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BES 485 Species Report

The Rufous-Throated Dipper

Figure 1. A rufous-throated dipper perched on a rock

Intro

The Rufous-throated dipper (*Cinclus schulzi*) is a bird native to the subtropical forests of Southern Bolivia and Northwestern Argentina (Miranda et al, 2012). It is endemic to these regions of South America (Miranda et al 2012). It is an aquatic bird which inhabits streams and rivers cutting through the mountains. Currently the bird is listed as 'vulnerable' according to the IUCN (IUCN.org 2014). In Argentina, the dipper is believed to have less than 2000 individuals and their habitat is fragmented largely due to habitat transformation (i.e., dam construction), river pollution, and deforestation of river basins. (Miranda et al, 2012). There are only five species of Dippers globally, all from the same genus (Rijke and Jesser 2010). All

have a similar appearance and the only observable differences are behavioral traits and size (Miranda et al, 2012). *C. schulzi* is the only species in the genus *Cinclus* that is native to the mountain-forests of Bolivia and Argentina.

One difference unlike the other four species of Dipper is that *C. schulzi* is not capable of diving when searching for food (Rijke and Jesser 2010). They hunt for macro-invertebrates in between rocks, on water surface, and at the edge of waterfalls (Rijke and Jesser 2010). Macro-invertebrates consist of insects and other small aquatic invertebrates that are visible to the naked eye. Many of them creep in cracks and dark shadows brought about by the downstream flow of abiotic material capable of providing shelter and nesting.

The ongoing flow of sediments downstream is important to the continuing sustainability of *C. schulzi* habitats. It brings more material downstream capable of supporting the creatures the bird depends on. Without macro-invertebrates that use sediments, there is no way *C. schulzi* can continue to live there unless it changes its diet; there is nothing else to eat.

The problem at this point is that the development of dams for hydroelectric power is blocking sediments downstream from continuing its movement downward. Without these sediments, the streams and rivers become less rich; variance in rock size is reduced and erosion of banks can reduce food availability for the macro-invertebrates (Miranda et al, 2021). The human induced process of just one activity such as installing a dam is affecting organisms at three different levels of the food chain; *C. schulzui*, the food it preys on, and the food that its prey consumes (Miranda et al, 2012).

Feather Structure and Relationship with Water

Dippers are the only passerines which find their prey underwater (Rijke and Jesser 2010). The rufous-throated dipper only dips its head in from a perch. Their feathers are well adapted to aquatic scavenging habits and water repellency (Rijke and Burger 1985). The breast feathers, specifically, have evolved exceptional water repellency (Rijke and Jesser 2010). Although no difference is seen between the barb and barbules of dippers' feathers to the naked eye, the rufous-throated dipper has contour feathers similar to terrestrial birds (Rijke and Jesser 2010). This would explain why they only bob their heads and rarely dive. Studies suggest the diving mechanism adapted by other species of dippers is a relatively new feature (Rijke and Jesser 2010). Diving is an evolutionary step that the rufous-throated dipper has not yet completed (Rijke and Jesser 2010).

Bobbing is usually performed while standing on a stone above the water (Rijke and Jesser 2010). Branches, drift wood, bank ice, and even shallow water also provide hunting locations (Rijke and Jesser 2010). Sometimes dippers turn their head and forepart of the body with each dip to the left or right in order to scan their environment (Rijke and Jesser 2010). This is a defense mechanism to ensure their safety. They also have characteristics which allow them to dry off quickly. Strong bobbing movements are usually accompanied by aggressive shakes of the head and wing flicking (Rijke and Jesser 2010). This sheds the water off their body in an efficient manner.

