Identifying Crayfish

A Guide for Bait Vendors and Aquaculturists

Help keep invasive crayfish species out of your aquaculture, bait business and out of Missouri waters.

The key to keeping invasive crayfish out of Missouri

To keep our fisheries healthy, the Missouri Department of Conservation is working with aquaculturists and bait vendors to reduce intentional and unintentional introduction of non-native crayfish. These groups have a vested interest in this effort because the future of their livelihoods is dependent on Missouri's healthy aquatic systems and fisheries.

A non-native species is any plant or animal species that has been transported and released to an area in which it was not found historically. Because of their popularity, crayfish are sometimes released or otherwise introduced by well-meaning humans into water bodies from which they did not originate.

These introductions, unfortunately, can and have caused big problems to aquatic communities and fisheries, even in places where native crayfish previously existed. The rusty crayfish is probably the most widespread and harmful introduced crayfish in North America. Like other invasive crayfish species, rusty crayfish are extremely aggressive and cause many problems including:

- destruction of aquatic plants
- declines in fisheries
- declines of native crayfish.

Because crayfish species can be difficult to distinguish from each other, the Conservation Department is providing this guide to help you identify the invasive rusty crayfish and the four crayfish species on the Approved Aquatic Species List. As of March 1, 2008, approved crayfish species are virile (northern) crayfish, calico (papershell) crayfish, White River crawfish and red swamp crawfish. Use the information in the following pages to ensure that only crayfish species appearing on the Approved Aquatic Species List are available in Missouri.

If you find a rusty crayfish or another species that doesn't seem to match the characteristics described in this key, contact your conservation agent or Department office near you by calling 573-751-4115 or going online at *www.missouriconservation.org* to find the regional office near you.

Instructions for using crayfish key

Step 1: Read the descriptions provided in both choices (1a and 1b) of the first "couplet" and view the accompanying illustrations and photograph. Note that the illustrations and some photographs provide red arrows that point out the specific crayfish features being discussed.

Invasive rusty crayfish have black bands on tips of claws.

Step 2: Decide which of the two first choices (1a or 1b) better describes the physical appearance of the crayfish being identified.

Step 3: Move to the next couplet (either 2 or 3 as appropriate) and repeat steps 1 and 2 above. Note: If you move to couplet 2, either choice you select (2a or 2b) will result in an identification of your crayfish.

Step 4: If you move on to the next couplet and the described characteristics of neither choice seem to match the crayfish in hand, it is always a good idea to go back to the previous couplet and recheck your work.

Helpful Hints: Individual crayfish, like people, sometimes vary in their physical makeup. Therefore, have several individual crayfish of the species in question on hand. If characteristics described in a given couplet don't work for an individual crayfish, look at a second or third individual. Use all of the clues or characteristics presented in each couplet, and don't forget to use the illustrations and photographs provided.

Remember: This key is provided to help you keep unwanted and invasive crayfish species out of your aquaculture or bait facility and out of Missouri waters.

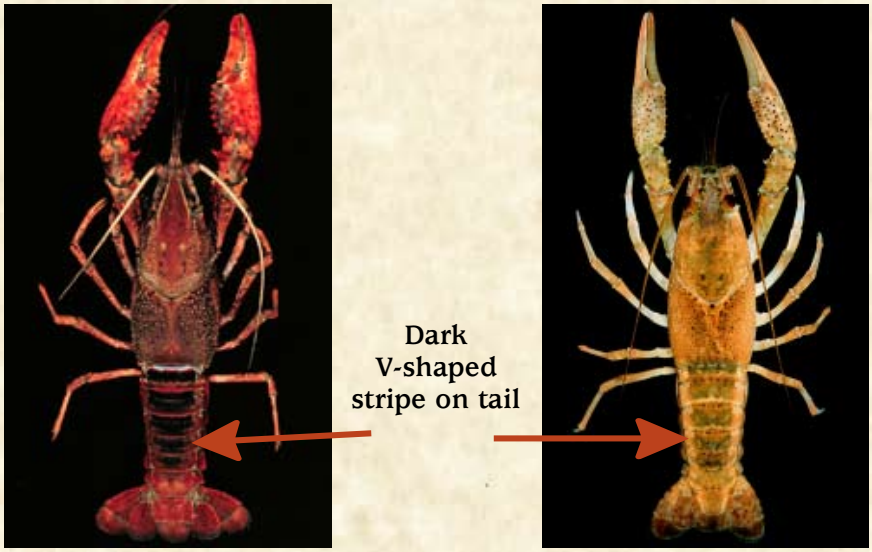
CRAYFISH KEY

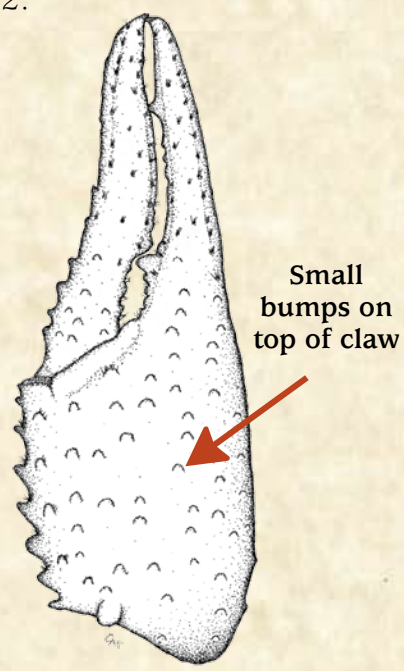
1. Look at crayfish's claws, sides of its body and tail for the presence of bumps. Based on these observations, decide if 1a or 1b better fits your crayfish:

1a. The sides of the body and top of the claws are covered with small bumps. Adults are red or light tan in color with a dark V-shaped stripe on top of the tail.

No: Go to option 1b below.

Yes: If this description matches your crayfish, go to 2.

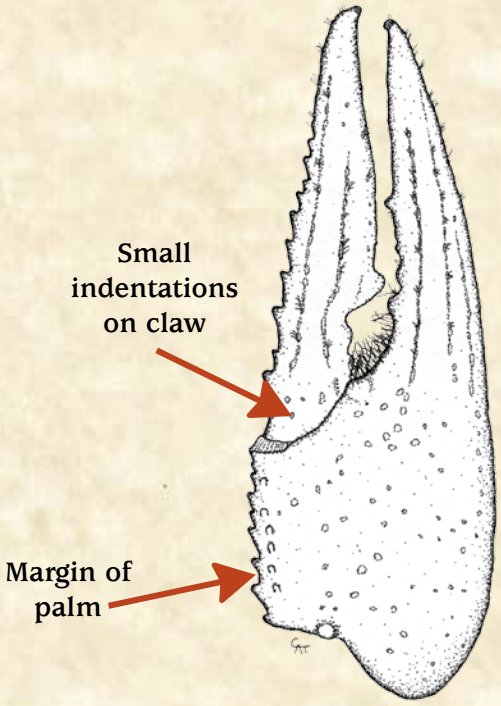




1b. The sides of the body are *not* covered with small bumps. Small bumps are found only along the margin of the claw's palm. Small indentations or pits may be present on the claws. The crayfish is tan to olive green with *no* distinctive V-shaped stripe on top of the tail.

No: Re-examine the same crayfish or try again with a different one from the same source.

Yes: If this description matches your crayfish, go to 3.



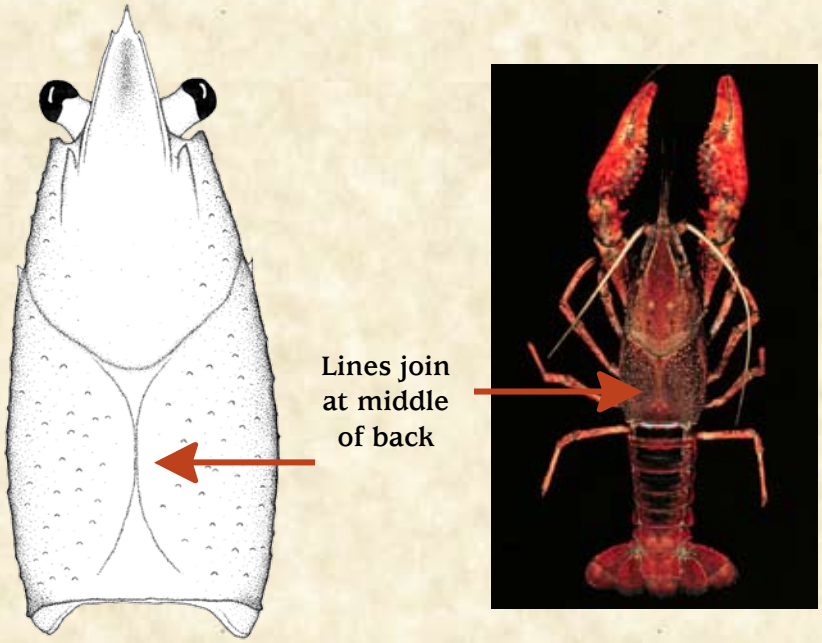
CRAYFISH KEY

2. Look at the ridges on the crayfish's back, and decide if 2a or 2b better fits your crayfish:

2a. Lines or ridges on the back between the head and tail join or touch at the middle of the back.

No: Go to 2b.

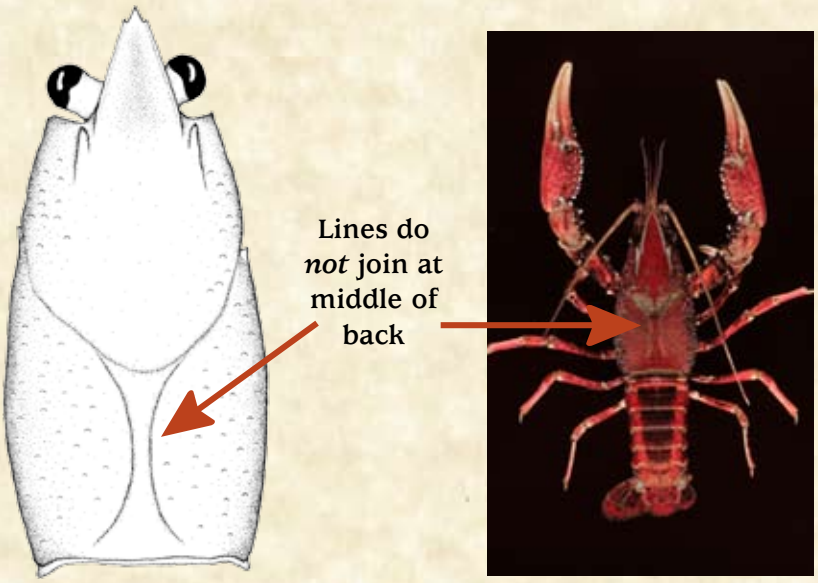
Yes: Red swamp crawfish *(Procambarus clarkii)*



2b. Lines or ridges on the back between the head and tail *do not* join or touch at the middle of the back.

