

Tropical Marine Fish

How to care for pufferfish & boxfish

Pufferfish and boxfish are interesting to aquarists due to their body shape, bright colours and interactive behaviours. Pufferfish are from the family *Tetraodontidae* and boxfish from the *Ostraciidae* family. Both live on coral reefs all over the world. Pufferfish and boxfish can make good aquarium inhabitants if the correct precautions are taken and their requirements are met. You should also consult your OATA retailer before purchasing any pufferfish or boxfish.

Thanks to TMC for the use of this picture



Water requirements

Pufferfish and boxfish are usually undemanding of water chemistry and their suggested parameters are shown below. These parameters are a general guide for this group of fish, so it is important to check with your OATA retailer for any species-specific requirements before purchasing. Please also note that if keeping these fish in a reef aquarium, some parameters will need to be altered to accommodate more sensitive species.

Salinity:	Between 1.020-1.025
Temperature:	Between 24-26°C
pH:	7.9-8.3
Ammonia:	Zero mg per litre
Nitrite:	Zero mg per litre
Nitrate:	Not to exceed 50 mg per litre
Carbonate hardness:	Hard (8-12°dkH)
Calcium:	Between 380-450 ppm
Magnesium:	Between 1250-1350 ppm

Biology

Popular pufferfish species include the dog face (*Arothron nigropunctatus*), valentini (*Canthigaster valentini*) and porcupine (*Diodon holocanthus*) puffers. Popular boxfish species include the yellow boxfish (*Ostracion cubicus*) and the cowfish (*Lactoria quadricornis*). Pufferfish and boxfish may be harmful as they can be poisonous, and to deter predators they secrete a toxin if eaten or threatened. Large individuals can also inflict a painful bite with their sharp beaks so both groups of fish should be handled carefully. For more information see our [Hazardous Aquatic Animals](#) guidance. Please read this guidance so that you are aware of what actions to take should you or anyone else be harmed by these species. It is best practice to have a sign on the front or lid of the aquarium, warning people what hazardous



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species are in the aquarium and the risks they pose. Pufferfish should not be encouraged to 'puff' up as this is a stress response and can be bad for their health. They should be kept underwater at all times to avoid them swallowing air and inflating.

Pufferfish and boxfish vary in size. Species like the valentini puffer are unlikely to exceed 10cm, whereas the long horned cowfish (*Lactoria cornuta*) will grow to 40cm. Regardless of species, these fish can live for many years in a well-matured set up with good water quality. In the wild, pufferfish and boxfish "hover" around the reef looking for prey items. It can be very difficult to identify the sex of most pufferfish and boxfish unless they are in breeding condition. Some pufferfish have slight colour differences between male and females. Most pufferfish will be aggressive to the same or similar looking species therefore, avoid mixing multiple individuals of closely related species. Always ask your OATA retailer before adding any of these species to your aquarium.

Aquarium requirements

As a general rule, you should within reason buy an aquarium as large as possible. It is recommended that an aquarium of at least 100 litres is used for a single individual of the smaller pufferfish (under 10cm). Boxfish and larger pufferfish species will need significantly larger aquariums, so ask your OATA retailer for advice for the specific species in which you are interested. Aquariums will need to be larger if you wish to keep your pufferfish or boxfish with other species. A larger aquarium will also provide more stability to environmental conditions such as temperature and water quality. Whatever the size, **a filter is essential**. For marine set-ups this can be in the form of live rock with sufficient water flow, an internal or external filter, or a sump-based filter. A protein skimmer can also be beneficial for maintaining water quality as it will help to remove dissolved organic waste before it can break down into more harmful substances.

Pufferfish and boxfish are relatively undemanding in terms of aquarium décor. However, plenty of live or artificial rockwork is recommended to provide cover and an opportunity for this fish to behave naturally. The bigger species will also require a large amount of open swimming space. A thin layer of coral sand (approximately 2cm) is useful to make pufferfish and boxfish feel secure and to maintain carbonate hardness levels. There should be a moderate water flow to provide good surface movement and to ensure detritus doesn't accumulate. A lid or cover is recommended to prevent anybody sticking their fingers into the aquarium.

A heater is required to maintain a suitable temperature all year round. To minimise fluctuations in water temperature, the aquarium should not be situated near any draughts or heat sources. It should also be out of direct sunlight and away from loud noises, vibrations and sudden movements. Overhead tank lighting is recommended to maintain a correct day-night cycle. This will not need to be particularly bright for pufferfish or boxfish alone but may need



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to be brighter if keeping with coral species - see our coral care sheets for more information.

Water testing kits are essential so that water quality can be checked on a regular basis (once a week) to ensure it does not slip below the water requirements stated above.

