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AQUATIC TURTLE CARE

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Introduction - Aquatic turtles are popular pets, but this does not mean they are easy to care for. In fact, they are among the most labor intensive of all reptiles to maintain. Inadequate care often results in problems for turtles. The following are some general guidelines for aquatic turtle care. Keep in mind that there are exceptions to most rules, and there is no substitute for good information on the natural history of the turtle you have, to guide you in captive care.

Taxonomy - The most common genera seen in the United States include Trachemys (sliders), Chrysemys (painted turtles), Kinosternon and Sternotherus (mud and musk turtles), Graptemys (map turtles), Clemmys (wood and pond turtles), Apalone (formerly Trionyx, soft shell turtles), Pseudemys (river cooters), Chelydra (common snapping turtles), Malaclemys (diamondback terrapins), Macroclemys (alligator snapping turtles), Chelus (mata matas), Cuora (Asiatic box turtles), Chinemys (Reeve's turtle), and Platysternon (big headed turtles).

Housing - Housing requirements vary according to the size of the turtle and the number being kept. A variety of enclosures can be utilized from glass aquaria, plastic containers, cement mixing tubs, livestock watering tanks, and pond liners, to elaborate outdoors ponds. Waterland Tubs, ZooMed, Vision, and Rubbermaid all make great aquatic turtle containers. Outdoor enclosures should have some shade available. Never place an aquarium in direct sun, it could easily overheat and kill your turtle quickly. A rule of thumb, for minimum cage size, is the combined shell size of all residents should not exceed 25% of the cage's accessible space for turtles.

Water Quality – Clean water is crucial to prevent skin and shell infections in turtles. Water laden with bacteria, feces and urine stinks, clean water should have little to no odor. Likewise, turtles should have no odor, unless they are overly excited, and express their musk glands. Water should be kept clean by frequent water changes and/or filtration.

Filtration designed for fish doesn't work as well for turtles for several reasons. Aquatic turtles produce a lot more bacteria in their poop, so regular full water changes are indicated. Bacteria

are not easily removed by filtration unless there is ultraviolet or ozone sterilization. The bacterial nitrification cycle that converts ammonia in urine to nitrites, then less toxic nitrates, is much more important for fish than turtles. Partial water changes used with fish (needed so the bacterial nitrification cycle isn't wiped out), are better than no water change, but won't remove as much bacteria as a full water change. For turtles, full water changes, regularly, are needed to keep bacterial levels low. Turtles are not like fish with delicate gills. Thus, dechlorination of water, so crucial for fish gills, is not necessary for turtles.

How often the water needs to be changed depends on several factors. The more animals present, the more frequent the water needs to be changed. The larger the water volume, the less frequently it needs to be changed. The better the filtration, the less frequent the water needs to be changed. For instance, for three or less, four-inch turtles, a 10-gallon aquarium should be changed two to three times per week, a 50-gallon aquarium once a week, and 200 gallons, once a month. One can keep the water cleaner by feeding in a separate container, as most foods foul the water quickly and promote bacterial growth, but this isn't required. Initially some turtles may be reluctant to feed in the separate container, but can be acclimated to this over time. Using the same water from the home container helps.

Unless under gravel filtration is used, it is easier to do full water changes if no substrates, or easily removable substrates, are present. Sand, or gravel, are harder to clean, and aquatic turtles can ingest gravel, which can block their intestines. For smaller setups (10-gallons or less), one can carry the whole setup outdoors, to clean, or dump the water into a toilet and rinse in a bathroom. Keep in mind that cleaning areas are a potential source of serious infectious bacteria, such as Salmonella. Avoid food preparation, or infant bathing areas, when cleaning turtle cages.

For larger setups, too heavy to move, make it as easy as possible to drain the water. Portable electric submersible pumps, can be purchased from hardware stores, major department stores (such as Sears), pool supply stores, or online. A very good one is the Little Giant Water Wizard (model 50500 5-MSP, (www.lilgiantpumpproducts.com, \$123 with shipping in 2015) which pumps down to 1/8 inch and pumps 1,200 gallons/hour. Be sure to purchase a bottom suction pump, not a side suction pump. When in use, make sure a turtle doesn't get caught in the pump's suction, panic, and drown. Submersible aquarium pumps, pump too slowly to be used for cleaning.