No: Re-examine the same crayfish or try again with a different one from the same source.

Yes: White River crawfish *(Procambarus acutus)*

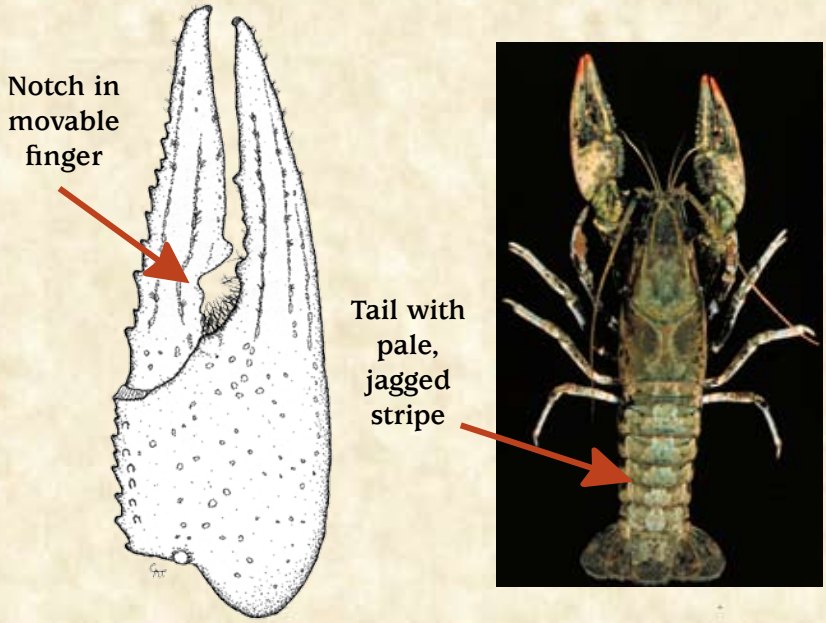


3. Look at the movable finger of the claw and the tail, and decide if 3a or 3b better fits your crayfish:

3a. The movable finger of the claw has a deep incision or notch at its base. A pale, jagged stripe runs down the middle of the tail.

No: Go to 3b.

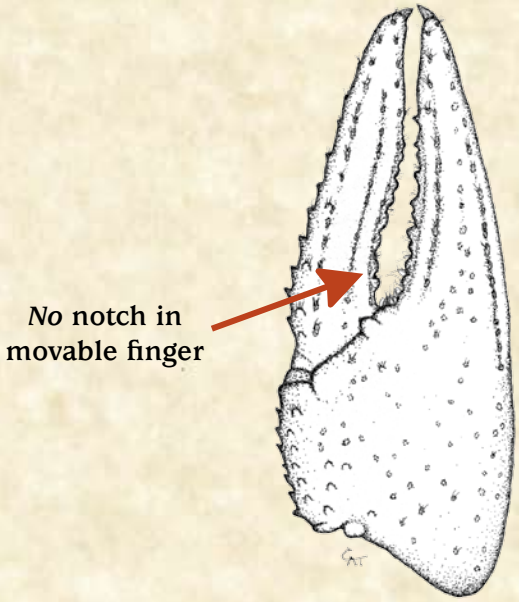
Yes: Calico (papershell) crayfish *(Orconectes immunis)*



3b. The movable finger of the claw has *no* deep incision or notch at its base. The inside of the margin is broadly concave.

No: Re-examine the same crayfish, or try again with a different one from the same source.

Yes: Go to 4.



CRAYFISH KEY

4. Look at the tips of the claws and the sides of the crayfish, and decide if 4a or 4b better fits your crayfish:

4a. A large rust-colored spot is on the side of the body in front of the tail, and the fingers of the claws have black bands near the tips.

No: Go to 4b.

Yes: Contact the Conservation Department because you have identified the invasive rusty crayfish *(Orconectes rusticus)*!

Black band on tips of claws

Rusty-colored spot on each side

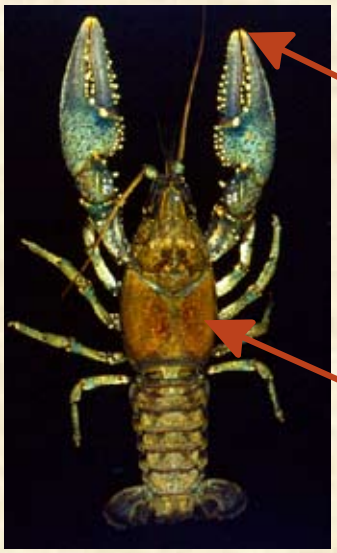
C. Lukhaup

Invasive rusty crayfish

4b. There is *not* a rust-colored spot on the side of the body in front of the tail, and *no* black bands are found on the tips of the claws' fingers.

No: Re-examine the same crayfish, or try again with a different one from the same source.

Yes: Virile (northern) crayfish *(Orconectes virilis)*



***No* black band on tips of claws**

***No* rusty colored spot on each side**

Approved Missouri bait crayfish

Virile (northern) crayfish* (*Orconectes virilis*)

- The body is brown or olive green, and several different shades of those colors can be present on one crayfish.
- Lines or ridges on the back between the head and tail do not join or touch at the middle of the back.
- Each segment of the tail usually has a pair of dark blotches on top.
- Sawtooth-like bumps along the inner edge of the claw are cream or yellow.
- Tips of the fingers may be light orange but never with black bands. Claws of large crayfish may be light gray or blue.

Calico (papershell) crayfish*

(*Orconectes immunis*)

- Crayfish usually are gray or light green with a light jagged stripe running down the middle of the top of the tail.
- The jagged stripe may be present on the back of the body but it's usually more prominent on the tail.
- Lines or ridges on the back between the head and tail do not join or touch at the middle of the back.
- Claws usually are light purple in color with a patch of short hairs at the base of the inner edge of the fixed finger.
- Tips of the fingers usually are orange or red.

White River crawfish (*Procambarus acutus*)

- Large adults are dark red in color; smaller individuals can be light brown and covered with black and white spots.
- A wide, dark V-shaped bar or stripe runs down the top of the tail. The width of bar is narrower at the back end of tail.
- Lines or ridges on the back between the head and tail do not join or touch at the middle of the back.
- The body and the top of the claws are covered with small bumps.
- The inside edge of the claw's palm has forward-pointed sawtooth-like bumps.

Red swamp crawfish (*Procambarus clarkii*)

- Large adults are dark red in color; smaller crayfish can be light brown and covered with black and white spots.
- A wide, dark V-shaped bar or stripe runs down the top of the tail; the width of the bar is narrower at the back end of tail.
- Lines or ridges on the back between the head and the tail join or touch at the middle of the back.
- The body and top of the claws are covered with small bumps.
- The inside margin or edge of the claw's palm has forward-pointed sawtooth-like bumps.

***Note:** The Conservation Department recommends the use of virile (northern) crayfish and calico (papershell) crayfish, rather than the White River crawfish or red swamp crawfish, because virile crayfish and calico crayfish are native to a much wider range in Missouri than the other two species.

Invasive species—Do not sell or release into Missouri waters

Rusty crayfish
(*Orconectes rusticus*)

- Crayfish are usually light tan to light green with some body regions being darker or lighter than others.
- A large, rust-colored spot is on each side of the body just forward of the tail.
- Large crayfish usually have a rust or brick-red colored body forward of the tail; the claws are light gray or light blue.
- Lines or ridges on the back between the head and tail do not join or touch at the middle of the back.
- The claw's fingers have red or orange tips and black bands. Bumps along the inner edge of the claw are smooth and not directed forward.
- Each tail segment may have a pair of dark blotches, with one blotch on each side of the segment.

Crayfish regulations in Missouri

- Only species listed on Missouri's Approved Aquatic Species List may be sold as bait in Missouri.
- Crayfish sold as bait may not be obtained from the wild but can be obtained from a private commercial source.
- An organism may not be released into a water body from which it did not originate.
- It is illegal to dump unused bait into a water body from which it did not originate.
- Anglers may catch their own crayfish (up to 150 per day with a valid fishing license) but should not transfer crayfish to waters from which they did not originate.
- Crayfish captured from the wild may not be sold as bait or transported outside of the state.

For a copy of the *Wildlife Code of Missouri*, visit www.mdc.mo.gov/regs/code/, or contact your local conservation agent for additional information on regulations concerning crayfish.

Crayfish are vital to Missouri and its waters

Crayfish are an important part of Missouri's biodiversity. Of the 33 known species of crayfish in Missouri, eight are found nowhere else in the world. Crayfish play an important role in water quality. They break down decaying material such as leaves, woody debris, grass and dead animals in streams and lakes, which help keep debris from clogging up the water. Crayfish also serve as:

- prey for over 200 species of insects, fish, amphibians, reptiles, birds and mammals
- desired food for many popular sport fish
- most important forage for smallmouth bass and goggle-eye
- food for people and as bait for fishing
- source of income for bait dealers and aquaculturists

CONSERVATION DEPARTMENT MISSOURI

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ILLINOIS NATURAL HISTORY SURVEY

Written by Bob DiStefano, Mary Litvan, Allison Meyer and Chris A.Taylor

Photo cover by Jim Rathert of a virile (northern) crayfish

Other photos and illustrations, unless noted, by Chris A. Taylor

SCI006 6/2008

Brief Guide to Crayfish Identification in the Pacific Northwest

December 2009

Signal crayfish (*Pacifasticus leniusculus*)

Washington has only one native crayfish species, the signal crayfish. It is fairly easily identified by its uniform brownish or blue-tinged coloration as adults with a white band at the joint of the claws (chelae). Juveniles of the signal crayfish will likely be drab brown with the white band less noticeable. It is also quite smooth on all its surfaces compared to other crayfish, especially the claw.



