just rock up on the day. Induction and training of all participants immediately prior to the activity should include:

- signing an 'Assumption of risk, waiver of liability and indemnity agreement' before commencing (this can be incorporated into the volunteer sign-in attendance sheet);
- A brief explanation of the purpose of the pest removal
- What each participant is expected to do
- Correct identification of Northern Pacific Seastars and similar native seastars
- Safe work methods
 - Participants are to be competent in snorkelling and swimming ability
 - All Coordination Team members and snorkelers and divers are to have and understand a set of communicative hand signals.
- Collection and disposal methods
 - Members are able to correctly identify native sea stars and compare with introduced species. Waterproof identification charts can be made available (laminated photo-cards, with physical characteristics), for new volunteers.

Essential equipment, cont.

Assembling your equipment

Appropriate equipment is essential to efficiently catch and dispose of pest seastars in safe conditions. While some equipment (such as first aid kits) may rarely be required, they will be sorely missed should the need arise! The equipment listed here are ESSENTIAL ITEMS.

Activity Coordinator + Safety Observer (collectively)

- “Diver in water” Flag
- Airhorn for Safety Observer to alert boats of divers – or to contact Divers in water
- First Aid Kit
- Indemnity Forms and Participant Medical Forms (including Emergency Contact details)
- Appropriate Permits (see section above for further details)
- Seastar identification poster
- Catch bags for (one for each 2 divers)
- Kayak for checking and supporting divers
- Wheelie bins for freshwater immersion and ultimate disposal of pest seastars
- Clip-board with Diver / Snorkeler record sheet noting water entry and exit time of each diver / snorkeler spent in water and consequently hypothermic symptoms (Safety Observer needs to be extra vigilant of hypothermic symptoms).
- “Weather appropriate” Personal clothing and sunscreen
- Warm drinks and snacks for volunteers



Diver / snorkeler

Wetsuit (see information below)

- Mask + Snorkel
- Gloves
- Fins or Appropriate protective footwear – i.e. reef shoes, booties etc.
- Catch bag



Data Collector/s

- 4 large buckets (numbered) to queue seastars waiting to be processed
- Sizing sheet (2m X 2m plastic with size gradations marked on it)
- Weight scale
- Camera
- Stationary for data collection

Essential equipment, cont.

Public Relations + Community Education Officer

- “Weather appropriate” Personal clothing
- Information booklets / brochures / fact sheet
 - “What we are we doing”; “How to get involved” ; etc

Optional Gear:

- Waterproof camera for diver use in underwater habitat assessment

Wetsuit Guide

For Temperate Victorian waters (12°-25°C), **a good quality wetsuit is imperative**. In choosing a wetsuit, we have to consider: Size, Water Temperature, Wind, Cold Sensitivity and Activity.

Size – If the suit is too tight it could restrict blood flow to the brain.

Water temperature – Direct contact with water (conduction) pulls heat away from the body 25 times faster than air because water has a greater density (therefore a greater heat absorption capacity). You can use the chart below as a guide; however consider the following variants carefully

Surface water Temperature	Minimum thickness recommendation for wetsuits
10 < 13 °C	6/5/4 mm
13 < 16°C	5/4mm
16 < 19°C	4/3mm
19 < 22 °C	3/2mm

*based on a diver in the water for 90 min or longer

Wind – the strength and direction play a major part in changing the water surface temperatures. The Safety Observer and Lead Diver will need to monitor the changes in the wind throughout dive. The amount of ‘chop’ on the surface with the onset of increased wind will also affect snorkelling conditions and possibly the underwater visibility.

Activity - Snorkelling is not the most strenuous of activities, especially when collecting seastars, therefore a thicker wetsuit than what you would surf in for example is important to keep the core body temperature warm and comfortable.

Cold sensitivity – individual tolerances to cold vary. Aim to be a little warm instead of a little cold.

1. **Start your dive warm. Before you even step into a wetsuit, make sure your core body temp is toasty. It’s much easier to warm up when you are dry!**
2. **Get your hood on: changes in surface temperature and wind can dramatically affect heat loss through convection**
3. **How good is your suit? Make sure it fits well and doesn’t have any leaks!**

Environmental conditions

Environmental Factors – When to dive?

Environmental factors are a major influence on whether the activity can be conducted safely or not; and also the efficiency and effectiveness of the activity. Activities should be called off whenever conditions are likely to compromise safety (see Appendix 2 – Example Job Safety Assessment). The Lead Diver should conduct a pre-activity safety assessment including the following:

Weather (particularly winds):

Prevailing winds can vary greatly from day to day and with each site. A 'choppy' wind-affected surface makes snorkelling difficult; and in shallow waters the seabed may be churned up by the turbulence creating poor visibility.

