A gammarid shrimp (*Gammarus salinus*)

MarLIN – Marine Life Information Network
Biology and Sensitivity Key Information Review

Georgina Budd

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The Marine Life Information Network, Marine Biological Association of the United Kingdom.

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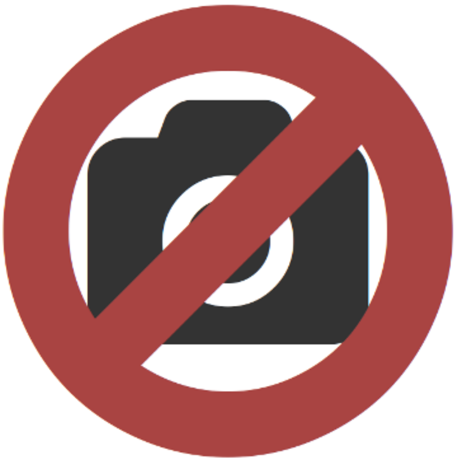

See online review for distribution map

Distribution data supplied by the Ocean Biogeographic Information System (OBIS). To interrogate UK data visit the NBN Atlas.

Researched by	Georgina Budd	**Refereed by**	This information is not refereed.
Authority	Spooner, 1947		
Other common names	-	**Synonyms**	-

Summary

Description

Gammarus salinus has a laterally compressed, smooth, curved body, which grows up to 22 mm in length. Its body is divided into three segments; head, pereon (thorax) and pleon (abdomen), but its abdomen is not distinctly demarcated from the thorax in either size or shape. Its head lacks a carapace and is fused with the first thoracic segment. Two well developed elongate pairs of antennae are distinct. Both pairs are pedunculate (a stalk consisting of larger segments) with a long, multi-articulate flagellum. The first pair of antennae have a small accessory flagellum, whilst the second pair have many, longer bristles. Its sessile compound eyes are large, elongate and kidney shaped. Each body segment has its own pair of limbs; pereopods on the thorax and pleopods (used for swimming) and uropods (used for hopping/scudding about on substrata) on the abdomen. The first pair of thoracic limbs are modified into maxillipeds, used for feeding, whilst the second and third pair have a distinctly different, more robust structure and are called gnathopods. The tail-piece (telson) is lobed with bristles and spines. *Gammarus salinus* appears brownish or greenish brown in colour, with slight transverse banding along the body.

Recorded distribution in Britain and Ireland

On all coasts of England, Scotland and Wales in brackish-water, especially in the Humber and Severn Estuaries.

Global distribution

North-west Europe from English Channel to Baltic, some isolated reports of *Gammarus salinus* on the Iberian Peninsula.

Habitat

Gammarus salinus inhabits brackish waters of an intermediate salinity. The densest populations have been found in the middle reaches of estuaries that do not have a steep salinity gradient. *Gammarus salinus* lives amongst algae and other vegetation, as well as generally over the sediment surface and beneath stones.

Depth range

0-10 m

Identifying features

- Laterally compressed smooth body; < 22 mm in length, with limbs on each body segment
- The lateral lobe of the head is angular and truncated with a deep post-antennal sinus
- Large, elongated kidney-shaped compound eyes
- Two pairs of pedunculate antennae. Antenna 1, peduncle article 1 has about 6 ventral groups of bristles (setae), article 2 has 5-6 setal groups and article 3 has 2-3 setal groups. The long multi-articulated flagellum has an accessory flagellum equal in length to the length of peduncle article 2. Antenna 2 more bristled, with calceoli (sensory structure) present in males.
- Amphipod telson is of major taxonomic importance from specific through to familial level; telson lobes of *Gammarus salinus* have 3 apical, 1 sub-apical and 1-2 lateral spines, each group with a few setae, which may be longer than associated spines
- Brownish or greenish brown in colour, with light banding
- Distinguished from *Gammarus zaddachi* Sexton, by less pronounced setation (coverage of hair-like bristles) on body and appendages.