Red swamp crayfish (*Procambarus clarkii)*

The invasive red swamp crayfish will be red as adults with longer, narrower claws than the signal crayfish. Additionally, red swamp crayfish claws will be covered with red, white or black bumps (tubercules). Red swamp juveniles will be brown but with a body shape and pattern similar to adults, including a black “V” pattern on the dorsal side of the tail (abdomen) and a salt and pepper pattern of spotting in black, grey, white or red over the carapace.


SIGNAL CRAYFISH **RED SWAMP CRAYFISH**

Northern crayfish (*Orconectes virilis)*

The northern crayfish is a medium to large crayfish and is distinguished from signal and red swamp crayfish by broad flattened tuberculate (i.e., large tubercules) claws, and a olive-brown body that is dappled with dark brown, and abdominal segments with dark brown medial spots.

Rusty crayfish (*Orconectes rusticus*)

The invasive rusty crayfish, a major nuisance species in the midwest United States and elsewhere, was recently found in the John Day River of Oregon (Olden et al. 2009). The species is not yet known from other sites in the Pacific Northwest. Rusty crayfish may be best identified by the rust colored spot on each side of the carapace near the joint with the abdomen (see figures). Rusty crayfish also frequently have black tips to their claws. Rusty crayfish belong to the same genus as *Orconectes virilis*, but their claws are generally smoother – although may still have tubercules/bumps in contrast to the native signal crayfish.

Crayfish that do not conform to these descriptions could be other species such as the ringed crayfish *Orconectes neglectus* or the white river crayfish *Procambarus acutus.*

PLEASE PHOTOGRAPH ANY CRAYFISH THAT YOU ARE NOT ABLE TO IDENTIFY.

PLEASE KEEP VOUCHER SPECIMENS OF ANY NON-NATIVE CRAYFISH (deposit in ethanol).

Getting Your Specimens to the University of Washington

Once you have collected some nonnative specimens, I'd like to make arrangements to get them to UW. Please give me a call:

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School of Aquatic and Fishery Sciences
University of Washington
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e-mail : olden@u.washington.edu
phone: 206-616-3112
web: http://www.fish.washington.edu/research/oldenlab/
skype: goldenolden

Government of Western Australia
Department of Fisheries

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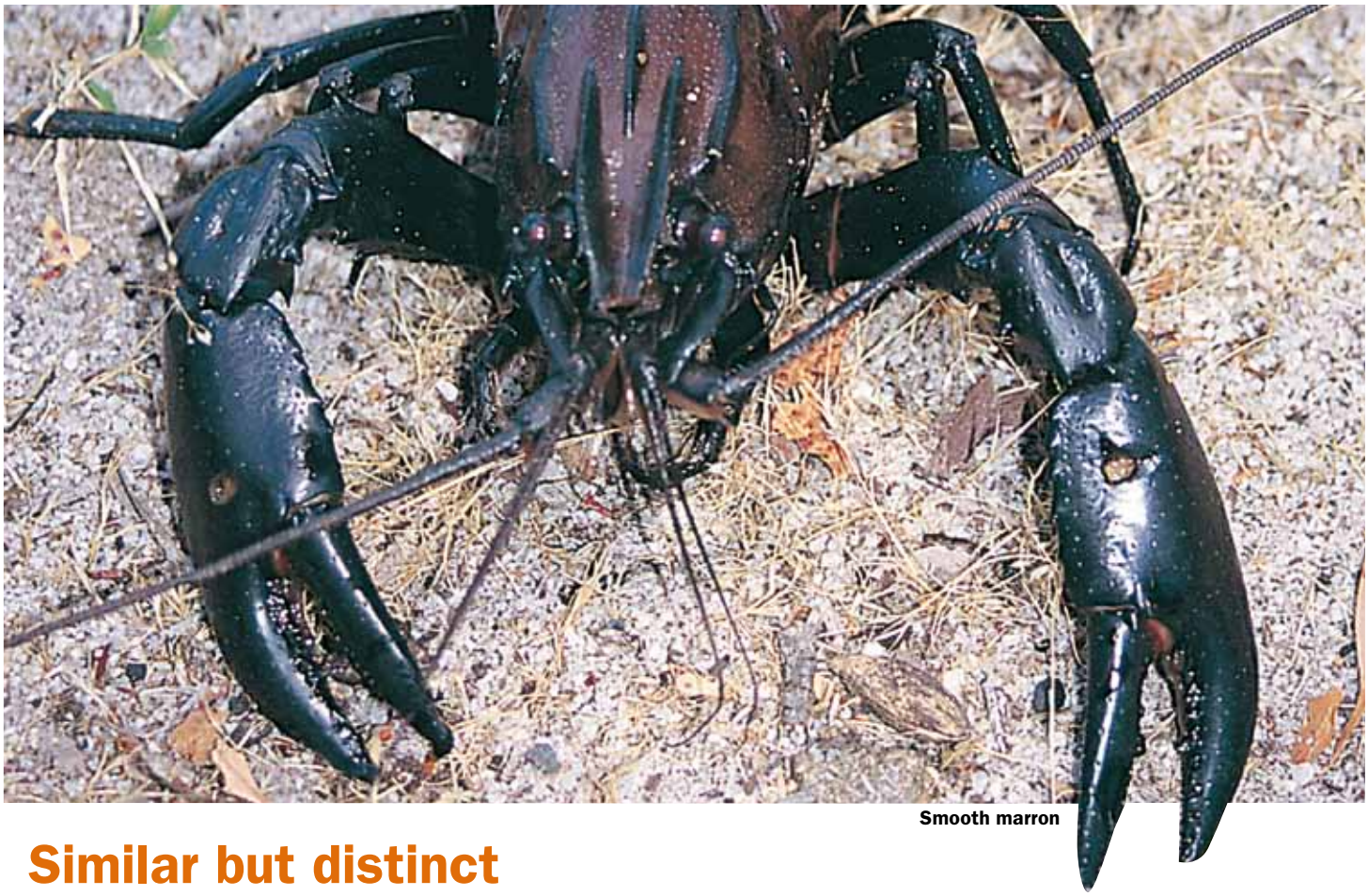
Fish for the future

FISHERIES FACT SHEET

IDENTIFYING FRESHWATER CRAYFISH



Smooth marron

Similar but distinct

Freshwater crayfish are an important part of ecosystems in south-west rivers and dams and are also one of Western Australia's great delicacies. There are more than 100 species of crayfish native to Australia, and at least seven species are commonly caught by recreational fishers in the streams and dams of southern WA. Other smaller crayfish species may also be seen by recreational fishers, tourists and bush-walkers in different locations.

Comparison is the key

Identifying WA's freshwater crayfish is very easy if you have all the species present. However, most people are usually trying to identify a single animal. Many Western Australians are unaware that so many species are commonly found in south-west waters, and common names (like 'yabby') have been mistakenly used to describe freshwater crayfish in general.

Crayfish from different regions or different areas can often be quite different in appearance. There is even evidence that marron from within the same waterway can look different. This fact sheet will help to correctly identify the commonly seen species of south-west crayfish (marron, koonac, gilgie and yabby) by using a simple key, photographs and illustrations to highlight the features that make each crayfish species unique. Once you have used this guide a couple of times, and have looked at the four major groups of freshwater crayfish in the South West, you will quickly become an expert at identifying WA's freshwater crayfish!

Scientists who classify plants and animals (called taxonomists) are trained in looking for differences among animals which look somewhat similar. For ease in telling species apart, taxonomists produce 'identification keys', which provide two choices of information about a feature of the animal you are looking at. A simple key that has been specifically designed to help classify WA freshwater crayfish is provided in this fact sheet.

Features of freshwater crayfish

Carapace: Protective shell covering the crayfish head and abdomen.

Cervical groove: Semicircular notch that divides the head of the crayfish.

Chelipeds: The claws of freshwater crayfish.

Keel: A long ridge that runs lengthwise along the top of the head.

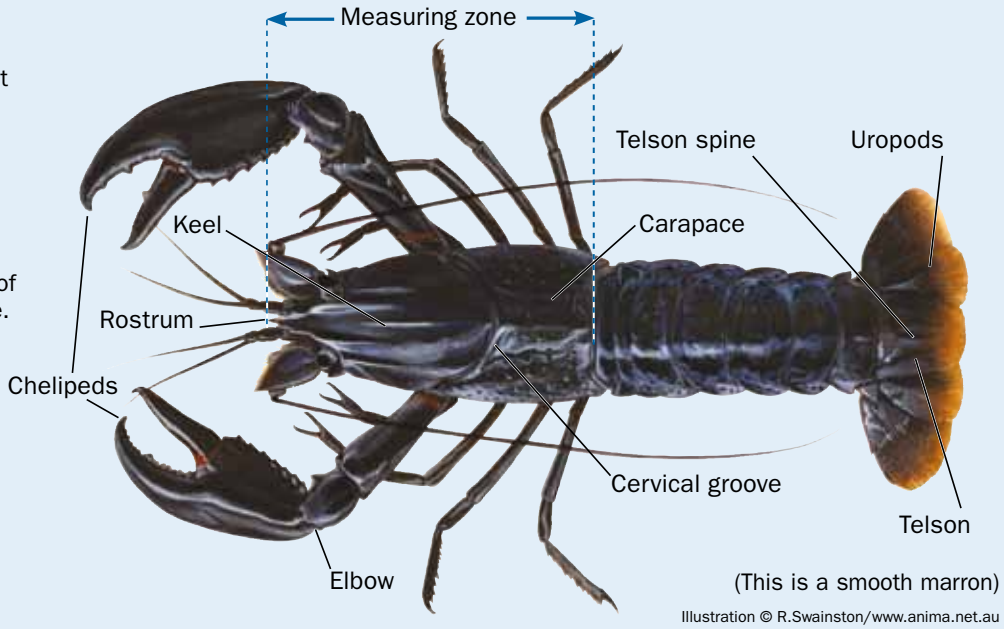
Measuring zone: Measure from the tip of the rostrum to the back of the carapace.