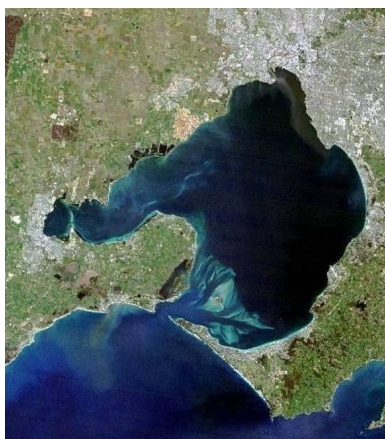
Tides and currents:

Timing the collection around low tide maximises the area that can be effectively covered by pest seastar collectors. Tidal streams should be considered in the south of the Bay where ebb tide currents are quite strong. Check the Bureau of Meteorology website for local tide times.



Changes in wind strength and direction affect local wave action. If the site is not protected from wave action, a 'swell report' is necessary to check predicted changes to water conditions. Waves can significantly impact on diver safety in a pier/ break wall site, which are hard and quite often encrusted in barnacles. In the picture on the left, whilst it's a pretty good day for snorkelling at St Kilda Pier, a change in wind direction could result in the diver being forced into the pylons.

- **Rainfall** - Heavy rain can increase turbidity due to mud and organic matter being washed into the Bay from waterways and drains. This can dramatically decrease the ability to see / find the target seastars.

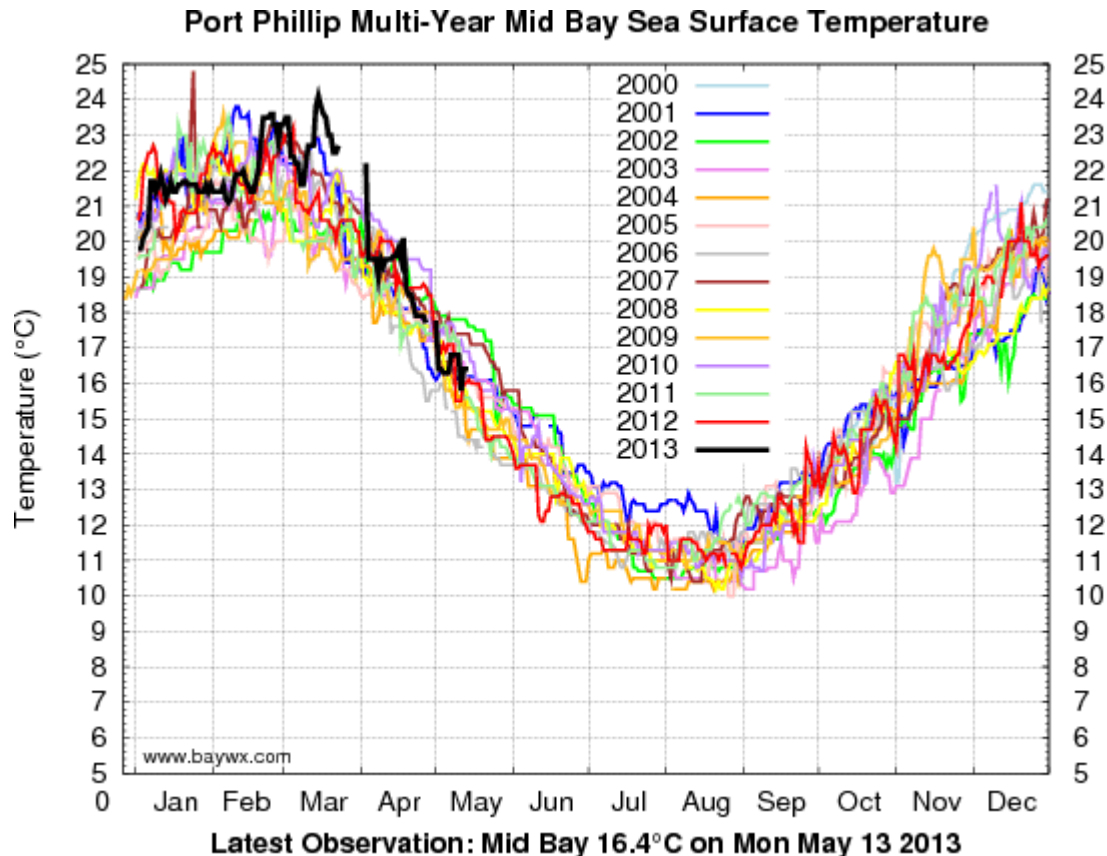


In this satellite image of Port Phillip Bay (taken after heavy rains) you can clearly see the plume of dirty river water mixing with the waters of the Bay along the north-eastern coastline.