Introducing your fish

Before adding any fish, seek advice from your OATA retailer to make sure that your aquarium is an appropriate size for the pufferfish or boxfish you would like to keep. Check that the water quality in your aquarium is suitable i.e. levels of ammonia and nitrite are zero. Only increase the number of fish you have in your aquarium slowly as the population of beneficial bacteria established when maturing your aquarium filter need to increase every time more fish are added and feeding increases. Overstocking or stocking your aquarium too quickly can result in 'new tank syndrome'. This occurs when there are not enough nitrifying bacteria to cope with the increased waste from the fish, leading to unhealthy levels of ammonia and nitrite, which may cause fish to become ill or die.

Healthy fish have clear bright eyes, undamaged fins, intact scales, no ulcerations or bumps, appropriate swimming behaviour and steady breathing. Do not purchase a seemingly healthy fish if sickly fish are present in the tank with it. Signs of disease can include clamped fins, flicking against gravel or décor and shimmying (shaking). Diseases can be easily carried by fish that do not show any clinical signs. If in doubt, ask your OATA retailer for advice as they will have in-depth knowledge and experience.

Your OATA retailer will usually sell your fish to you in a plastic bag, try not to keep them in this for too long. Once purchased, take your new fish home as quickly as possible because fish are easily stressed by bright lights, extreme temperatures, noise and movement.

Once home, your fish will need to acclimatise to their new environment and a common method of doing this is known as the 'floating bag' method. Switch off the aquarium lights and take the bag containing your new fish out of its outer wrappings carefully, avoiding exposure to bright light. Float the bag in the water of your tank to ensure the temperature in the bag is the same as the aquarium water. After 10 minutes, slowly introduce small amounts of aquarium water into the bag containing the fish for up to 30 minutes. Once complete, carefully release the fish into the aquarium whilst introducing as little bag water into the aquarium as possible. This is especially important if keeping fish with any invertebrate species as some retailers run copper in their systems, which is toxic to invertebrates. After this, dispose of the bag and any excess water appropriately.

For sensitive species or to ensure retailer water does not enter your aquarium, a better method might be the use of drip acclimation. This could be achieved by keeping the fish in the container in which it is sold and a small airline siphon started to drip water into



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the container, slowly changing the water parameters to that of the aquarium. Ensure that the temperature does not fall too low during this procedure. Once conditions match, carefully net the fish from the container into the aquarium. Dispose of the water in the transport container appropriately. Monitor your new fish carefully for the first week, paying particular attention to water quality. If in doubt, contact your OATA retailer for advice.

If possible, quarantining new livestock in a separate aquarium for at least a week before they enter the main tank can help reduce any risk of disease spread from new inhabitants. Ask your OATA retailer for advice on this topic.

Maintenance

At least once every week, a partial water change of 25% is strongly recommended (a siphon device is useful to remove solid waste from the gravel). Filters should be well maintained, with regular checking and cleaning to prevent blockages. If the filter needs cleaning, do not run it under the tap because any chlorine or chloramine present may kill the beneficial bacterial population that has established in the media. Instead, it should be rinsed lightly in the tank water which is removed during a partial water change as this reduces the amount of bacteria which are lost. Protein skimmers should be regularly cleaned to maintain their performance.

Good husbandry is essential as pufferfish and boxfish can be stressed by even the smallest amounts of ammonia and nitrite which may then cause them to develop various diseases. Test the water to monitor the ammonia, nitrite and nitrate levels, together with pH and carbonate hardness every week, especially during initial set-up and after adding extra fish. It is also important to regularly monitor salinity and use reverse osmosis water to replace any water lost through evaporation.

What to watch out for

All fish will have slight variations in their behaviour or appearance, but keeping an eye on any changes in the following will help to identify any potential problems before they become a real health issue:

- swimming behaviour – hanging at the surface, sitting on the bottom or erratic swimming
- colour – turning a darker or paler colour than normal
- temperament – changes in level of aggression or hiding more than normal
- breathing – gill covers moving at a slower or faster rate than normal
- appearance – development of white spots or fluffy growths, loss of fins or scales
- condition – increase or decrease in body weight and condition
- feeding – reduced intake or lack of interest in food



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If you are concerned about the health of any of your livestock, then test your water quality and contact your OATA retailer for further guidance.

Feeding

Pufferfish and boxfish are mostly carnivores and should be fed accordingly. For smaller species, this should include meaty frozen feeds such as mysis shrimp, enriched brine shrimp or krill. Larger species will require larger prey items, such as frozen mussels, cockles and lancefish. Feeding whole clams in the shell to larger puffers will help keep their beak (teeth) from growing too long. Pufferfish and boxfish should occasionally be offered algae in the form of nori sheets. Almost all pufferfish and boxfish will predate on small fish or invertebrates they can find in the aquarium (see "Compatibility" below).

Generally, pufferfish and boxfish should only be fed what they can eat within a few minutes, twice a day, but ask your OATA retailer for species specific advice. Take care not to overfeed as this can lead to a build-up of uneaten food which breaks down releasing toxic waste into the water. This is especially important for pufferfish and boxfish as they have a protein rich diet that can quickly foul the water if not adequately monitored. If in doubt, ask your OATA retailer for advice on appropriate feeding levels.