Rostrum: The long spike that sticks forward from the head between the eyes.

Telson: The middle 'panel' of the tail.

Telson spine: Tail spine found only on marron.

Uropods: The two pairs of 'fans' on either side of the telson that make up the tail.



(This is a smooth marron)

Key to identifying freshwater crayfish

The key is very simple to use. Simply start at point 1 and read the two choices you have. Decide which of the choices fits the crayfish best and look below the description. If it provides a number, then go to that numbered point and again read the choices. Alternatively, if a name is provided, then you have matched your crayfish to the likely species.

For example, a crayfish has four keels on the head and no spines on the rostrum. Starting at section 1, this description fits best with point 1b. After point 1b it says, "Go to 3". At section 3, the best fit is 3b, that the claws are elongated and quite large and there are hairs inside the 'elbow'. Therefore, you have successfully identified a yabby.

START
1
SELECT

1a
Five obvious keels on the head. Small spines present on the rostrum.

Go to 2

1b
Four keels on the head but usually only two keels are obvious. No spines present on the rostrum at all.

Go to 3

3
SELECT

3a
Chelipeds (claws) are oval in shape and quite broad.

Koonac (2 species)

3b
Chelipeds (claws) elongated and quite large. Obvious hairs on the inside of the 'elbow'.

Yabby (2 species)

2
SELECT

2a
Two small spines on the telson, located about halfway up. Three pairs of small spines on the rostrum.

Marron (2 types)

Go to 4

2b
No spines on the telson. Two pairs of small spines on the rostrum.

Gilgie (2 species)

4
SELECT

4a
Middle keel extends all the way to the cervical groove. Head covered with short hairs.

Margaret River Hairy Marron

4b
Middle keel does not extend to the cervical groove. No hairs on head.

Smooth Marron

Marron

Marron are the largest freshwater crayfish in the south-west of WA and one of the largest freshwater crayfish species on earth. Before the introduction of other freshwater fishes, marron were the largest animal in south-west rivers.

Originally only found between Harvey and Albany, the range of marron has been extended by the 'seeding' of rivers and irrigation dams with juvenile marron, along with their use in aquaculture ventures. Marron are now found in rivers and dams from the Hutt River (north of Geraldton) to east of Esperance. There are small populations of marron in dams in the Goldfields.

Marron prefer sandy areas in rivers and dams, particularly areas that have lots of structure (fallen trees, rocks) but do not tolerate high salinity.

Marron can grow more than 380 mm (total length) and they are usually measured from the tip of the rostrum to the back of the carapace.

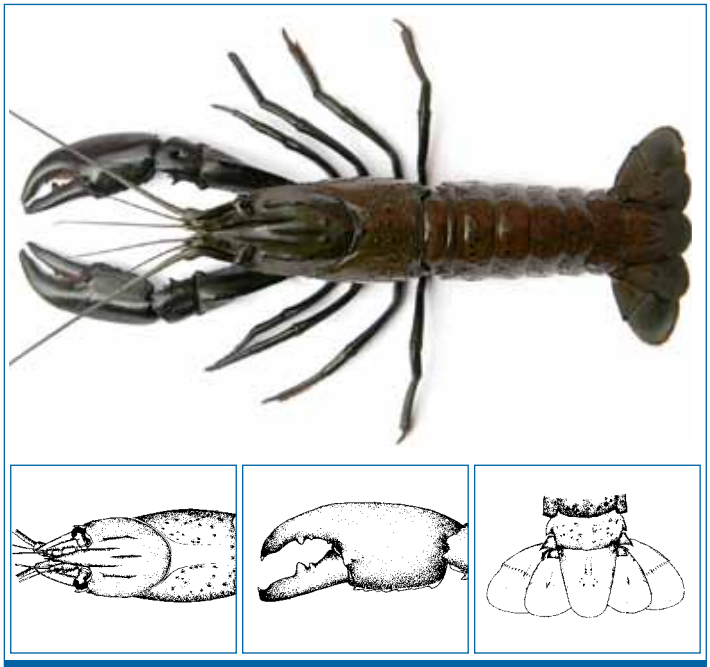
Marron possess five keels along the head, three pairs of short spines on the rostrum, two small spines on the telson and narrow, pincer-like chelipeds (claws). They range in colour from jet-black to brown or even striped, red and cobalt-blue, a rare natural version now farmed for aquariums.

There are two types of marron found in WA – smooth and hairy. Smooth marron are widespread and found in most south-west rivers and dams. They are what most marroners have seen and captured, and are the farmed aquaculture species.

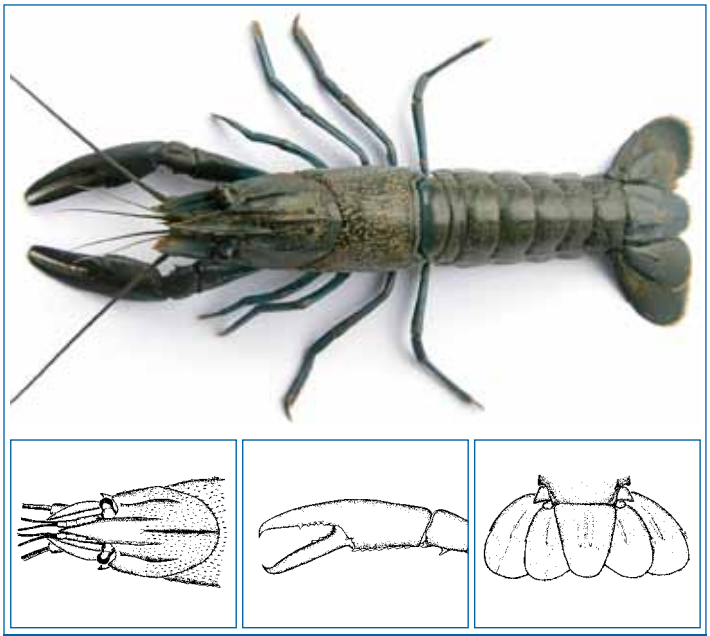
Hairy marron are found almost exclusively in the upper reaches of Margaret River. The head and sometimes tail (of larger marron) are covered in clusters of short hairs. The central keel also extends all the way to the cervical groove.

Hairy marron are threatened by smooth marron that have become established throughout Margaret River. The Department of Fisheries is restocking hairy marron to assist the recovery of this endangered type. The upper reaches of Margaret River are now closed to recreational fishing, so if you capture hairy marron in Margaret River, please put them back immediately.

Recreational fishers in WA need a licence to catch marron. A detailed information brochure about marron fishing is available from the Department of Fisheries website at www.fish.wa.gov.au.



Smooth marron photo and illustrations



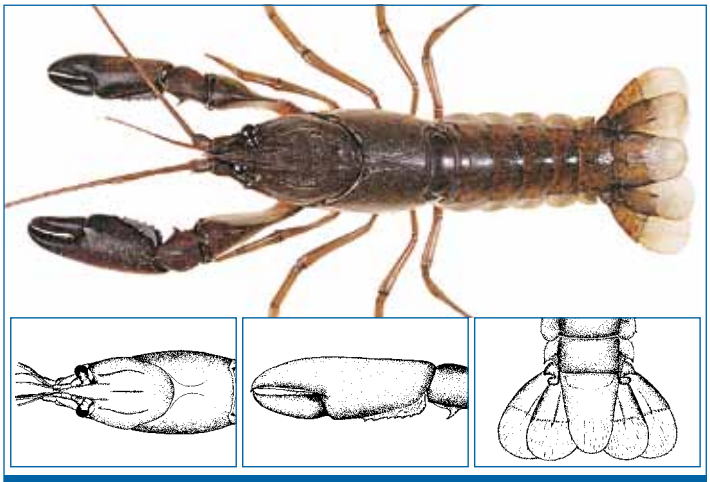
Hairy marron photo and illustrations

Gilgie (two species in WA)

Gilgies can be commonly found in most streams, rivers and irrigation dams in the South West, and are often caught while fishers are marroning. Gilgies can burrow to escape drought and have a wider distribution than marron.

Gilgies also have five keels along the head, like marron, but only have two pairs of small spines on the rostrum. Gilgies do not have any spines on the telson. Gilgie chelipeds are narrower than those of koonacs or yabbies.

Most gilgies are small, but may reach 130 mm in total length. Gilgies range in colour from a black-brown to a light brown colour, and often have speckled patterns on their chelipeds (claws).



Gilgie photo and illustrations

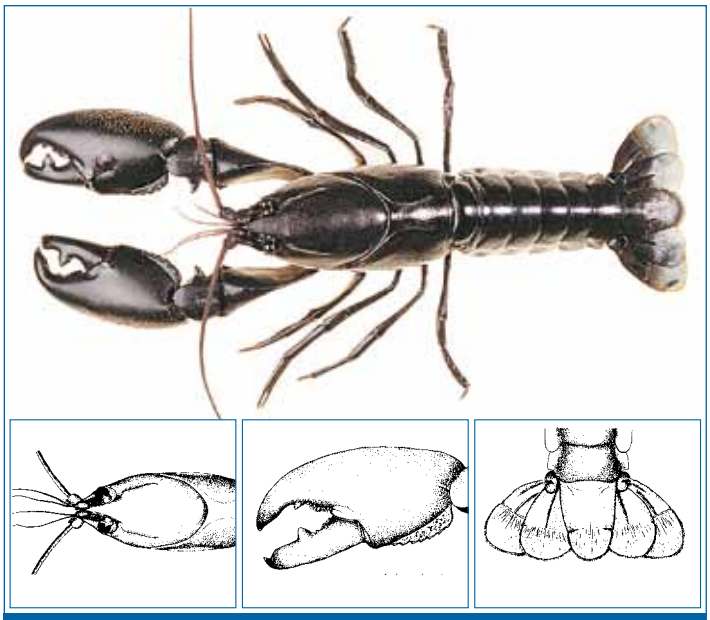
Koonac (two species in WA)

Koonacs are also relatively large freshwater crayfish, growing up to 200 mm in total length. However, their distribution is further inland than that of marron, and they are often found in seasonal rivers and swamps that dry-up during summer.