Environmental conditions, cont.

Water temperature

Monthly average surface water temperatures in Port Phillip Bay since 2000 are found in the graph below, courtesy of CSIRO and <http://www.baywx.com/temps.html> (13/05/13). These results are relevant for diver preparation, but also for predicting the *A. amurensis* spawning cycle.



Asterias amurensis spawning cycle

Strategic concentration of 'catch effort' for removal of *Asterias* may play a vital part in their control. The most opportune time to conduct removals would be during April - June when they tend to move closer to shore and are therefore most accessible to land-based removal. Also, this period precedes *Asterias* spawning and removal of adults will eliminate the larvae that would have been spawned.

There are correlations between water temperatures and spawning periods. In the report compiled by The State of Victoria, Department of Sustainability and Environment 2002, "CONTROLLING THE NORTHERN PACIFIC SEASTAR (*ASTERIAS AMURENSIS*) IN AUSTRALIA", they find a prevalence of *Asterias* larvae at three sites in Port Phillip Bay, between the 29th May and 30th October. "*Spawning is therefore likely to have occurred in early to mid-May with a larval duration to early November*".

In considering the water temperatures from May to November in the above graph it is apparent that *Asterias* spawn in Port Phillip Bay when the water temperature is around 17 degrees or below.

Collection & handling

Correct identification

All participants involved in removal of *Asterias* in Australian waters need to, at the very least, know how to correctly identify this pest animal and not to confuse them with native species of Australian sea stars. Below is a brief summary of the characteristics of *Asterias* as taken from CSIRO, and <http://www.marinepests.gov.au/nimpis> (10/05/13)

“Asterias amurensis is a large sea star with a small central disc and five distinct arms that taper to pointed tips. It is predominantly yellow in colour and often seen with purple or red detail on its upper surface. There are numerous small spines with sharp edges on the upper body surface that are arranged irregularly along the arm edges. On the underside of the body, these spines line the groove in which the tube feet lie, and join up at the mouth in a fan-like shape. The underside is a uniform yellow in colour. Fully grown individuals can reach 40-50 cm in diameter”



Different sizes and colours of *Asterias amurensis*, the smallest being less than 1cm.

In Port Phillip Bay *A. amurensis* usually have 5 arms although some have been found with only two or three. The arms have irregularly arranged spines along them and pointed tips which are often turned upwards. The arms join into a central disc. Colour of the upper surface can vary from yellow and orange with purple shading. The underside is uniformly yellow.

Note: More than one of the characteristics mentioned above must be checked off in order to be certain that what you are looking at is in fact *A. amurensis*.

Know your local species



Asterias amurensis (left) with *Uniophora granifera* - Granular Seastar, a native seastar which occurs in southern Australian waters including Port Phillip Bay.



Meridiastra calcar - 8 armed seastar (left & right); and *Tosia australis* - Biscuit Star (centre top & bottom)

Coscinasterias muricata - 11 armed seastar

Handling & disposal methods

Catch equipment

Equipment to pick up *Asterias* will vary depending on the location and collector. People wading in shallow waters can use long-armed tongs (as used to pick up litter) and a catch bag. Whereas, snorkelers and scuba divers prefer to collect and place the pests into a catch bag with gloved hands.



There is no apparent physical human threat to removing these animals by hand, however wearing gloves is recommended.

Asterias Amurensis is a declared noxious species in Victoria and regulations are set by the Department of Environment and Primary Industries (DEPI) to control handling of these animals.

"Once declared as noxious, people must not bring these species into the state, nor take, hatch, keep, possess, sell, transport, put into any container or release into protected waters any declared noxious aquatic species (unless otherwise authorised by permit)."

The DPI have a "HOTLINE" for any witness of an offence relating to noxious aquatic species (such as keeping or selling these pests) to report it to the Department of Fisheries on 13 "FISH" or 13 3474.

For more information on Noxious Aquatic Species in Victoria or the Fisheries Act visit the website:

<http://www.dpi.vic.gov.au/fisheries/pests-weeds-diseases/noxious-aquatic-species>

The DEPI has a simple plan towards removing noxious pest species in Victoria.

