

Fitzroy river turtle (r leukops) literature review

Sociology, Population



**ASSIGN
BUSTER**

- Fitzroy River Turtle (R Leukops)
- The Biology

Fitzroy River Turtle, *Rheodytes leukops* is also called the white eyed river diver referring to its Latin name. Locally, it is sometimes called the “ bum breathing turtle referring to its ability to utilize cloacal ventilating. This method of breathing improves its breath-holding capacity and enabling it to colonize riffle zones and take advantage of the associated greater densities of food resources during the wet season and early dry season. . “ *R. leukops* was first described as a new genus and species in 1980 (Legler and Cann, 1980) and most publications on its biology have occurred in the last 13 years. “ .

DIAGNOSIS (of genus and species): A short-necked Australian chelid distinguished from all other members of the Chelidae by the following characters (each character marked with an asterisk (*) is alone diagnostic among chelids): (1)* interlateral seam contacts on the posterior parts of the sixth and eighth marginal scutes; (2)* rib tips of costals 2-4 forming gomphoses with the centers of peripherals 4-6; (3) a narrow, unridged maxillary triturating surface that becomes even narrower in the premaxillary region; (4)* splenial bone lacking; (5) a long completely coossified dentary symphysis; (6) a maxillary tomial edge that is straight in profile; (7) a white ring around the iris; (8) relatively small eggs and short incubation period; (9) huge cloacal bursae. .

These turtles do not reach maturity until 15-20 years of age. Breeding is in the springtime when females produce clutches of about 15 eggs. Incubation takes approximately 45 days. . The eggs are deposited in nests on sand

banks 1 - 4 m above water level. Because they can use the more productive riffle zones to develop the energy and fat resources to carry them through the dry season it increases their potential to have larger and more productive breeding. Without proper food resources, “ the completion of vitellogenesis may be compromised. In such cases adult females would cease vitellogenesis and commence atresia of the developing follicles, hence fuelling the adult’s energy/nutrient requirements in preference to fuelling reproductive output.” .

The Fitzroy River Turtle is an opportunistic omnivore that eats plants and assorted insects and larvae on land as well as seeking food in the water. “ R. leukops is not necessarily a riffle zone specialist. The feeding specialization of R. leukops for scraping invertebrates, their eggs and algae from substrates provides an essential factor that influences its distribution, viz. the distribution and abundance of benthic invertebrates and encrusting algae (epiphytes).” .

- Inferences on the impacts potentially caused by AMD
- Bioaccumulation of Food Source

Because the Fitzroy River Turtle is an omnivore, it is less likely to suffer from bioaccumulation of contaminants from its food sources than its carnivorous relatives. However, that is not to say that it does not exist. This is especially relevant in that their diet varies depending on the location:

At Marlborough Creek, R. leukops fed primarily on periphyton (41. 3 per cent by weight sponge growing on Vallisneria, 3. 3 per cent sponge growing on wood, 22. 1 per cent algae growing on wood and 31. 8 per cent sponge and algae growing on wood) with aquatic insects and invertebrate eggs being

minor components at 1. 2 per cent and 0. 2 [per cent respectively.

At Glenroy Crossing, *R. leukops* fed primarily on aquatic insects (98. 2 per cent by weight Simuliidae dipterans, 0. 6 per cent all other insects) while wood and other detritus were a minor part of the stomach content at 0. 7 per cent and 0. 5 per cent respectively. .

- Precipitation of Metals in the Respiratory System

The Fitzroy River Turtle is a specialist species with cloacal ventilation . It also grows slowly, and matures late. Fitzroy River Turtles take 15–20 years before their first breeding. These traits are make them one of the turtle species most susceptible to the impacts of habitat change: . “ Turtles often associate with logs in deeper water, and may sit on the downstream side or under rocks in fast flowing riffles In order to be able to breathe in these fast flowing habitats, the Fitzroy River Turtle has adapted to be able to breathe bimodally, using either its lungs or its cloaca. Cloacal ventilation is the process where water is drawn into and expelled from the cloaca at a rate of 15–60 times per minute. Due to this mode of cloacal ventilation, the Fitzroy River Turtle is commonly referred to as the " bum-breathing" or " bottom-breathing" turtle. . (Internal cites removed). In this respect, the Fitzroy River Turtle has two respiratory systems that are potentially at risk for exposure to a toxic environment, neither of which has been studied. Nevertheless, studies have been done on other species that may shed some light on the potential risks to any creature dwelling in water contaminated by mine runoff toxins. “ when fish are exposed directly to metals and H⁺ ions through their gills, impaired respiration may result from chronic and acute toxicity.” .

Some of the rivers in the Fitzroy River Basin were known as “ Fish Rivers” In

the early years of European settlement. This was because of how many native fish lived in them.. in sections unexpended spills killed the native fish and most other aquatic life downstream from the site. Despite government, funded rehabilitation efforts there are still stretches of rivers that never recovered from the repeated toxic spills. In these river sections few if any native fish remain and there is nothing but introduced fish species and is still waiting for the native fish species to be re-established by stockings.”. The Fitzroy River is not as close to the Mount Morgan Mine, but it is subject to toxic runoff from what, during the 19th and 20th centuries was the largest gold mine in Queensland. The water flow from the Mount Morgan Mine enters the Fitzroy from the Dee River. “ The Dee River flows into the Don River and then into the Dawson River before it reaches the Fitzroy River. The Dee River catchment represents just 0. 63% of the entire Fitzroy River catchment. Although water seepage from the Mount Morgan Mine site has a high level of sulphates (salts) indicative of acid rock drainage, the water quality at the lower end of the Dee River is suitable for irrigation and livestock.” . To help the local population use the full available the Queensland Government established a web site to manage and monitor the Fitzroy River Basin. .