Additional information

- Nine other marine species of *Gammarus* are found around the British Isles: *Gammarus locusta*, *Gammarus zaddachi*, *Gammarus oceanicus*, *Gammarus chevreuxi*,*Gammarus tigrinus*, *Gammarus finmarchicus*, *Gammarus duebeni*, *Gammarus insensibilis* and *Gammarus crinicornis* (Lincoln, 1979).
- Accurate identification of amphipods requires a certain amount of manipulation under a microscope.

Listed by

Further information sources

Search on:

G G NBN WoRMS

Biology review

Taxonomy

Order	Amphipoda	Sand hoppers and skeleton shrimps
Family	Gammaridae	
Genus	Gammarus	
Authority	Spooner, 1947	
Recent Synonyms	-	

Biology

Typical abundance	
Male size range	< 22mm
Male size at maturity	
Female size range	7-8mm
Female size at maturity	
Growth form	Articulate
Growth rate	
Body flexibility	High (greater than 45 degrees)
Mobility	
Characteristic feeding method	Surface deposit feeder
Diet/food source	Herbivore
Typically feeds on	Organic detritus and seaweed.
Sociability	
Environmental position	Epibenthic
Dependency	No information found.
Supports	No information
Is the species harmful?	No

Biology information

Moulting

Kinné (1960) found that the frequency (days - weeks) at which *Gammarus salinus* moulted varied with changes in temperature, the intervals being longer in males than in females. Females kept without a male showed a progressive prolongation of the intervals between moults beginning with the 3rd of 4th interval following isolation. Females kept together with males, in pairs, maintained moults at constant intervals. No differences were observed to occur in different salinities of 5, 10 and 30 psu.

Habitat preferences

Physiographic preferences	Estuary
Biological zone preferences	Lower infralittoral, Upper infralittoral
Substratum / habitat preferences	Macroalgae, Coarse clean sand, Gravel / shingle
Tidal strength preferences	Moderately Strong 1 to 3 knots (0.5-1.5 m/sec.), Strong 3 to 6 knots (1.5-3 m/sec.)

Wave exposure preferences	Extremely sheltered, Sheltered, Very sheltered
Salinity preferences	Low (<18 psu), Reduced (18-30 psu)
Depth range	0-10 m
Other preferences	No text entered
Migration Pattern	Non-migratory / resident

Habitat Information

Gammarus species are abundant estuarine animals. Spooner (1947) stated that gammarids were adaptable to various surroundings and not limited to particularly specialised ecological niches. Nor did they show gross patchiness of distribution within their habitable range, rather continuous populations occupy the entire length of estuaries, although the proportion of species represented changes from head to mouth. Furthermore, gammarids are relatively indifferent to the nature of the substratum to a remarkable degree. Provided that there is some kind of object to provide them with shelter/cover it does not matter whether the substratum is muddy or stony, the water turbid or clear and almost any kind of organic matter provides detritus upon which to feed (Spooner, 1947).

The distributional range of *Gammarus salinus* to the south was thought to be restricted as far as the English Channel. However, Van Maren (1975) reported *Gammarus salinus* for the first time on the Spanish coast in 1974.

Life history

Adult characteristics

Reproductive type	Gonochoristic (dioecious)
Reproductive frequency	Annual protracted
Fecundity (number of eggs)	See additional information
Generation time	<1 year
Age at maturity	20-30 days
Season	Autumn - Spring
Life span	<1 year

Larval characteristics

Larval/propagule type	-
Larval/juvenile development	Direct development
Duration of larval stage	Not relevant
Larval dispersal potential	100 -1000 m
Larval settlement period	Not relevant