Koonacs survive drought because they can burrow and remain there for months at a time.

Koonacs have four keels on the head and two are very prominent. Koonacs have no spines on the rostrum or telson. The chelipeds (claws) are unique, being very broad and serrated on the inside edge.

Koonacs are usually very dark in colour, ranging from blue-black to mottled brown-black.



Koonac photo and illustrations

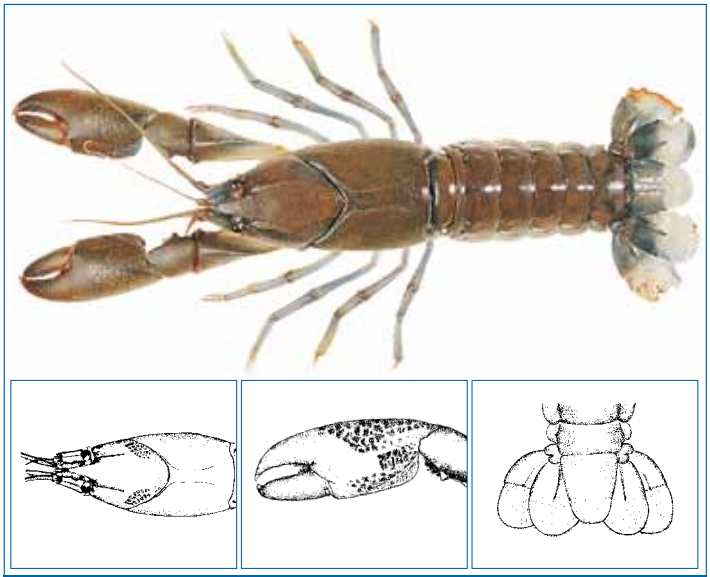
Yabby

Yabbies are an introduced species to WA. They are native to New South Wales, Victoria and South Australia, and were stocked into farm dams in WA in 1932. Yabbies can now be found in some south-west rivers and dams.

Yabbies are much smaller than marron – very few yabbies grow to 130 mm in length. Yabbies can range from a beige or coffee colour to almost black. They can also take on a blue colour when held in aquariums for a long time.

Their head has four keels, with two keels being very obvious, and have a short rostrum with no spines. The inner edges of the chelipeds (claws) have a mat of very obvious hairs not found on other crayfish species in WA.

Yabbies are a threat to the marron fishery, as they breed faster than marron and may carry diseases that affect other freshwater crayfish. Help preserve native species; never release yabbies into rivers, lakes and dams and do not use them as live bait. If you catch a yabby, keep it.



Yabby photo and illustrations

References

Websites:

Department of Fisheries, Western Australia
www.fish.wa.gov.au

Freshwater Fish Distribution in WA
freshwater.fish.wa.gov.au

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FURTHER INFORMATION

Visit the Department's website at **www.fish.wa.gov.au** or contact:

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Crayfish Identification, Distribution and Legislation

In the UK there are seven species of crayfish present in the wild; this includes our native White-clawed crayfish with the rest being all non-native species. In order to facilitate effective management, conservation or control of crayfish, they need to be identified correctly. This first section guides you through materials and methods for identifying crayfish and how to do it correctly. Note that to catch or handle crayfish, you need a licence. Without one you will be committing an offence: Click here.

Identification Resources

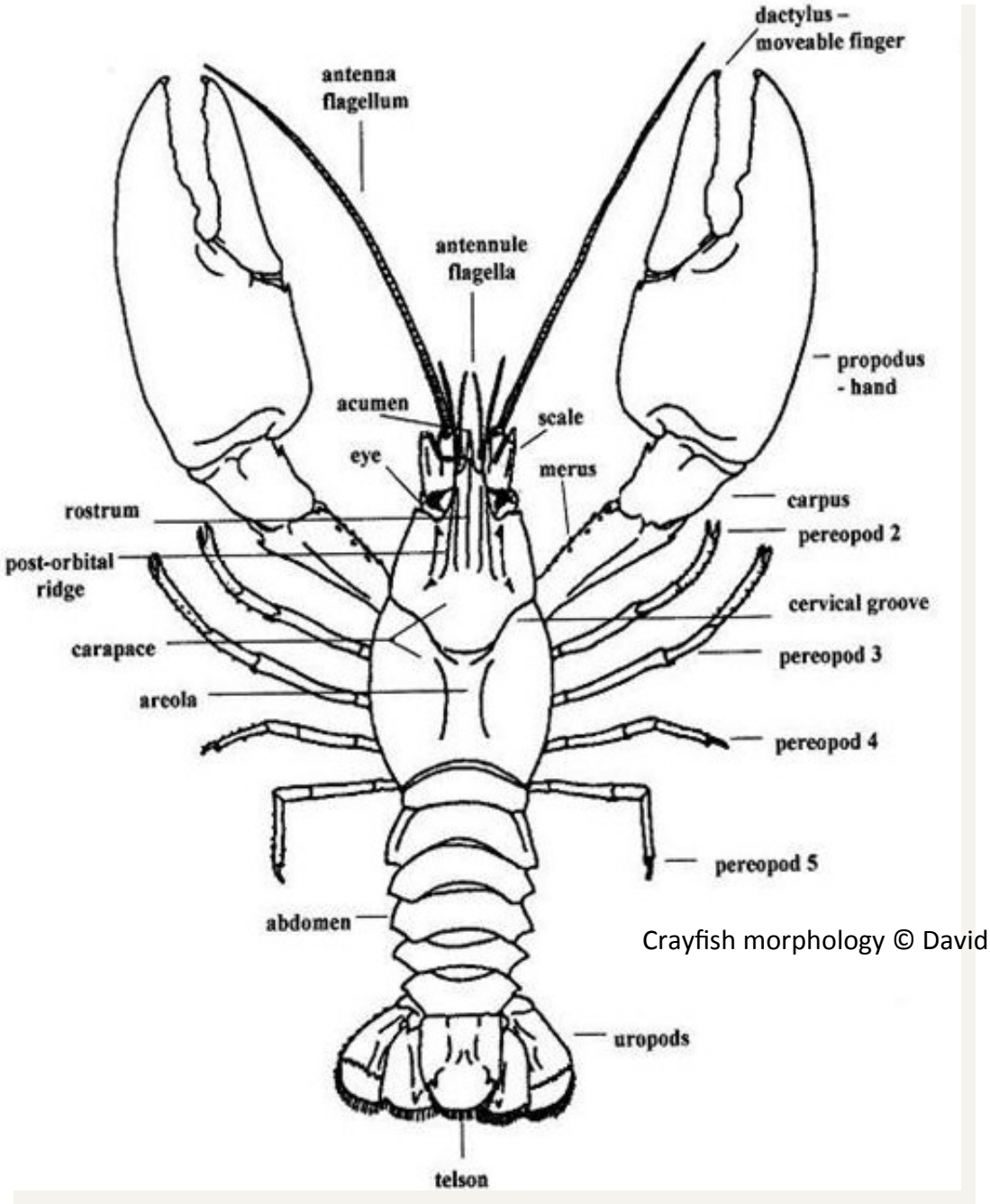
Outlined below are the best resources that are currently available on crayfish identification:

- An excellent diagnostic key can be found within David Holdich's paper 'Identifying Crayfish in British Waters', which can be found on page 147 of the proceedings of Crayfish Conservation in the British Isles.
- The University of Nice is developing a database for field identification of crayfish in Europe which will be available as an app to download. Link to crayfish key.
- The Centre for Ecology and Hydrology, the Biological Records Centre and JNCC have recently completed an online recording form which can also be used to record sightings. If photos are uploaded, recorders will receive an email confirming the identification.

Photographs for Identification

To identify crayfish you can also use photographs of individuals, below is a list of photographs that should be taken in order to allow verification. For verification of crayfish photos contact your local environmental agency.
Photographs that will provide the best details for identification are as follows:

- General view whole crayfish from above
- Close up of one claw (whole – moveable "finger" and hand, plus next section of limb), view from above
- Same view of underside of the claw
- Close up of head viewed from above showing detail of pointed rostrum and whole head including groove between head and body
- Close up of head and cervical (carapace) groove, side view
- Close up of underside between lowest two pairs walking legs to see sex organs especially of mature male



Crayfish morphology © David Holditch

Taking a specimen—(information for licensed crayfish workers)

If you are 100% sure the crayfish is not a White-clawed crayfish and you can't identify the species, then take a specimen of the non-native crayfish by freezing it and then preserving in 90% ethanol. This can then be sent off to your local environmental agency biologists to check ID.

In England and Wales contact - the Environment Agency on 08708 506 506
In Scotland contact - the Scottish Environment Protection Agency (SEPA)
SEPA North 01349 862021 , SEPA South East 01314 497296 and SEPA South West 01355 574200
In Northern Ireland contact - the Northern Ireland Environment Agency on 0845 302 0008

Descriptions of crayfish species present in the UK

The following table is mainly sourced from Pöckl, Holdich & Pennerstorfer (2006) this describes all those species of crayfish currently present in the wild in the UK as well as two species (in the dark grey boxes) that are at high risk of escaping into the wild. For more information on non-native crayfish and their control please click here.

Description of crayfish species based on Pöckl M., Holdich D.M. & Pennerstorfer J. (2006) *Identifying native and alien crayfish species in Europe*, European Project CRAYNET and, Holdich (2009) and Holdich & Sibley (2009) both in 2009 Conference Proceedings.