Dislodge all plants and animals and bin them.

Drain water from boat and gear. Try not to let it drain back into the water.

Dispose of unwanted live bait in a bin.

Douse your boat and gear with freshwater. Try not to let it drain back into the water.

Dry your boat and equipment.

Don't forget to apply an authorised antifoulant where appropriate (within the antifoulant maximum in-service period and as directed on the can).

Handling & disposal methods, cont.

Ethical and responsible disposal

Great! You've got the pesky pests out of the water... now what? Attention to ensure they are dead and disposed well away from waterways is just as important as catching them. They should be taken to landfill or composted. Ensure there are no traces of larvae on any equipment (see next chapter).

- 1) Wheelie bins are sturdy containers which can be moved easily. Make sure bin is secure so the contents can't be spilled back into the Bay!
- 2) Wheel your collection to a point away from the water and fill it with FRESH water, and submerge the sea stars.
- 3) Ideally, your bin will be plumbed with a tap at the base to drain water away after approximately 20 min (just to be sure!!) Otherwise, tip the contents out on land well beyond the high tide line.
- 4) Approach your local Council for collection if quantities are en masse, otherwise you can bag and dispose in your garbage bin or compost in smaller quantities

Alternatively: (if you don't have fresh water and storage containers)

- Freezing is considered the most 'humane' way to euthanize pest seastars (if you have access to enough freezer space).

Whatever you do.... DO NOT chop up *A. amurensis* and throw them back!

In 1993 a few organised culls were undertaken in Tasmania's Derwent River. Over 30,000 *A. amurensis* were captured and cut into pieces and thrown back into the water. It wasn't known at the time that these resilient sea stars have the ability to regrow a whole body if they have some part of the central disc remaining. Numbers grew exponentially after their multiplication.

Data Collection

Collection of accurate data on the number and size of seastars removed on each removal, and the habitats that they were found in is invaluable to better understand their biology and behaviour in Port Phillip Bay. Good data also enables the effectiveness of removals to be assessed and informs any decisions to improve the removal method.

Mentioned earlier in the Duty Statements section of this document, make sure all Data is collated and given to your Diver Co-ordinator. [See Appendix 5 – Example data sheet.](#)

Cleaning your equipment

As our aim is to control the spread of *A. amurensis* in Australian waters we must ensure our actions don't unintentionally transport larvae to other waters.

Equipment hygiene

Proper cleaning of all equipment ensures no transfer of eggs or larvae into other waters.

“Proper” cleaning involves:

- Designate a ‘cleaning’ area **AWAY FROM STORM WATER DRAINS** to ensure no larvae or remnants of pest seastars can get washed into the drainage systems, and therefore get possibly redirected back into the marine environment.
- Have a watertight bucket for immersion of equipment (not the same one you used for collection!), making sure that they are cleaned, inside and out. Ideally, soak gear with fresh water which will destroy sea life if submerged for long enough.
- The discharge water can then be spread on plants or grass to absorb into the earth or be exposed to UV from the sun

Communication / education

It is highly desirable for all participants (and non-participants) to understand the reason for the *Asterias* removals and the best practice methods discussed in this Guide. Education is necessary at all levels within the community (including environmental groups and authorities) to ensure proper understanding during the “Experience” of Marine Conservation – Primary for relevant studies, and Secondary as part of an Outdoor Recreation activity.

Community Groups

- Seastar Informative and identification poster
- Appropriate and accessible websites including FAQ’s
- Contact details of relevant management agencies and government departments

Authorities and Environmental Groups

- All information gathered in reports to be made available to such groups to inform future planning and collaboration

Study Groups (University + VCE)

- Methods of physical removal of seastars, locations targeted, and data collection methods should be maintained over longer term to enable clearer analysis and conclusions to be drawn on effectiveness of removals

The Public (on-site)

- Passers by will be curious to your study. Some will ask... others may stare! Ensure that you are polite and informative. Provide website addresses that community awareness and participation, interactive membership packages etc. They may become a volunteer, or know someone who could support the activity.

Engaging students

- Pest seastar removals are a great basis for ‘out-of-classroom’ maths and science; and an interesting way to get school children to engage with their local environment and community.

Appendix I: History of *A. amurensis* in Port Phillip Bay



Asterias Amurensis was first spotted in Port Phillip Bay in 1995 by a scallop fisherman off Point Cook. They are believed to have originated from Japan and then travelled from Tasmania's Derwent Estuary (which was infected in 1986). Populations are almost too big to monitor at the time of this publication (2013), but the significant reproduction capacity of *A. Amurensis* in Victorian waters, suggests they are most definitely in their millions. What is alarming is that this growth is exponential.