Alternatively, one can use a siphon to drain the water into a toilet, or outdoors, to water plants. Siphons take longer than pumps. If one has the luxury of floor drains, one can install drains in the bottom of the cage, attach a hose, and drain the cage by gravity. Refill larger setups through a hose (with a nozzle), attached to a faucet, or hose bib. Separate drainage and refill hoses make cleaning much easier. When using a hose to drain or refill a cage, secure the loose ends, or inadvertent flooding will occur. The empty cage can be rinsed out and occasionally scrubbed

out, but it need not be disinfected. Abrupt changes in water temperature can kill turtles, especially hot water; make sure the water temperature after cleaning, is similar to what it was prior to cleaning. Thermometers facilitate this, with experience, one can gauge this with one's hand.

A partial alternative to the laborious task of full water changes is filtration, which can decrease the time interval required for partial to full water changes, but should not eliminate them. The best filters for turtles are large external canister filters, such as those designed for Koi, or rapid sand filters. Fluval makes good filters for aquatic turtles (such as the U Series and cannister filters). Outdoors, ultraviolet sterilization eliminates algae. Good aeration of water, through air stones, or return water falling into the setup, is important to support aerobic bacterial growth in biological filters. Water should be dechlorinated if using biological filters, otherwise it need not be. Under-gravel filters need a deep gravel bed (7.5 cm or more), or the turtle may dig and expose the filter plate. Once exposed, water will bypass most of the gravel as it follows the path of least resistance, and the benefits of biological filtration will be decreased. Foam rubber filters don't do much for keeping water clean.

Water should be at least as deep as the width of the widest turtle's shell so that if overturned the turtle will be able to right itself and avoid drowning. Diamond back terrapins live in brackish water and require addition of two tablespoons of aquarium salt and mineral mix per gallon of water.

Temperature - Water, and air, must be warm; 75 to 82°F are recommended for most species. Submersible aquarium heaters (Eheim Jager, Germany, makes good durable ones) will keep the water warm, this is especially important for hatchlings. Alternatively, one can keep the room temperature within this range, without heating the water. Some species such as mud and musk turtles, common snapping turtles (not alligator snapping turtles), and Chinese bigheaded turtles prefer it cooler.

Haul Out Area - A dry "haul out" area should be present so that turtles can crawl out of the water, dry off, and bask. Basking is a means of behavioral thermoregulation whereby turtles can achieve their preferred optimum body temperature. An ultraviolet basking light that provides heat (Reptisun,ZooMed, San Luis Obispo, CA) should be directed towards the basking area to create a hot spot for basking indoors. Basking areas can be as simple as a flat rock resting on submerged bricks or a cinder block. More elaborate platforms can be built into the cage, above water, with access via a plastic ramp or piece of wood. One also can use floating pieces of cork, hardwood driftwood, or plastic floating platforms. Snapping turtles and Matamatas do not need basking areas.

Nesting Areas - Nesting areas should be provided for adult females, even if adult males are not present. If a sufficient nest area is provided, difficulty laying eggs can be avoided. The

Columbus Zoo, with their prodigious aquatic turtle breeding program, believes that temporarily rigging a nesting area or shifting a gravid female to a cage with a nesting area is far less successful than keeping a nesting area present year round. The nesting area should be approximately four to five times larger than the shell of the female. Nest medium should be a mixture of 50% slightly moist sand or potting soil/peat moss and two times deeper than the length of the shell. Nest area containers can be made from a variety of plastic tote containers, with rocks and water weighting down the bottom, to prevent the nest area from floating and tipping over. The nesting area can double as a basking area. Some aquatic turtle cages, such as those Waterland Tubs and Zoo Med, have built in nest areas with a ramp coming up out of the water.