Species and origin, introduced into UK	**Body length**	**Rostrum**	**Body**	**Appendages**
White-clawed crayfish *(Austropotamobius pallipes)* Native	< 12cm	Narrows to either a small triangular or a long sharp tip.	Brown to olive with a pitted appearance, but may be black, whitish-grey or beige. Row of spines on the shoulder of their carapace behind the cervical groove.	Topside of claws are weakly granular with the underside usually a dirty-white colour (sometimes light pink or green, but never red)
North American signal crayfish *(Pacifastacus leniusculus)* North America 1970s	Up to 16cm	More or less parallel ending in a very pointed tip with prominent spiniform shoulders.	Smooth, bluish-brown to reddish-brown colour or light- to dark-brown.	Smooth claws with a white-turquoise patch on top of junction of fixed and moveable finger. Underside of claws are red.
Narrow-clawed crayfish *(Astacus leptodactylus)* Turkey 1980s	Up to 15cm (can be larger)	More or less parallel and is spiny.	Olive-green to honey-brown and may be mottled. Joints are often dark orange. Olive-green to honey-brown and may be mottled. Joints are often dark orange. Blue varieties have been known. Prominent spiny tubercles on the shoulder of the carapace behind the cervical groove.	Claws usually same colour as the body and granular with the undersides light-coloured with elongated fingers.

Spiny-cheek crayfish *(Orconectes limosus)* North America, 1990s?	Up to 12cm	Smooth and more or less parallel.	Relatively smooth, pale in colour or dark brown or olive-green with a transverse brown-red band across abdominal segments. Prominent spines on the sides of the upper carapace	Smooth claws except along inner edge which display a row of pale tubercles. Tip of claw is orange with a black band below.
Red swamp crayfish *(Procambarus clarkia)* North America, 1980s	Up to 15cm, usually 10cm	Triangular.	Rough, dark red, orange or reddish brown in colour but olive-green to brown when young.	Red claws on both surfaces and covered in tubercles, more prominent on the upper side.
Noble crayfish *(Astacus astacus)* mainland Europe, 1980s	<15cm	More or less parallel with a row of tubercles/ spines on the tip.	Variably granular and variable in colour from dark-brown, beige, to light-brown, occasionally brilliantly blue or red coloured. Row of spines on the shoulder of the carapace behind the cervical groove.	Topside of claws are granular, usually the same colour as the body with the underside red to dirty brown with two obvious widely-spaced tubercles (small nodules) on the inner side of the fixed finger.
Virile crayfish *(Orconectes virilise)* North America, 1990s/2000s?	Up to 12cm, often <10cm	More or less parallel.	Smooth, chestnut or chocolate in colour with a bowl-shaped or wine glass-shaped light brown pattern.	Claws are the same colour as the body on the upper surface and dirty-white on the underside with prominent yellow tubercles
Red claw crayfish *(Cherax quadricarinatus)* High risk of introduction	large adults up to ≥35 cm	Long and well-developed, margins extending well back onto anterior carapace, acumen long and bordered by spines	Body smooth. Antennae and claws very long in adult males. Body colour usually blue, mottled with beige, and red.	Characterized by red patch on outer margin of claw in males. Inner margin of claw longer than moveable finger, whereas in members of the Astacidae and Cambaridae, it is shorter.
Marbled crayfish *(Procambarus sp.)* High risk of introduction	Up to 13cm, often <10cm	Tapering, triangular tip.	Smooth, bluish tinged to brightly blue in colour. Variable decorative (marbled) pattern.	Very small claws, weakly granulate and marbled with the same colouring as the body

UK crayfish species photos

See below for photos of the seven crayfish present in the wild in the UK. Please note that there can be big colour variations within each species and photographs alone should not be used for identification.

White-clawed crayfish (*Austropotamobius pallipes)*

Usual brown and more unusual blue colour forms

Austropotamobius pallipes crayfish © S. Peay

Signal Crayfish *(Pacifastacus leniusculus)*

© B. Case

Narrow-clawed crayfish *(Astacus leptodactylus)*

© B. Case

Spiny-cheek crayfish *(Orconectes limosus)*

Noble crayfish *(Astacus astacus)*

Virile crayfish *(Orconectes virilis)*

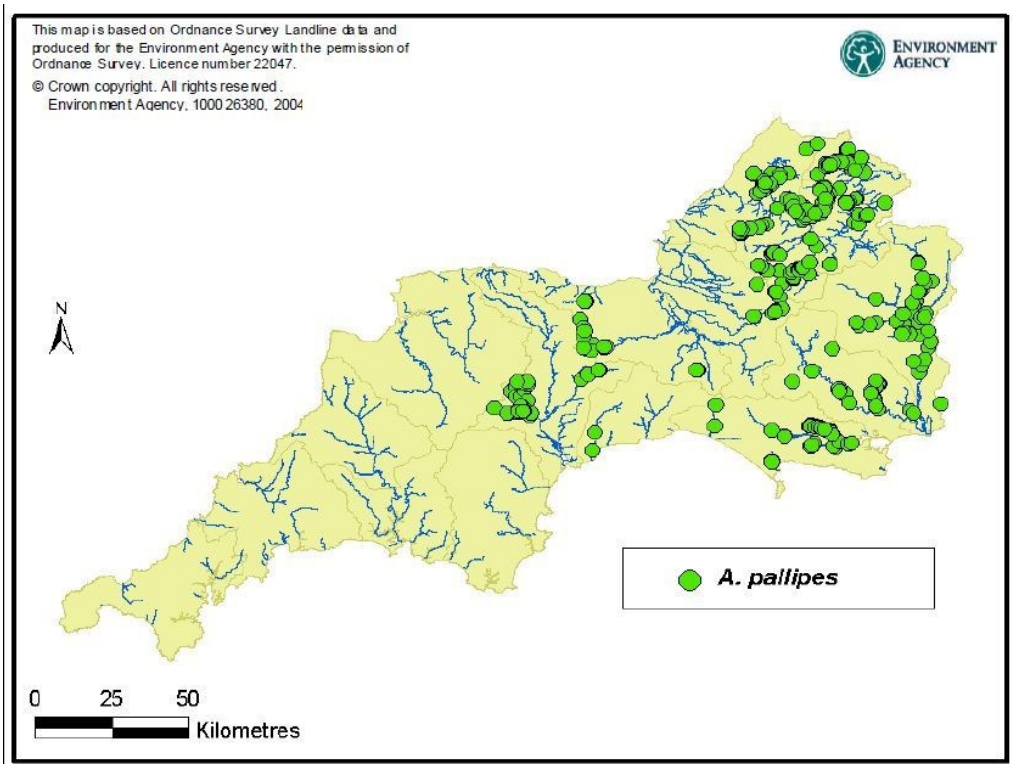
Red swamp crayfish *(Procambarus clarkii)*

Red-claw crayfish *(Cherax quadricarinatus)*

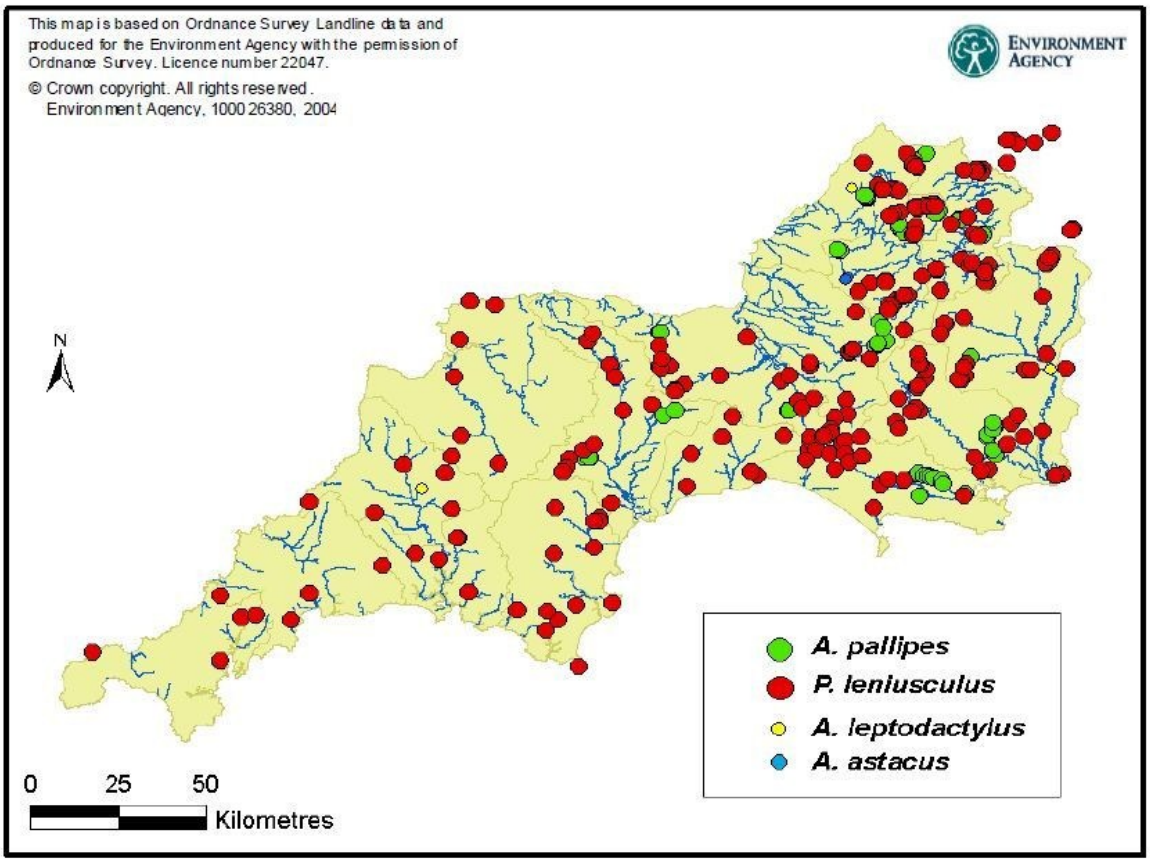
Crayfish distribution in the UK

White-clawed crayfish populations are found in fragmented patches across England and Wales. The White-clawed crayfish has been declining rapidly across its range since the 1970s due to habitat loss, pollution, crayfish plague and competition from invasive crayfish species such as the North American signal crayfish (*Pacifastacus leniusculus*). As a result many populations of White-clawed crayfish have been lost in England and Wales.