In 1999 the Australian and New Zealand Environment and Conservation Council (ANZECC) and the Ministerial Council on Forestry, Fisheries and Aquaculture (MCFFA) established a team to combat the problem in Australian waters, and thus the "National Taskforce on the Prevention and Management of Marine Pest Incursions" were introduced. The "National Control Plan" in Appendix H is a great tool to reference for background information compiled before 2000.

<http://www.environment.gov.au/coasts/imps/publications/pubs/apph.pdf>

<http://www.environment.gov.au/coasts/imps/publications/pacific-seastar/index.html>

Appendix 2: Example of permit under *Fisheries Act 1995*

 Department of Primary Industries	
Permit FISHERIES ACT 1995	
Issue Date: 9 July 2012	Expiry Date: 8 July 2013
BLAKE, NEIL 55A BLESSINGTON ST ST KILDA VIC 3182	Personal File Number (PFN): 10094

Permit Noxious Aquatic Species	Permit Number NP226	Fee Not Paid
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PERMIT DESCRIPTION
This permit authorises Neil Blake, Port Phillip EcoCentre Inc, and any person whose name is listed on the permit to undertake the following activities, subject to the conditions listed:

ACTIVITIES
The collection of Northern Pacific seastars for eradication purposes.

CONDITIONS:

AUTHORISED PERSONS
Neil Blake
Julianne Stuart
Jason Strugarek

At least one of the persons authorised under this permit must be present during any activities conducted pursuant to this permit.


The permit holder must ensure that the persons authorised to operate under this permit comply with the conditions of this permit.

Issued under and subject to the provisions of the Fisheries Act 1995 and subject to the conditions that are specified above and any conditions that may be prescribed by Regulation or added to this licence in accordance with section 52 and 54 of the Fisheries Act.

Issued by
Executive Director, Fisheries Victoria and delegate of the Secretary.

1LS BN: 99999 60502 NP 226 Date Printed: 09-Jul-2012 Page 1 of 4

Appendix 3: Job Safety Analysis

	JOB SAFETY ANALYSIS WORKSHEET (Safe Work Method Statement) November 2009		JSA seastar removal Earthcare St Kilda.doc Form: C-0130 Version: 2.0 Page: 1/5

A Job Safety Analysis must be completed for tasks undertaken by PV staff. Each of the identified risks associated with a hazard needs to be assessed to understand how harm can be caused. It is essential for those undertaking these tasks to know the best and safest way of doing the job. Each JSA must be site specific and include all workers in its development.

Task / Project Title	Invasive seastar <i>Asterias</i> removal	Date of Assessment	11/11/09 Updated today 12 September 2012 by Emily Verey Updated 15 November 2012 by Emily Verey
Site / Location	St Kilda Harbour and around the breakwater	Permit to Work Requirement	No
Date of Site Visit		Is there a previous JSA?	No
Analysis By		Reviewed By	Edena Critch
Management Rep		OHS Rep	Emily Verey
JSA No –			

Activity Description


Survey and removal of Northern Pacific Seastars

References –

Indicate Worst Hazards	Potential for drowning, collision with a vessel, cuts, falls, UV and heat exposure and hypothermia	PPE Required	Land-based participants – long-sleeved clothing, hat, sunglasses, sunscreen Water-based participants – sunscreen, well fitting wetsuit, booties, appropriate snorkeling equipment if applicable
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Tick when the Following Hazards have been considered in the Analysis:

Your Safety	Others Safety	Plant	Chemicals
Alerts	Barriers	Auto Power	Application Method
Communications	Falling Objects	Dust	Clean-up
Emergency Response	First Aid	Electrocution	Chemicals & Hazardous Substances
Falls from Height	Induction & Supervision	Fumes	Fuels & Dangerous Goods
Injury Reports	Trip Hazards	Guarding	Ingestion – Skin/Lungs
Manual Handling	Warning Signs	Maintenance	MSDS Precautions
Noise	Construction - Heights	Transport	Waste Disposal
Sharps/Biological hazards	Trenching (Notify Worksafe)	Vibration	