Life history information

Leineweber (1985) sampled a population of *Gammarus salinus* over 15 months in the south-western Kattegat at Sangstrup Klint, Denmark and reported that *Gammarus salinus* most likely had two generations per year, mature females were found from late November to late July. However,

in the Limfjord, Denmark, the population of *Gammarus salinus* was reported to only produce one generation between 1977-1978, despite the presence of egg bearing females throughout the year (Kolding & Fenchel, 1979). Juveniles were most numerous from April through to July, and in the warmer months between July and October a relatively stable population was attained. The main reproduction period occurred during the winter months, with 80% of the female population reported to be pregnant, the adult generation died in May.
During reproduction, the male carries the smaller female grasped by his gnathopods, a condition known as amplexus. The animals separate briefly to permit the final preadult moult of the female. Sperm transfer is accomplished quickly; the male twists his abdomen around so that his uropods touch the female marsupium (brood pouch) and sperm are swept into the marsupium by the ventilating current created by the female. Finally the pair separate (Rupert & Barnes, 1994). The eggs are brooded within a chamber, the marsupium, beneath the thorax, formed by shelf-like plates projecting inward from the thoracic coxae.
Kinné (1960) examined the effects of different temperatures and salinity on the incubation time of *Gammarus salinus*. At a temperature between 19-20 °C females attained sexual maturity (1st oviposition) 20-30 days after hatching; their average length (from tip of rostrum to base of telson) being 7-8 mm. Males reached maturity one or more weeks later than the females. The incubation time (period between oviposition and hatching) of the eggs depended largely on the temperature at which the females were maintained; < 14 °C incubation took over 15 days and decreased to 5 days at 20 °C. As in other amphipods Kinné (1960) found that the fecundity of females increased with length, with numbers of eggs varying in a clutch (Ruppert & Barnes, 1994).

Sensitivity review

This MarLIN sensitivity assessment has been superseded by the MarESA approach to sensitivity assessment. MarLIN assessments used an approach that has now been modified to reflect the most recent conservation imperatives and terminology and are due to be updated by 2016/17.

Physical Pressures

	Intolerance	Recoverability	Sensitivity	Confidence
Substratum Loss	Intermediate	Very high	Low	Low

Gammarus salinus lives in a variety of locations within the estuarine environment: amongst algae and other vegetation, as well as generally over the sediment surface and beneath stones. *Gammarus salinus* is a mobile species capable of a rapid escape response and therefore likely to be able to local substratum loss. Nevertheless, a proportion of the population is likely to be removed with the substratum. Therefore, an intolerance assessment of intermediate has been made. Recoverability is likely to be very high (see additional information below.

Smothering	Intermediate	Very high	Low	Moderate

Gammarus salinus lives in a variety of locations within the estuarine environment: amongst algae and other vegetation, as well as generally over the sediment surface and beneath stones. It is a mobile species capable of a rapid escape response (back flip) if disturbed, however in the event of suddenly being smothered by 5 cm of sediment individuals resting on the surface may be killed, particularly so if the materials are viscous or impermeable. Intolerance has been assessed to be intermediate. Recovery has been assessed to be very high owing to the production of an new generation within the year (see additional information below).

Increase in suspended sediment	Tolerant	Not relevant	Not sensitive	Not relevant

As an estuarine species *Gammarus salinus* probably experiences fluctuations in the concentration of suspended sediment, which in the estuarine environment may be measurable in grams per litre (benchmark is mg per litre). Consequently the benchmark increase for the duration of one month is unlikely to affect *Gammarus salinus* and it has been assessed to be tolerant.

Decrease in suspended sediment	Tolerant	Not relevant	Not sensitive	Not relevant

As an estuarine species *Gammarus salinus* probably experiences fluctuations in the concentration of suspended sediment, which in the estuarine environment may be measurable in grams per litre (benchmark is mg per litre). Consequently the benchmark decrease for the duration of one month is unlikely to affect *Gammarus salinus* and it has been assessed to be tolerant.

Dessication	Low	Immediate	Not sensitive	Moderate

Desiccation events are unlikely to prove a lethal factor to a species with a rapid escape response and ability to find cover. Consequently, the species is probably sufficiently mobile to avoid prolonged exposure if stranded and intolerance has been assessed to be low. Recovery is likely to be immediate upon finding cover.