The decline in White-clawed began in the 1970s and is continuing at a rapid rate across England and Wales. As the invasive species of crayfish (principally the Signal crayfish) spread northward and their populations have grown they have pushed the range of the White-clawed crayfish northward. This has had severe implications for the White-clawed crayfish as while they can co-exist in some habitats for a few years in 'mixed zones' with non-native species, eventually they disappear through competition, predation or disease. Despite this decline there are populations of White-clawed crayfish persisting in areas such as: South Wales, Suffolk, East Midlands, Dorset, Somerset, Gloucestershire, Exmoor and the North York Moors. To illustrate the effect of invasive crayfish see maps below showing the decline in White-clawed crayfish distribution across the South-west from 1975 to 2009.



Approximate distribution of crayfish in the South-west in 1975 as created by Pete Sibley



Approximate distribution of crayfish in the South-west in 2009 as created by Pete Sibley

Sources of distribution information

Displayed below is a link to the National Biodiversity Network (NBN) Gateway. Here you can search and view distribution records of UK crayfish. NBN presents all of the publicly available data on a single map. However it should be noted that NBN crayfish data are not complete and not all records have been verified therefore these maps may still contain some errors and so use this information carefully when assessing status.

NBN Gateway

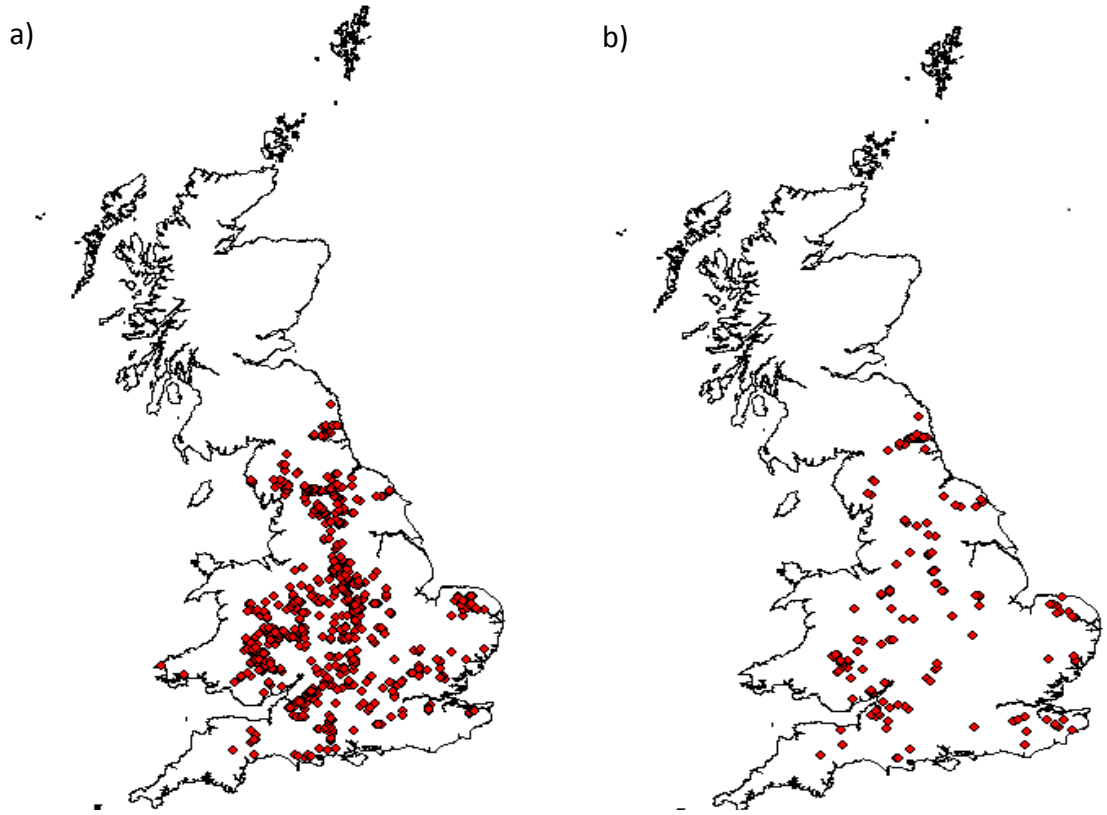
Other useful sources of records are:

- Local Biological Record Centres click here for contact list
- Local environmental agency offices can be reached through the contacts given below. Remember to check whether the data you obtain has been verified.

In England contact - the Environment Agency on 08708 506 506
In Scotland contact - the Scottish Environment Protection Agency (SEPA). Find your local office here. SEPA North 01349 862021 , SEPA South East 01314 497296 and SEPA South West 01355 574200
In Northern Ireland contact - the Northern Ireland Environment Agency on 028 9054 0540 or email.
In Wales contact– Natural Resources Wales on 0300 065 3000 or email.

There are also new crayfish distribution maps available from the University of Cardiff.

[The Distribution of Crayfish Species in the UK—University of Cardiff Report]



The distribution of native White-clawed crayfish in the UK, a) before 1991 and b) from 2009 onwards (as these are the only populations we can be confident still exist) from the University of Cardiff.

White-clawed crayfish distribution maps are also available within the JNCC's conservation assessment for the species.

Gathering and interpreting crayfish distribution data

Here is some advice on how to gather and interpret crayfish records, when undertaking crayfish projects.

- Always obtain records for native and non-native crayfish, when assessing crayfish status in a catchment.
- For non-native crayfish records post 1975 assume that the population is still present. If there is an old record of Signal crayfish expect the population of Signal crayfish to have spread beyond the recorded site unless recent detailed surveys show otherwise.
- For White-clawed crayfish old records are useful for historic distribution and evidence that catchment was colonised in the past – even after the population has been lost as they will be relevant if re-stocking is feasible after recovery from pollution events or crayfish plague.
- Take care as even White-clawed crayfish records a few years old may not reflect recent losses to crayfish plague or invasion by non-native crayfish, if there are no recent records, do a survey.
- Records are most useful when shown in relation to watercourses so the status of crayfish by catchment and sub-catchment can be seen. Most desk studies for developments limit search areas to 1km or 2km from a site except for statutory sites, which may mean crayfish records are missed.

Distribution database in England and Wales

This distribution data of all crayfish species and crayfish plague outbreaks was collated from a variety of sources to develop a comprehensive, current and historic database. The database represents a valuable tool for managers and researchers.
Rogers, D. & Watson, E. (2010) Distribution database for crayfish in England and Wales. Link to paper. (Found on page 14).

Distribution references

Below are further publications on crayfish distributions in the UK from the last five years.

Holdich D.M. & Sibley P.J. (2009) ICS and NICS in Britain in the 2000s; Brickland J, Holdich D.M. and Imhoff E.M. (eds). Crayfish conservation in the British Isles. Proceedings of a conference held on 25th March 2009 in Leeds, UK. Link to conference proceedings.

Rogers, D. & Watson, E. (2010) Distribution database for crayfish in England and Wales. IN Species Survival Conference, Securing White-clawed Crayfish in a Changing Environment. Bristol, November 2010. Link to paper. (Found on page 14).

Souty-Grosset C., Holdich D.M., Reynolds J., and Sibley P.J. (2009) A review of the ever increasing threat to European crayfish from non-indigenous crayfish species. *Knowledge and Management of Aquatic Ecosystems* **11** 394-395. Link to free access journal.

Reynolds J. (2009) The current status of white-clawed crayfish in Ireland; Brickland J., Holdich D.M. and Imhoff E.M. (eds). Crayfish conservation in the British Isles. Proceedings of a conference held on 25th March 2009 in Leeds, UK. Link to conference proceedings

Sinclair (2009) Fine-scale mapping of crayfish in Scotland. SNH ROAME report *available soon.*

Souty-Grosset C, Holdich DM, Noel PY, Reynolds JD and P Haffner (2006) The Atlas of Crayfish in Europe. Muséum National d'Histoire Naturelle.

D.M. Holdich (2002) Distribution of crayfish in Europe and some adjoining countries. *Knowledge and Management of Aquatic Ecosystems* **367**, 611-650 Link to free access journal

Crayfish legislation

Legal protection, licences and consents

There is a considerable amount of legislation in place in an attempt to protect the White-clawed crayfish. This species is listed under the European Union's (EU) Habitat and Species Directive and is listed under Schedule 5 of the Wildlife and Countryside Act (1981). It is also classified as Endangered in the IUCN Red List of Endangered Species. As a result of this and other relevant crayfish legislation such as the Prohibition of Keeping of Live Fish (Crayfish) Order 1996, a series of licences are needed for working with White-clawed and non-native crayfish. These are:

A licence to handle crayfish (therefore survey work) in England - click here for a link to the Natural England website and the protected species form (England). A licence for the keeping of crayfish in England and Wales - click here for a form (England) - with an exemption for Signal crayfish for defined areas click here for a form (England). People in the post-code areas listed with crayfish present prior to 1996 do not need to apply for consent for crayfish already established. It does not, however, allow any new stocking of non-native crayfish into waterbodies. Consent for trapping of non-native crayfish for control or consumption is most likely to be granted in Thames and Anglian regions in the areas with "go area" postcodes. Harvesting of crayfish is prohibited in much of England and in any part of Scotland and Wales. Application for a licence to release non-native species and those listed under Schedule 9 - click here for a link to the Natural England website with the form (England).

Wales
For licence applications in Wales, applicants should contact the Welsh Assembly Government on:
Welsh Assembly Government
Environment - Conservation & Management (Fisheries)
Cathays Park
Cardiff CF10 3NQ
Email: fisheries@wales.gsi.gov.uk
Tel: 02920 823567

Scotland
If you want to trap Signal crayfish in Scotland, you must request a licence from the Scottish Natural Heritage licencing team. You can find more details at:
http://www.snh.gov.uk/protecting-scotlands-nature/species-licensing/

Or you can contact them at:
licensing@snh.co.uk or by calling 01463 725 246/245

England
For any use of crayfish traps a crayfish trapping consent is needed from the Environment Agency. This is necessary for any species of crayfish and for any purpose, whether surveys or removal of signal crayfish as harvest, to reduce nuisance to angling or for scientific research. For more information on trapping click here.