ACTIVITY	HAZARDS	RISK CONTROL MEASURES	WHO IS RESPONSIBLE
List the tasks required to perform the activity in the sequence they are carried out.	Against each task list the hazards that could cause injury when the task is performed.	List the control measures required to eliminate or minimize the risk of injury arising from the identified hazard. The Hierarchy of Control is a list of control options that have been placed in a preferred order from the highest level of protection and reliability, to the lowest . 	Write the name of the person responsible (supervisor or above) to implement the control measure identified.
Pre-survey activities	Inappropriate equipment	Elimination and PPE: • All participants to wear/carry equipment as listed in PV Diving and Snorkeling Operations Manual. • An air horn must be in working order and be able to be used by the on shore observer.	Activity leader or PV staff
	Inappropriate knowledge or skills	Elimination and administration: • All participants to be briefed on snorkeling requirements including safety prior to activity and to complete section 3 of Volunteer Activity Form and sign that they are competent snorkelers. • The designated on-shore observer to read through the dive plan and run through the hand signals for in water communication.	Activity leader
	Unsure who is participating	Elimination and administration: All participants to sign the Volunteer Activity Form including section 2 or 3 if required	Activity leader
	Group becoming lost	Elimination and Administration: An appropriate person not on site to be notified before activity. A designated 'on shore observer' must remain out of water to watch over participants in water	PV staff at Williamstown Activity leader or PV staff
	Requirement of Insurance	Elimination and administration: All participants to sign the Volunteer Activity Form including section 2 or 3 if required	Activity leader
	Unsuitable weather	Elimination and PPE: Check weather information for St Kilda area before undertaking	Activity leader

Appendix 3, cont.

Undertake seastar removal	conditions	activity and ensure all participants have appropriate clothing and protection	
	Fitting of appropriate clothing and equipment	Elimination and PPE: All personal clothing and equipment as listed in the PV Diving and Snorkeling Operations Manual to be fitted and checked for suitability, workability and comfort before entering the water.	Individual participant and activity leader
	Trip hazards while entering and leaving the water	Elimination: Preferred access to the water is a shallow, flat, sandy area and fins are to be removed until knee deep, when they can be put on.	Individual participant
	Disorientation from group	<p>Elimination and Administration:</p> <ul style="list-style-type: none"> Buddy system to be employed. Always swim within a pair at 1 m distance maximum from each other; no single snorkelers permitted. One group of three is allowed. If one person in the pair (or one group of three) needs to come to shore for various reasons including tiredness, cold, heat, etc the other person/people in the pair/three must come to shore together. If the person in the pair that is feeling ok still wants to continue, they can only go back in the water if the on shore observer allocates them with another buddy. See below for on shore observer. An on shore observer is allocated for the session. Their job is to keep records of those entering the water and to keep a watch over the snorkel buddies, maintain a watch out for anyone who may be struggling and vessel traffic. The on shore observer must note number of participants entering the water. The observer notes the time the buddy pairs enter the water. E.g entered water at 9am. A head count of the whole snorkeling group must occur after 30 minutes of snorkeling (maximum time permitted to 'regroup') and check sea, weather and participant's health conditions. This will require snorkelers to keep an eye on the time and surface at the designated re-group time for the on shore observer to do a headcount. The time for the head count can be shorter e.g. 15 mins, it should be determined on the day and communicated to the snorkeling group by the designated on shore observer. Note, 30 minutes is the maximum time allowed before a headcount must be done. The number of participants leaving the water after the snorkel session is to be checked off by the on shore observer to ensure everyone who entered the water has left the water safely. The on shore observer notes the time the buddy pair has left the water and totals the time they were in the water. E.g out of water at 9.20am; total in water time 20 mins. If at any time a vessel looks to be heading towards the snorkel group, the on shore observer must alert the vessel of the snorkelers if it appears the vessel operator hasn't seen the in-water snorkelers. If hand signals do not work, the on shore observer must blast the air horn to try and alert the vessel operator. 	Activity leader
	Prolonged exposure to cold water temperatures	<p>Elimination and PPE:</p> <ul style="list-style-type: none"> All participants to wear a well fitting wetsuit On shore observer to control in-water times- no more than 30 minutes at a time Participants to monitor own body temperature and heart rate and notify buddy and on shore observer if feeling uncomfortable before exiting the water 	Individual participant and Activity leader
	UV and heat exposure	PPE: All participants to wear wetsuit with long sleeves, sunscreen, and ensure fresh drinking water is readily available	Individual participant
	Severe weather conditions	Elimination: On shore observer to call off activity if conditions become unsuitable	Activity leader
	Boats and other watercraft	<p>Elimination and administration:</p> <ul style="list-style-type: none"> All participants to remain clear of boating zones where applicable and be alert at all times for on-water traffic Snorkeling only permitted in areas clearly marked with 'divers below' flags On shore observer to monitor activity of watercraft Notify yacht club of planned activities 	Activity leader
	Glass and sharps	Elimination and PPE: All participants to wear gloves and not touch dangerous items	Individual participant
	Exposure to hazardous marine life	Elimination and PPE: All participants to wear gloves, keep hands and feet out of cracks and crevices, and not deliberately handle marine creatures (excluding sea stars being removed). Please note the blue ringed octopus, stonefish and cone shells may be found in the waters of Port Phillip.	Individual participant
Land-based survey and recording activities	Trip hazards - uneven or slippery surfaces	Elimination and PPE: All participants to be briefed prior to activity, to wear sturdy footwear and move carefully whilst on the pier and breakwater	Activity leader
	UV and heat exposure	PPE: Wear long sleeved clothing, hat, sunglasses and sunscreen, carry drinking water and remain in the shade wherever possible	Individual participant
Post monitoring debriefing	Injuries or concerns during activity	Administration: Written records to be prepared at the site prior to anyone leaving.	Individual participant and activity leader
	Injuries or health issues occurring after the activity	Administration: PV contact information to be given to all participants for any future correspondence.	PV staff