- Exposure to lower pH waters and heavy metals

Once again, cloacal ventilation puts the Fitzroy River Turtle at a greater risk in water with lower pH and heavy metals than it does for turtles that only use surface breathing because it takes in water as a source of oxygen as well as with its food. Another problem that faces the Fitzroy River Turtle is that the same cloacal ventilation that give it the advantage of longer dives enables it to feed at the bottom of the streams and pools where the greatest

concentrations of heavy metals exist. “ The Fitzroy River Turtle forages on the river bottom and is known to consume a variety of foods, including Ribbonweed (*Vallisneria* sp.), freshwater sponge, aquatic insect larvae, algae, small snails, terrestrial insects and terrestrial plant material such as leaves and bark.” . (Internal cites removed). In this aspect the Fitzroy River Turtle suffers some of the same risks that fish who are exposed to AMD do. “ interactions of pH, calcium, and aluminum may be important to understanding the overall effects on fish survival and productivity. Several reports indicate low pH conditions alter gill membranes or change gill mucus resulting in death due to hypoxia.. Some of the heavy metals and other materials released by AMD are only toxic in large amounts. These include zinc and calcium that are not only nontoxic in small amounts they are necessary elements. However, the key is the amount; while necessary in trace amounts, they are potentially fatal in the amounts release in AMD. Other heavy metals are toxic at any level, fatal in higher doses and build up in the bodies of the animals that consume them. Because the Fitzroy River Turtle is a long lived species that does not reach maturity until about 15 years old it is greatly subject to suffering a buildup of heavy metals such as arsenic, or mercury. Both of these heavy metals are associated with gold mining operations worldwide. According an analysis of fish in the Dee River “ Results for most sites in the Dee River indicated that metal concentrations in the water generally exceeded ANZECC (2000) trigger levels for Al, Cu, and Zn. For Cd, the highest value observed (0. 0592mg/L) was at Kenbula (closest to the mine i. e. 5km from the mine). Subsequent analysis of concentrations of heavy metals in five species of fish – Rainbow Fish

(*Melanotaenia splendida*), Fly Specked Hardihead (*Craterocephalus stercusmuscaru*), Glass Perchlet (*Ambassis agassizii*), Spangled Perch (*Leiopotherapon unicolor*) and Purple Spotted Gudgeon (*Mogurnda adspersa*) – revealed that metal concentrations generally declined with distance from the mine but not a single fish was caught at the site closest to the mine. Al (1100mg/L), and Cu (61. 6 mg/L) concentrations in fish species at Penny Royal (22. 2 km from the mine) exceeded ANZFA (2000) maximum permitted levels for human consumption whereas Cd (0. 05 to 0. 3 mg/L), and Zn (100 to 195 mg/L) were also high, but below ANZFA levels. These results demonstrate clearly that, even though the Mt Morgan mine is no longer operational, the plume of contaminated acidic water originating from the mine continues to enter the Dee River and presents a significant threat to the environment..

Ground water studies suggest that “ groundwater originating from the Mount Morgan mine site is not discharging directly into the Dee River. Instead, the deeper groundwater (in fractured bedrock) is discharging into a more permeable aquifer along the Dee River valley. . However, the toxic discharge still makes its way into the Fitzroy River, it follows the direct path via the Dee River. Acid Mine Drainage (AMD) can encourage a biological feedback loop. When the acid mine drainage starts it helps certain microbes thrive in the resulting acidic environment. These microbes increase the production of sulfuric acid and further poison the downstream environment for other organisms. This feedback loop is an important component in all the most severe cases of acid mine drainage. . “ Water contaminated by AMD, often containing elevated concentrations of metals, can be toxic to aquatic

organisms, leaving receiving streams devoid of most living creatures.” . The effect on the Fitzroy River Turtle could also be similar here as that suffered by fish. Fish suffer from growth and reproduction problems as a result of AMD. . One of the problems facing the Fitzroy River Turtle is that it has a disproportionately low young turtle population. It is also possible that exposure to heavy metals could be the same as those suffered by humans. These problems include those from lead which include brain, kidney, and nervous system damage, Cadmium that can cause high blood pressure, liver damage, cancer and Mercury that causes deterioration of the nervous system. .

- Unknown Responses

In a study entitled The biology and management strategies for freshwater turtles in the Fitzroy Catchment, with particular emphasis on *Elseya albagula* and *Rheodytes leukops*: A study initiated in response to the proposed construction of Rookwood Weir and the raising of Eden Bann Weir the authors observe “ The species is not functioning well in the Redbank, Glenroy and Rookwood Crossings reaches of the Fitzroy River. Further studies are needed to identify the role that climate change, drought, chemical pollution and turbidity play in determining the population dynamics of this species.” .

The Action Plan For Australian Reptiles finds that “ a combination of factors including soil and water pollution resulting from mining and agricultural activities, ” is a primary reason for the decline in the Fitzroy River Tortoise. Rivers within the Fitzroy River Turtle's range have experienced increases in turbidity since the species' discovery. Increasing turbidity and sedimentation

may affect food resources and cloacal respiration, and have been observed to coincide with some population declines (Cann 1998). Pollution of water and soil by surrounding land uses, such as agriculture and mining operations, may also pose a threat to populations. .

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