Increase in emergence regime	Low	Immediate	Not sensitive	Moderate

In the estuarine environment *Gammarus salinus* may experience regular periods of immersion and emersion. At low tide it probably seeks shelter amongst vegetation, under pebbles / rock or burrows loosely into the surface of the substratum in order to avoid the effects of desiccation. *Gammarus salinus* is a relatively slow crawler, swimming using the three pairs of pleopods is much faster. However, the speciality of amphipods is the tail-flip, a rapid escape response whereby the abdomen flicks the animal away after the uropods are dug into the ground. Consequently, the species is probably sufficiently mobile to avoid prolonged exposure resulting from an increase in emergence and intolerance has been assessed to be low. Recovery is likely to be immediate upon finding cover.

Decrease in emergence regime Low Very high Very Low Moderate

In the estuarine environment *Gammarus salinus* may experience regular periods of immersion and emersion. An increased period of immersion may favour fish which prey upon *Gammarus salinus* such as sprats, *Sprattus sprattus*. However, although normally abundant in the environment, *Gammarus salinus* was ingested in disproportionately small quantities by other fish, perhaps reflecting its concealment amongst floating weeds and a selection made by larger fish against small (< 1 cm) prey items (Moore & Moore, 1976). Intolerance has been assessed to be low and recoverability likely to be very high (see additional information, below).

Increase in water flow rate High Very high Low Low

Spooner (1947) stated that species of *Gammarus* are relatively indifferent to the nature of the substratum to a remarkable degree, provided that there is some kind of object to provide them with shelter/cover. However, an increase in the water flow rate would increase scour which, over the period of a year (see benchmark) may create the problem of retaining a position in the estuarine environment, against conditions of net seaward transport. Therefore intolerance has been assessed to be high as the population may be washed from the estuary. Recovery and repopulation are likely to occur within a year (see additional information, below).

Decrease in water flow rate Tolerant Not relevant Not sensitive Not relevant

A decrease in water flow rate, in the absence of wave action determining particle grain size, would favour the accretion of finer silts and clays. Such deposition would alter not only the physical properties of the substratum, but also the chemical properties, especially the degree of oxygenation. Spooner (1947) stated that species of *Gammarus* are relatively indifferent to the nature of the substratum to a remarkable degree, provided that there is some kind of object to provide them with shelter/cover and such changes are unlikely to be of consequence to *Gammarus salinus*. Therefore, an assessment of tolerant has been made.

Increase in temperature Low Immediate Not sensitive Moderate

Gammarus salinus lives in brackish waters and experiences a variety of temperature and salinity changes. Furch (1972) exposed *Gammarus salinus* to both constant (8 °C, 14 °C & 20 °C) and fluctuating (daily fluctuations between 8 °C to 20 °C) temperatures. The species revealed significant differences in heat resistance, which became apparent within 12 hours. *Gammarus salinus* was able to endure long term exposure (2 to 4 weeks) to fluctuating temperatures, although fast temperature changes (every hour) were less well tolerated by it than slower temperature fluctuations (2 hours). Intolerance has been assessed to be low, as acute temperature changes may cause additional stress but did not result in mortality. Recovery from rapid fluctuations was apparent within a matter of hours, therefore recovery has been assessed to be immediate. Parasitized specimens may be more intolerant of acute temperature increases.

Decrease in temperature Intermediate Very high Low Low

Gammarus salinus lives in brackish waters and experiences a variety of temperature and salinity changes. The distribution of *Gammarus salinus* extends to the north of the UK, into the

Baltic Sea, so the species would probably tolerate a chronic decrease of 2 °C. Acute temperature decreases may cause death of vulnerable individuals, such as those that are parasitized owing to additional stress, and intolerance has been assessed to be intermediate.

Increase in turbidity	Low	Very high	Very Low	Low

Gammarus salinus may feed upon macroalgae as well as detritus, which is dependant on light availability for photosynthesis. An increase in turbidity for the duration of a year would reduce light penetration and therefore probably the abundance of macroalgae as a food resource which may consequently affect the species viability. Therefore intolerance to increased turbidity has been assessed to be low. The species is likely to have a very high capacity for recovery (see additional information below).

Decrease in turbidity	Tolerant	Not relevant	Not sensitive	Not relevant

Gammarus salinus is not likely to be directly sensitive to decreased turbidity.