Record of Site Visits & Record of Supervision:

Date	Comments Indicate if safety controls are being complied with. Note any areas of non-conformance	Signed by: PV Supervisor	Signed by Staff Member/ Contractor/ Volunteer

Appendix 4: Coordinating Team role descriptions

Activity Coordinator

Must be physically fit for duties without risk to themselves or others; be an experienced snorkeler and assessor of marine hazards and snorkeler competence; and be qualified to instruct and rescue a snorkeler and administer first aid.

Key responsibilities

1. Plan, assess, and document Dive Plan and JSA for each site snorkelling site and ensure all participants are familiar with and understand the Dive Plan and are suitably experienced and equipped to fulfil their designated role.
2. Plan date and time for each snorkelling activity and liaise with local land management agency and relevant boating community to confirm plans.
3. Oversee each snorkelling activity to ensure all participants adhere to the Dive Plan and safe work practices.

Specific duties

- Complete a snorkel plan and familiarise all participants with it prior to snorkelling activity;
- Instruct, train and advise snorkelers, including ensuring all participants are given a pre-snorkel briefing;
- Enter the water to instruct, guide and supervise from that position if required;
- Conduct an environmental assessment of the snorkelling site;
- Cancel or modify the conduct of the snorkelling where existing control measures mean it cannot be conducted safely;
- Remain at the snorkelling site to control the overall operation and ensure all control measures are implemented;
- Work as a team leader, supervise and consult with other snorkelling workers;
- Assist team members as required, including Onshore Observer, Rescue and First Aid;
- Ensure prospective snorkelers complete any required documentation, such as medical statements;
- Assess the competence and fitness of prospective snorkelers;
- Ensure there are sufficient people to be guides, lookouts, rescuers and first aid personnel;
- Ensure snorkelers are appropriately equipped;
- Ensure equipment, plans and personnel are available for emergencies;
- Ensure snorkelers work in 'buddy' pairs;
- Ensure a head count is conducted as required;
- Ensure all injuries and incidents are recorded and reported;
- Ensure all trip documentation is returned to the place of business

Appendix 4: Coordinating Team role descriptions, cont.

Safety Observer (oversees maximum 15 persons)

Must be physically fit for duties without risk to themselves or others; be an experienced snorkeler and assessor of marine hazards and snorkeler competence; and be qualified to instruct and rescue a snorkeler and administer first aid.

Reports to the Activity Coordinator.

Key responsibilities:

1. Responsible for maintaining a close watch on snorkelers, the snorkelling site and any on-water activity in the vicinity of the snorkelling site.
2. Responsible for ensuring 'Diver Below' flags are deployed and delivering effective warning to boats whenever necessary.
3. Responsible for implementing the relevant safety control measures, monitoring condition of Divers each time they return to shore, and assisting the Activity Coordinator to maintain the Dive Plan log.