More information on licencing and consents and how to apply for them see the paper below:
Bradley and Peay (2008) Licencing and consents paper *(revised version available soon).*

The UK Crayfish website is a partnership project between Buglife and the Environment Agency

Local Office Details:
Buglife – South West Office, THINQTANQ, Fairbairn House, Higher Lane, Plymouth, PL1 2AN

Produced by Olaf Booy, Max Wade and Vicky White of RPS

Signal Crayfish

Species Description

Scientific name: *Pacifastacus leniusculus*
AKA: Cimwch dir Croyw (Welsh)
Native to: North America
Habitat: Most freshwater habitats

Their small lobster-like appearance makes crayfish easy to recognise. Distinguishing non-native species from the threatened native white-clawed crayfish is essential. Compared to the native species, the signal crayfish is much larger and its claws are red underneath with a small turquoise / white blotch on the surface. There are several other non-native crayfish species, but these are relatively rare.

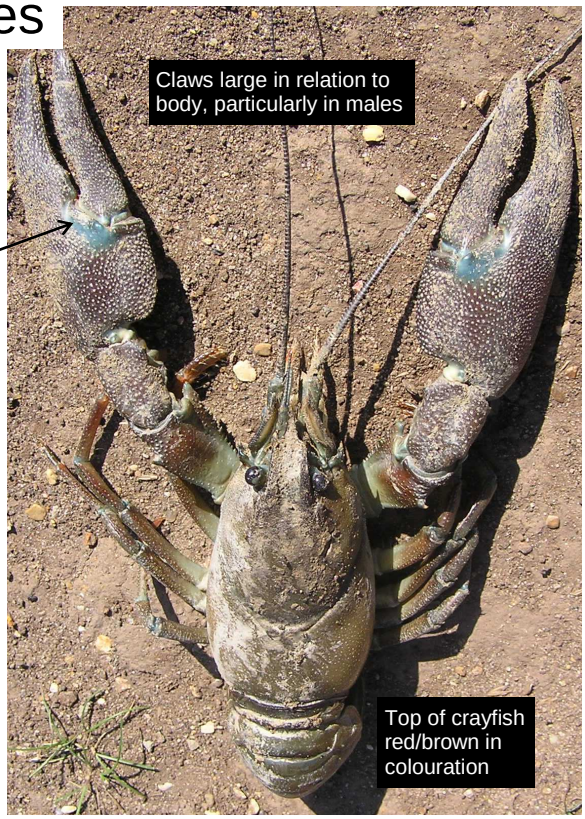
Introduced for food in the late 1970s and 1980s but spread quickly across much of the UK. Distribution in Scotland is limited. Spreads up and downstream and may cross land to colonise adjacent water bodies. Human transfer, although illegal, still continues. Negative impacts include the almost complete loss of the native crayfish through the spread of disease and direct competition. Also undermines riverbanks through burrowing and can predate on native fish eggs and aquatic invertebrates.

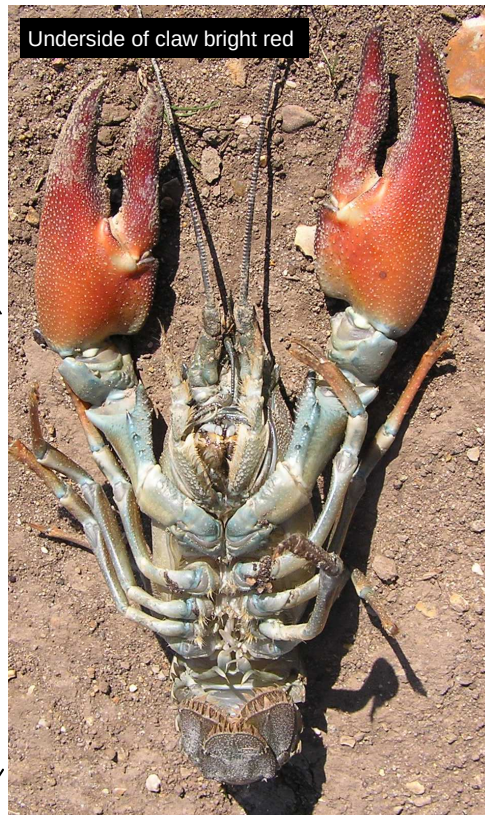
Signal crayfish is listed under Schedule 9 to the Wildlife and Countryside Act 1981 with respect to England, Wales and Scotland. As such it is an offence to release or to allow the escape of this species into the wild. In the UK it is an offence to keep any crayfish without a license, except in some parts of southern England. If trapping of signal crayfish is planned, an application should be made to the relevant environmental protection agency.

For details of legislation go to www.nonnativespecies.org/legislation.


DH

Key ID Features





Identification throughout the year

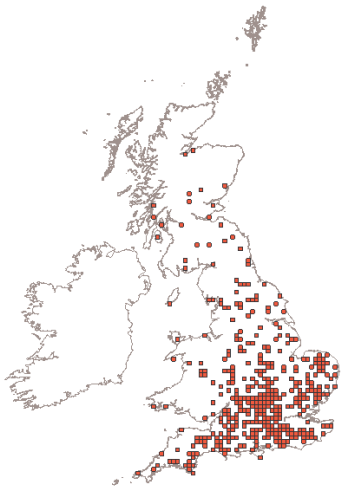
Least active during winter when much time is spent in a state of torpor often in burrows in riverbanks. Peak activity is during the summer. Mating takes place in autumn and early winter and females carry the developing eggs in a dense cluster attached to the underside of their tail over the winter. When the eggs hatch, young remain attached to the female. Release of the young usually begins in May-June. The life cycle then proceeds through a series of moults.

Field signs

- Burrows in banks of water body
- Parts of dead animals including claws and body shell either on shoreline or stream edge, in bird or rodent nests, or discarded by predators
- Unlike natives, active during daylight hours

Distribution

Wide spread throughout England and Wales. Limited to a few water bodies in Scotland.



Source: NBN Gateway. Check website for current distribution

Similar Species

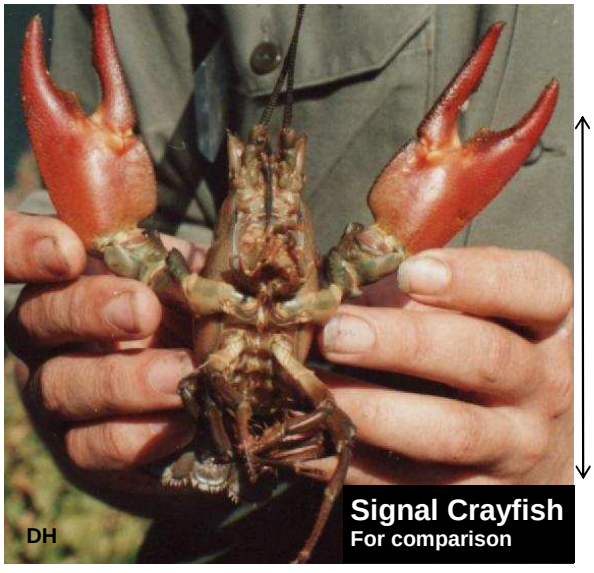
The only native crayfish in the UK is the white-clawed crayfish, which is under serious threat from non-native species. It is therefore essential to be able to distinguish between this and non-native species.

White-clawed Crayfish
Native
(*Austropotamobius pallipes*)

Claws are dirty white to pink on the underside

White-clawed crayfish are considerably smaller than signal, generally have a brown to olive colour, unlike the red / brown of the signal and are usually more docile and less aggressive than the signal crayfish.

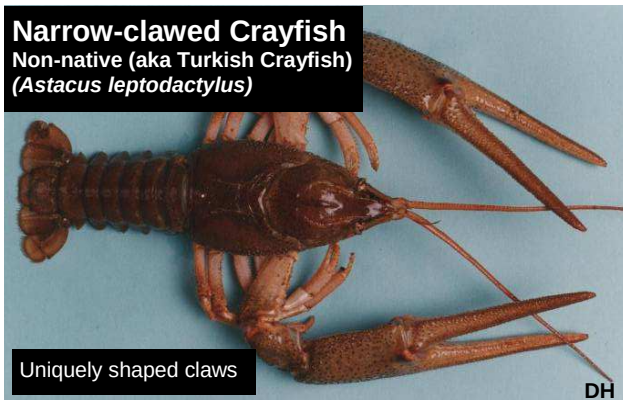
The cervical groove (line between head and body) of the white-clawed crayfish has spikes whereas the same groove in the signal crayfish is smooth.



Signal Crayfish
For comparison

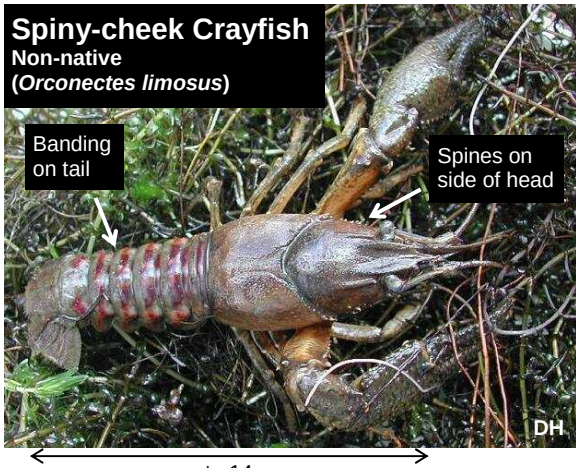
A number of other non-native crayfish have been introduced into the UK though they are less prevalent than the signal crayfish, these include:

Narrow-clawed Crayfish
Non-native (aka Turkish Crayfish)
(Astacus leptodactylus)



usually up to 15cm, but can be larger
(from tip of tail to front of head)

Spiny-cheek Crayfish
Non-native
(*Orconectes limosus*)



up to 14cm
(from tip of tail to front of head)

References and further reading:

Pőckl , M, Holdich, D and Pennerstorfer, J (2006) *"Identifying Native and Alien Crayfish Species in Europe*". Craynet

Souty-Grosset, C, Holdich, D, Noël, O, Reynolds, J and Haffner, P, (eds) (2006). *Atlas of crayfish in europe*. Museum national d'histoire naturelle, Paris

Photos from: Dawn Alvarez, David Holdich (DH), Stephanie Peay (SP)