Increase in wave exposure	High	High	Moderate	Low

Gammarus salinus normally inhabits relatively well sheltered estuarine environments. It is likely to be washed away as a result of increased wave exposure owing to turbulence displacing it from shelter. The algae on which it feeds may also become detached, reducing its food source. Consequently intolerance has been assessed to be high.

Decrease in wave exposure	Tolerant	Not relevant	Not sensitive	Low

Decreased wave exposure is likely to result in changes to the composition of the estuarine substratum e.g., the accretion of finer particulate matter, settling out as a result of reduced turbulence. However, Spooner (1947) considered that species of *Gammarus* were relatively indifferent to the nature of the substratum to a remarkable degree, provided that they could find cover and it has been assessed as tolerant of a decrease in wave exposure.

Noise	Tolerant	Not relevant	Not sensitive	Not relevant

Gammarus salinus may respond to vibrations caused by noise, but it is unlikely to be directly sensitive to noise at the benchmark level.

Visual Presence	Tolerant	Not relevant	Not sensitive	Not relevant

Gammarus salinus is unlikely to have the visual acuity to detect the presence of boats, machinery present in its environment, and it has been assessed not to be sensitive to the factor.

Abrasion & physical disturbance	Tolerant	Not relevant	Not sensitive	Not relevant

Gammarus salinus is small, a highly mobile and likely to be able to avoid physical disturbance or to pass through passing fishing gear. Therefore, it has been assessed to be tolerant of physical disturbance.

Displacement	Not relevant	Not relevant	Not relevant	Not relevant

Gammarus salinus is a mobile species and therefore an intolerance assessment for displacement was not considered to be relevant.

Chemical Pressures

	Intolerance	Recoverability	Sensitivity	Confidence
Synthetic compound contamination	Low	Very high	Very Low	Moderate

No information specifically concerning the effects of synthetic chemicals upon *Gammarus*

salinus was found. However, in the closely related *Gammarus duebeni*, reproductive behaviour in the male is evoked by its detection of a chemical cue from the female. The cue is perceived by receptors on the second antennae and its function is to synchronize mating with the suitable phase of ecdysis in the female. Low concentration of the surfactant TWEEN 80 were shown to interfere with the reception of the females chemical cues, resulting in a decrease in mating success (Lyes, 1979).
Lawrence & Poulter (2001) examined the effect of pentachlorophenol (PCP) and benzo[a]pyrene (B[a]P) on the embryogenesis, and swimming stamina of *Chaetogammarus marinus* against a pump driven head of water. Swimming stamina was significantly impaired at a concentration of 40 µg PCP/l and 20µg B[a]P/l, whilst development of in vitro cultured embryos was significantly impaired by 20 µg /l of both PCP and B[a]P.
intolerance has been assessed to be low owing to evidence of sub-lethal effects and reduced reproductive potential. *Gammarus salinus* is likely to have a very high capacity for recovery (see additional information below), assuming deterioration of the contaminants.

Heavy metal contamination	Low	Very high	Very Low	Moderate

- No information specifically concerning the effects of heavy metals upon *Gammarus salinus* was found. However, a closely related species *Gammarus zaddachi* occurred in the brackish water upper reaches of Restronguet Creek, Fal Estuary, Cornwall, and over the creeks entire length there was a continuous population of gammarids, which was composed of several species of a typical succession (Bryan & Gibbs, 1983). Water entering Restronguet Creek from the Carnon River was acidic (pH 3.8) and contained high concentrations of soluble Fe (18500µg/l), Zn (12030µg/l), Mn (2974µg/l) and Cu (474µg/l) (Table 1, Site 1, Bryan & Gibbs, 1983). However, there was no further information concerning specific effects of such heavy metal concentrations on the gammarids, except to say that the flora and fauna in general in Restronguet Creek was less obviously affected than might be predicted from toxicity data in the literature. Possible reasons being development of metal-tolerant strains and/or the ability of species to migrate into other less contaminated areas of the Fal System (Bryan & Gibbs, 1983).
- Lawrence & Poulter (2001) examined the effect of copper on the embryogenesis and swimming stamina of *Chaetogammarus marinus* against a pump driven head of water. Swimming stamina was significantly impaired at a concentration of 15 µg Cu/l, whilst development of in vitro cultured embryos was significantly impaired by 20 µg Cu/l. Copper exposure extended the period of embryogenesis by 4 to 8 days and specific stages in the embryos' development were affected. These two assays were also responsive at environmental concentrations periodically experienced at some locations on the Humber Estuary, UK (Lawrence & Poulter, 2001).
- Ritz (1980) examined the tolerance of two intertidal amphipods, *Gammarus duebeni* and *Marinogammarus marinus* to copper under static conditions. For *Marinogammarus marinus* the LT_{50} varied from 106 hours in 0.04 ppm Cu, to 3 hours in 4 ppm Cu. Mortality in 0.04 ppm Cu was not significantly different to that in the control. For *Gammarus duebeni* the corresponding LT_{50} values were > 5 days at 0.04 ppm Cu and 3 hours at 4 ppm Cu. At concentrations of 0.04 ppm and below, the copper was not acutely toxic to *Gammarus duebeni*.