Dipping in *C. Schulzi* rarely occurs and with low intensity (Fjeldsa and Krabbe 1990). Wing flicking has been almost completely substituted for dipping and the flicking mechanism appears more exaggerated than in other species of dipper (Spitznagel 1996). In contrast to the other species in the *Cinclus* genus, *C. schulzi* rarely tail-flicks because its wing flicking

supplements that need (Spitznagel 1996). Another interesting distinction between *C. schulzi* and other dippers is that dipping is strongly associated with the blinking of the white eyelids; however, *C. schulzi* does not have white eyelids (Spitznagel 1996).

Habitat type is suggested to be related to the distribution of bobbing, flicking, and nodding movements in birds (Spitnagel 1996). In open areas such as tundra or mountains above the tree-line, predation pressure in increased. *C. schulzi* is not an effective hunter in these types of habitats. In dense vegetation such as forests, predator vision is poor, making it an optimal habitat for the rufous-throated dipper (Spitznagel 1995). It is not of surprise that *C. schulzi* bobs and wing flicks much more than other dippers because their primary habitat makes it harder for them to be seen by predators. Theories suggest other species of dippers developed the plunging technique as a way to avoid predators while searching for food in more visible environments (Spitznagel 1996). Up until recently, there wasn't a need for *C. schulzi* to dive; however, deforestation is occurring at an alarming rate. This is hindering the bird's ability to avoid predators and is an important reason for its population decline. The following section will explain the environmental impacts affecting *C. schulzi* and why its bobbing technique is losing effectiveness.

Environmental Impacts and Conservation Awareness

There are many environmental impacts related to the degradation of *C. schulzi*. First, the construction of dams are effecting the amount of material drifting downstream. When dams are built, they block material by which the dipper needs. Sediments build up behind the dam, blocking it from running down the waterway (IRO 2011). The water system is less accommodating towards dipper habitat as these sediments would naturally replenish the

downstream ecosystem (IRO 2011). Dams can increase erosion, cause changes in chemical composition and dissolved oxygen as well (IRO 2011). The first step in thwarting the effect dams have on *C. schulzi* is stopping the construction of them or to remove them altogether (although this can be harmful in its own right and should be done with caution) (IRO 2011).

Secondly, pollution in water systems can increase harmful rates of chemicals. For example, if there is a dry-spell, pollutants, heavy metals, and other dangerous chemicals build up on roadways (Salazar 2012). When a rain event occurs, suddenly all of that built up pollution is flushed to the nearest reservoir, runs off into water systems, and affects the health of organisms that use the habitat (Salazar 2012). In order to prevent this affect on *C. schulzi*, scientists need to develop better techniques that manage water. One example of this is diverting storm water runoff to a containment area where pollutants can settle, thus cleaning the water which can then gradually release into waterways (Salazar 2012).

The third and possibly most important environmental impact is deforestation of river basins. As discussed in the earlier sections, habitat fragmentation is a major affect on the population decline of *C. Schulzi* and other animals (NG 2014). They are only adapted to bob in water contrary to the other species of dippers who fully submerge themselves.. This is a disadvantage when their habitat is deforested because they can be spotted easily by predators. In order to sustain or build their population back up, policies in Argentina need to be implemented that would protect forested lands. This is a complicated process involving many different aspects including economics, politics, and conservation-biologist input. Clearly, *C. schulzi* will be in a much greater position if their natural habitat is conserved and deforestation is reduced.

Limitations of Study

It was very difficult finding information on the rufous-throated dipper. I found three peer-reviewed articles on the web of science and scouring the internet. One reason its information is limited is because the population range is so small, being strictly endemic to the Southern Yungas area.

I found a population status report which was very helpful. It gave me the most vital basic information on *C. schulzi* from which I was able to construct a legitimate introduction. I emailed the author of the report two weeks ago but she never replied. That was a let-down. In conclusion, it was a struggle to find information on the rufous-throated dipper. It was a frustrating challenge that I eventually over came by finding an additional peer-reviewed article about three weeks ago. If I could do a report like this over again I would like to study something that had a larger population range or wasn't endemic. I suppose that was the purpose of the study however, to challenge our ability to find relevant information on a little-known species.

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