Feeding - Feed adults one to three times per week, hatchlings daily. Feed as much variety as possible. The majority of the diet should consist of commercial fish based pellets, which can be soaked until soft, before offering them to the turtle. Patience and persistence is required with commercial diets because acceptance can take several weeks. Other options include whole animals such as mice, earthworms, slugs, snails, fresh whole shrimp (with shells, not freeze dried) and thawed frozen guppies, trout, bait fish, or freshwater (not saltwater) smelt. Whole fish are better than gutted fish and can be fed chopped or whole. Ideally, fish should be well fed prior to being fed to turtles. Freezing for more than three days may eliminate transfer of some, but not all, parasites. Wild-caught sticklebacks and mosquito fish should not be fed because they are natural vectors for several serious parasites. Most aquatic turtles will readily consume mice, from pinkies to chopped skinned adults. Mice are skinned to avoid the hair which isn't good for turtles. Older mice have more mineralized bone and are an outstanding source of bone for shell growth and mouse liver is a great source of vitamin A. A variety of insects (crickets, wax worms, mealworms, flies, moths, and grasshoppers), in moderation, also are OK. Be aware that insects are calcium deficient unless gut loaded with a diet greater than 8% calcium. Earthworms are widely available and nutritious; small turtles often need them chopped. Snails and slugs can also be fed. Check the ingredients; desiccated insects are nutritionally inadequate and should not be fed.

Many sliders and pond turtles become more herbivorous as they reach mature size and grow less rapidly. One can gradually increase dark leafy greens (kale, romaine lettuce, cabbage, watercress, endive, bok choy, escarole, spinach), duckweed, algae for these species.

As much variety as is possible is recommended to ensure a healthy diet for aquatic turtles. If a balanced commercial pellet is provided, multivitamin and mineral supplementation is not required. Do not be discouraged if novel items are tasted and spit out initially; it can take weeks for turtles to accept new foods.

Neonatal Care - Hatchling aquatic turtles can be a challenge to raise. Avoid crowding neonate turtles. The Rubbermaid 10-gallon storage container works well for young turtles because it is

easily cleaned and the nontransparent sides may offer additional security. Hatchlings may be shy and scramble for cover at your approach and can be reluctant to feed. Provide hatchlings with cover to retreat under, such as floating pieces of cork, clay flower-pot pieces, plastic leaves (large enough that they cannot be ingested), or a small board or flat rock over two bricks. Be certain that cage props are stable, so that they do not shift, and trap young turtles underwater, and drown them.

To coerce young turtles to feed, try feeder guppies, small live insects such as two-week-old crickets, mealworms, wax worms, chopped pink mice, small chopped earthworms or soaked, soft, pelleted fish based diets, such as those from Mazuri, ZooMed and Tetra. As the hatchlings begin to feed with more vigor, try a wider variety of foods. UV lights, proper temperature, and a wide variety of foods are important to prevent metabolic bone disease and ensure proper growth.

Species Interactions - Some turtle species, such as snapping turtles, large soft-shell turtles, mud and musk turtles and big-headed turtles are aggressive towards other turtles. These species can cause severe lacerations and kill other species and should only be kept with others of the same species and size. In addition, many aquatic turtles can be asymptomatic carriers of *Entamoeba invadens*, which can cause serious gastrointestinal disease in other reptiles.

Predators - Predators, especially dogs and raccoons, are fond of chewing on turtle shells and appendages and can wreak havoc in a very short time. Small turtles can be devoured without a trace. Raccoons and opossums will enter yards at night to prey on turtles, often from very far away. Other mammals and birds are also potential predators; aquatic turtles should always have screened outdoor cages to avoid mishap.

Parasites – Both captive and wild caught aquatic turtles can have a numbers of parasites, including roundworms, leeches, tapeworms, Coccidia and/or protozoans. Poop sample checks are highly recommended to see if parasites, or their eggs, are present. Collect a fresh brown portion of the poop in a cup or plastic bag and a fecal analysis can be performed.

Hibernation - Only healthy turtles, that normally hibernate, should hibernate, which means they have been eating well through the summer and are in good condition. A physical examination, weight check and blood work prior to hibernation is recommended in late summer to early fall. Low body weight, weight loss, low blood albumin, anemia or other signs of illness, such as nasal discharge or shell or skin infection, may be indications not to hibernate. If the turtle doesn't have sufficient body reserves it will break down its own body to survive. Aquatic turtles housed outdoors will hibernate in southern California in the winter if they have no supplemental heat. Feeding is discontinued in late November or December, as the nights start getting much colder. The turtles may remain active in the water or dig into loose soil and leaves outside the pond. Feeding can be started again as it warms in March or April. Watch for signs of pneumonia such as not floating levelly, from side to side (not front to back), inability to

submerge, discharge from the nostrils, or mouth, or not opening the eyes. Hypovitaminosis A can develop in animals that were poorly fed prior to hibernation.

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