intolerance has been assessed to be low owing to evidence of only sub-lethal effects of heavy metals and influence upon embryogenesis in another closely related species. *Gammarus salinus* is likely to have a very high capacity for recovery (see additional information below), assuming deterioration of the contaminants.

Hydrocarbon contamination	High	High	Moderate	High

Amphipods have been reported to be sensitive to oil (Suchanek, 1993).

- Ponat (1975) observed the narcotic effect of crude oil on *Gammarus salinus*, which reduced the species oxygen consumption to 40 % of normal levels.
  Lindén (1976) also observed narcosis in *Gammarus oceanicus*, a species related to *Gammarus salinus*, exposed to concentrations of oil between 5 and 20 mg/l, which caused an initial period of hectic swimming and then deterioration in crawling ability. Furthermore sub-lethal concentrations of crude oil (1-40µg /l) proved to be responsible for a reduction in the numbers of sexually mature adults of *Gammarus oceanicus* entering precopula, a requirement of successful fertilization (Lindén, 1976b).

- Penetration of the substratum by oil released from the *Amoco Cadiz* translated into massive mortality of amphipods of the genus *Ampelisca* in the fine sand of the Bay of Morlaix, north-west Brittany, France (Cabioch *et al*., 1978).

intolerance of *Gammarus salinus* to hydrocarbon contamination has been assessed to be high. Despite a very high capacity for recovery (see additional information below), recovery from hydrocarbon contamination has been assessed to be high rather than very high owing to the probable persistence of oil in sediments and the likelihood that juveniles are especially susceptible.

Radionuclide contamination		Not relevant		Not relevant

Insufficient information.

Changes in nutrient levels	Tolerant*	Not relevant	Not sensitive*	Low

Gammarus salinus is a both a detritivore and herbivore, consequently it may benefit form nutrient enrichment that stimulates the productivity of phytoplankton and macroalgae. Anger (1977) listed *Gammarus salinus* as an indicator species for slight organic pollution. Furthermore, *Gammarus salinus* has demonstrated a negative rheotaxic response to lethal and sublethal concentrations of oxygen (see oxygenation) which may result as a consequence of eutrophication. Therefore it has been assessed to be tolerant* to nutrient enrichment.

Increase in salinity	Low	Immediate	Not sensitive	Low

Gammarus salinus is a euryhaline species relatively tolerant of salinities as low as 2 psu and as high as 30 psu, but it is most abundant at 10 psu. It is likely that the species would experience some physiological stress following an acute increase in salinity (see decrease in salinity below), intolerance has therefore been assessed to be low and, as an euryhaline species, it is likely to recover relatively rapidly.

Decrease in salinity	Low	Immediate	Not sensitive	High

Gammarus salinus is a euryhaline species relatively tolerant of salinities as low as 2 psu and as high as 30 psu, but it is most abundant at 10 psu. Bulnheim (1984) recorded the respiratory response of *Gammarus salinus* in response to an acute salinity change, from 30 psu to 10 psu, respiration rate moderately increased after an initial shock like response and initially specimens were quiescent as they acclimated to the decreased salinity but recovered within 24 hours. Intolerance has therefore been assessed to be low and recovery immediate.