Compatibility

The smaller species of pufferfish and small boxfish individuals can be shy and should not be kept with boisterous tank mates or any which may try to predate on them. Larger boxfish and pufferfish can be mixed in most communities of large fish, with species such as triggerfish, eels and large angelfish, provided potential aggression or predation is taken into account. Pufferfish and boxfish should not be mixed with any species they can fit in their mouths. Larger boxfish and pufferfish can be very active and so should not be mixed with calmer, less active species.

Due to their predatory nature, it is generally accepted that no pufferfish or boxfish is "reef safe". All species will predate on small invertebrates, such as shrimp and crabs, if they can fit them in their mouth. Some species of pufferfish and boxfish may also nip at hard corals and clams. Always ask your OATA retailer before mixing pufferfish or boxfish with any other species.

Breeding

Breeding pufferfish or boxfish in the home aquarium is unlikely as they are not large enough to support a territory for two individuals. In the wild, pufferfish lay eggs in a nest, whereas boxfish release eggs and sperm into the water column. In all pufferfish and boxfish, once the eggs hatch, the larvae live in the plankton where they require microscopic food to grow. In a home aquarium, the larvae are likely to be sucked into filters and pumps or be



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eaten by aquarium inhabitants. If any larvae survive this, it is unlikely the required food would be present in the aquarium.

Checklist

Before purchase make sure:

1. You have the appropriate equipment and position for the aquarium.
2. You have researched all the species in which you are interested and your final choices are all compatible.
3. You are familiar with how to transport and release your fish.
4. You are aware of the daily, weekly and monthly maintenance your aquarium will require.
5. You are prepared to look after your fish properly for the duration of their life.

Shopping List

- ▶ Glass or acrylic aquarium
- ▶ Filter*
- ▶ Heater*
- ▶ Lighting*
- ▶ Gravel or sand
- ▶ Aquarium salt and a hydrometer or refractometer
- ▶ Access to reverse osmosis water or a reverse osmosis unit
- ▶ Water testing kits (ideally ammonia, nitrite, nitrate, pH and water hardness)
- ▶ Gravel cleaner/siphon cleaning device (recommended)
- ▶ Aquarium decorations
- ▶ Bucket for water changes
- ▶ Live or artificial rock
- ▶ Protein skimmer* (optional but recommended)
- ▶ Ultraviolet steriliser (optional but recommended)

*may be included in branded aquarium sets but can be purchased separately.

Before purchase make sure:

- ▶ The aquarium is of a suitable size that ideally can accommodate the fish once they are fully grown
- ▶ Water parameters are as advised in this leaflet.
- ▶ Aquarium is cycled and ready to receive your fish.

Always buy...

test kits and regularly check the water for ammonia, nitrite, nitrate and pH. This will allow you to make sure the water in your

Establish a routine...

for testing the water in your aquarium. Record your results to enable you to identify



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aquarium is not causing welfare problems for your pufferfish and boxfish.

Maintain...

the water in the aquarium within the accepted parameters highlighted above. You may need to do regular water changes to achieve this.

Never siphon by mouth...

A fish tank can harbour bacteria which can be harmful if swallowed. Buy a specially designed aquarium gravel cleaner which can be started or primed without the need to place the siphon in your mouth

fluctuations quickly. Also check the temperature of the water.

Always wash your hands...

making sure to rinse off all soap residues, before putting them into your aquarium, or use long sleeved rubber gloves. Wash your hands again afterwards and certainly before eating, drinking or smoking.

Five Welfare Needs Checklist:

The Animal Welfare Act 2006 states that all pet owners have a legal duty of care to their pets. Anyone who is cruel to an animal or is found not to be providing the five animal welfare needs, as listed below, can be prosecuted.

- ▶ A **suitable environment** e.g. appropriately sized tank (with water heater if tropical set up) within a suitable location in your home.
- ▶ A **suitable diet** which meets the needs of your chosen fish.
- ▶ **Behaviour** - Fish are able to exhibit their normal behaviour e.g. hiding places for timid fish, enough room for fish to swim freely.
- ▶ **Companionship** - Ensure you know whether your chosen fish need to be kept with, or apart from, other fish.
- ▶ **Health** - Protected from pain, injury, suffering & disease e.g. you are aware of the daily, weekly and monthly maintenance that your aquarium will need.

- ▶ **Water quality test kits are a necessity not an optional extra**
- ▶ **You must be prepared to look after your fish properly for the duration of their life and provide an aquarium which can accommodate your fish when fully grown**



*Never release your aquarium animals or plants into the wild It is illegal and for most fish species this will lead to an untimely and possibly lingering death. Any animals or plants that do survive might be harmful to our native countryside. Take care to properly dispose of any soiled substrate (e.g. sand or gravel) water or decorations so that non-native organisms do not enter natural watercourses.

Visit ornamentalfish.org to find a full range of how to guides and species-specific care sheets to help you look after your fish successfully.



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