Specific duties:

- The lookout shall wear distinctive, brightly coloured clothing and be equipped with binoculars, polarised sunglasses, mobile phone, and marine whistle so that effective communication can be made with the Activity Coordinator and any people or boats in the water.
- Be located in an elevated position providing a clear view of the entire site;
- Be solely engaged in being the lookout whenever people are in the water, unless engaged in an emergency response;
- Assist other workers as required, including rescue and first aid;
- Request assistance if needed;
- Recognise and report relevant hazards E.g. changing conditions, to the Activity Coordinator;
- Scan the area effectively and efficiently to observe all snorkelers;
- Alert snorkelers moving outside the designated site;
- Identify people in difficulty or distress;
- Act as a rescuer or first aider if required (see separate duty statements);
- Provide higher levels of supervision to participants assessed by the Activity Coordinator as being 'at risk' (to ensure they are removed from risk at the earliest possible opportunity).

Appendix 4: Coordinating Team role descriptions, cont.

Lead Diver (reports to the Activity Coordinator and works closely with Safety Observer).

Must be physically fit for duties without risk to themselves or others; be an experienced snorkeler and assessor of marine hazards and snorkeler competence; and be qualified to instruct and rescue a snorkeler and administer first aid.

Key Responsibilities:

1. Assist the Activity Coordinator to prepare the Dive Plan, including assessment of local risks and documenting the designated dive transects.
2. Ensure all safety procedures and equipment are in place (both onshore and in the water) and that all divers adhere to the buddy principle and remain within the designated dive transect.
3. Maintain communication with the Deputy Diver and Onshore Observer throughout the duration of people being in the water.
4. Ensure all divers understand and implement the project research method.

Specific duties:

- Work with the Activity Coordinator to identify and assess local marine hazards and ensure all risks are addressed within the Job Safety Analysis;
- Consult the Activity Coordinator on any expected boating activity and/or change of conditions prior to commencing in water activities;
- Ensure all dive equipment is maintained to appropriate operation standards;
- Confirm the designated dive transects with the Onshore Observer and deploy the Diver Below flag prior to divers entering the water;
- Undertake a snorkeler assessment and assist the Onshore Observer in testing wetsuits of all divers are well-fitting prior to entering the water.
- **Work with the Deputy Diver as a buddy pair, maintaining visual contact at all times underwater;** and using relevant hand signals as required.
- Collect sea stars from designated transects and transfer them to Shore-based Research Assistants for data collection.
- Check in with the Onshore Observer and Deputy Diver to report physical condition on each return to shore.

Data Collector/s

- It is expected that size and numbers, prevalence of habitat in which species are found are all documented. Minimal training and skills (beyond basic numeracy) required.

Public Relations + Community Education Officer

- During the event - someone is needed to aid public inquiries. This also allows active participants to not get distracted from their role.
- There to answer questions from curious passers-by.

Appendix 5: Example data sheet

Earthcare St Kilda

Northern Pacific Seastar Collection

Date:

[illegible]

Weight must be taken ASAP out of water

References & further reading

REFERENCES

FINAL REPORT FOR THE AUSTRALIAN GOVERNMENT DEPARTMENT OF THE ENVIRONMENT & HERITAGE

CONTROLLING THE NORTHERN PACIFIC SEASTAR (*ASTERIAS AMURENSIS*) IN AUSTRALIA

Prepared by Michaela Dommissie and Don Hough

Marine Strategy

Department of Sustainability and Environment (DSE)

March 2004

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<http://www.environment.gov.au/coasts/imps/publications/pacific-seastar/pubs/pacific-seastar.pdf>

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Author unknown. <http://www.baywx.com/temps.html> Referenced 13/05/13

This website uses publicly available weather data from the [Bureau of Meteorology](#), marine data from [CSIRO Marine and Atmospheric Research](#)

O'Loughlin, P. M., 2011, Northern Pacific Seastar, *Asterias amurensis*, in Taxonomic Toolkit for marine life of Port Phillip Bay, Museum Victoria, Referenced 28 May 2013, <http://portphillipmarinelife.net.au/species/7768>

Department of Environment and Primary Industries: Fisheries Department. Referenced 3 June 2013

<http://www.dpi.vic.gov.au/fisheries/pests-weeds-diseases/noxious-aquatic-species>

Volunteer Protection Legislation

http://www.dpcd.vic.gov.au/_data/assets/pdf_file/0004/39172/volunteerprotection.pdf (visited 27/05/13)

<http://www.volunteer.vic.gov.au/toolkit-for-volunteer-organisations/manage-your-organisation/risk,-safety-and-insurance/insurance> (visited 27/05/13)

Seastar morphology

NIMPIS 2013, *Asterias amurensis* general information, National Introduced Marine Pest Information System <http://www.marinepests.gov.au/nimpis>

CRIMP, CSIRO Marine Research