	Intolerance	Recoverability	Sensitivity	Confidence
Changes in oxygenation	Low	Immediate	Not sensitive	High

Gammarids are occasionally found in locations with reduced O_2 tensions, especially on soft substratum, in stagnant pools and in polluted waters. In deeper waters oxygen deficiency may be accompanied by the formation of hydrogen sulphide. Bulnheim (1984) examined the survival rates of five gammarid species held in brackish water with poor oxygenation. The LT_{50} for *Gammarus salinus* held at 15 °C, 10 psu with a depleted oxygen level of 0.5 ml O_2/l was 6.5 hours, 100% mortality occurred after 15 hours. *Gammarus salinus* being more tolerant than *Gammarus locusta* and *Gammarus oceanicus*. *Gammarus salinus* had an LT_{50} of 4 hours in brackish-water (10 psu) with oxygen depletion in the presence of hydrogen sulphide (< 0.2 ml O_2/l + 50 mg $Na_2S.9H_2O$/l) at 15 °C . However, Vobis (1973) used an experimental vessel to observe the behaviour of gammarids in various water current speeds and oxygen concentrations. In adequately oxygenated waters, *Gammarus salinus* demonstrated a moderate positive rheotaxis (swimming into the current). Lethal and sublethal oxygen concentrations, however, led to negative rheotaxis (swimming away from the current). Oxygen deficiency caused *Gammarus salinus* to swim downstream at 2.5 mg O_2 per litre. An intolerance assessment of low has been made, as the species can avoid the factor. The species is likely to repopulate areas as soon as the oxygen concentration of the water becomes optimal and recovery has been assessed to be immediate.

Biological Pressures

	Intolerance	Recoverability	Sensitivity	Confidence
Introduction of microbial pathogens/parasites		Not relevant		Not relevant

Gammarus salinus, *Gammarus zaddachi* and *Gammarus oceanicus* were found to be important host species for the transmission of parasites (Voigt, 1991). Larval stages of 4 fish parasites (1 Nematoda, 2 Acanthocephala and 1 Digena) as well as larval stages of 4 bird parasites (1 Nematoda, 1 Acanthocephala, 1 Digena and 1 Cestoda) were found. However, there was insufficient information concerning the effect that such parasitization may have on the species viability.

	Intolerance	Recoverability	Sensitivity	Confidence
Introduction of non-native species		Not relevant		Not relevant

No information concerning non-native species that might affect the abundance or survival of *Gammarus salinus* was found.

	Intolerance	Recoverability	Sensitivity	Confidence
Extraction of this species	Not relevant	Not relevant	Not relevant	Not relevant

Gammarus salinus is not a species targeted for extraction.

	Intolerance	Recoverability	Sensitivity	Confidence
Extraction of other species		Not relevant		Not relevant

No information concerning the extraction of other species that might affect the abundance or survival of *Gammarus salinus* was found.

Additional information

Recoverability

Gammarus salinus is an abundant, widespread species which typically produces two generations within its lifespan of a year, consequently the species is likely to have a very high capacity for recovery.

Importance review

Policy/legislation

- no data -

Status

National (GB) importance	-	Global red list (IUCN) category	-

Non-native

Native	-		
Origin	-	Date Arrived	-

Importance information

1. In the Severn Estuary, sprats, *Sprattus sprattus*, fed chiefly on *Gammarus salinus* or on *Neomysis integer*. However, although normally abundant in the environment, *Gammarus salinus* was ingested in disproportionately small quantities by other fish, perhaps reflecting its concealment amongst floating weeds and a selection made by larger fish against small (< 1 cm) prey items (Moore & Moore, 1976).
2. *Gammarus salinus* has a documented role as a seaweed disperser (Breeman & Hoeksema, 1987). The red seaweed *Audouinella purpurea* (= *Rhodochorton purpureum*) was able to survive digestion and grew in the field from faecal pellets of *Gammarus salinus* in the northern Netherlands.

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