

Nilssonina hurum (Gray 1830) – Indian Peacock Softshell Turtle

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SUMMARY. – The Indian peacock softshell turtle, *Nilssonina hurum* (Family Trionychidae), is a relatively abundant large riverine species that is found in rivers and reservoirs. The species attains a rather large size (carapace length to 60 cm). It is distributed over eastern Pakistan, northern and central India, Bangladesh, and Nepal. The species is primarily nocturnal and omnivorous, juveniles observed feeding on mosquito larvae and fish, while adults consume snails, earthworms, prawns, fish, frogs, carrion, and vegetation. Animals maintained in captivity are known to eat rice and palm sugar sweetmeats. Courtship takes place underwater, and spherical, brittle-shelled, eggs in clutches numbering 20–30 are produced between August to November; hatching takes place between June–July of the following year. The species is heavily exploited for its meat and calipee (the outer cartilaginous rim of the shell) throughout northern and eastern India and Bangladesh. The intensity of exploitation to which it is subject suggests that both some kind of quota or closed season system, as well as protection of nesting areas, are necessary.

DISTRIBUTION. – Bangladesh, India, Nepal, Pakistan. Distributed across eastern Pakistan, northern, central, and eastern India, southern Nepal, and all of Bangladesh.

SYNONYMY. – *Trionyx ocellatus* Gray 1830a, *Trionyx ocellatus*, *Gymnopus ocellatus*, *Trionyx hurum* Gray 1830b, *Isola hurum*, *Aspideretes hurum*, *Aspidonectes hurum*, *Tyrse hurum*, *Amyda hurum*, *Nilssonina hurum*, *Gymnopus duvaucelii* Duméril and Bibron 1835, *Trionyx sewaare* Gray 1872, *Trionyx bellii* Gray 1872, *Trionyx buchani* Theobald 1874.

SUBSPECIES. – None.

STATUS. – IUCN 2010 Red List: Vulnerable (A1cd+2d) (assessed 2000); CITES: Appendix I; Indian Wildlife (Protection) Act: Schedule I; Bangladesh Wildlife (Preservation) Act: Schedule III.

Taxonomy. – The first name proposed for this taxon was *Trionyx ocellatus* Gray 1830a (Plate 78 in *Illustrations of Indian Zoology*; the specific epithet corrected later

in the same work to *Trionyx ocellatus*), showing dorsal and ventral views of a juvenile. Webb (1980) showed that *Trionyx ocellatus* Gray 1830 is a primary (junior) homonym



Figure 1. Adult female *Nilssonina hurum* from the Brahmaputra River, India. Photo by Chittaranjan Baruah.



Figure 2. Adult *Nilssonia hurum* from Bangladesh. Photo by Indraneil Das.



Figure 3. Adult *Nilssonia hurum* from India. Photo by Shailendra Singh.

of *Trionyx ocellatus* LeSueur 1827, a synonym of *Apalone spinifera* (LeSueur 1827), and thus not available. *Trionyx hurum* Gray 1830b is the next available name, which was based on a manuscript name by the Scottish ichthyologist, Francis Hamilton (1762–1829), who later acquired the name Francis Buchanan (Theobald 1874), associated with Hamilton's drawings in the British Museum, originating from "Indiae fluvio Ganges", although the drawing bears the locality "Fatehgarh" (27°22'N, 79°38'E, Uttar Pradesh, northern India), to which the type locality was restricted by Smith (1931). Webb (1980) emended the type locality to "Barrackpore (about 23 km north of Calcutta), West Bengal, India" (= Barakpur, 22°45'N, 88°20'E). Webb (1980) and Gemel and Praschag (2003) provided extensive discussions on the synonymy of *Trionyx hurum*, which includes *Trionyx sewaare* Gray 1872, *Trionyx belli* Gray 1872, and *Trionyx buchanani* Theobald 1874. The species was transferred to the genus *Aspideretes* by Meylan (1987), along with three other species of large trionychids that were formerly in the trionychid genus *Trionyx*. More recently, Praschag et al. (2007) argued for an expanded concept of *Nilssonia*, and included the species of *Aspideretes* in it.

Description. — The carapace is low and oval and the anterior edge has blunt tubercles. The head is large, and the snout is strongly downturned. A straight carapace length (bony disk plus leathery cartilaginous flap) of 60 cm is attained (Annandale 1912a).

The carapace is dark olive green to nearly black, sometimes with a yellow rim, and juveniles have 4 striking, orange ringed dark-centered ocelli, that are subequal and symmetrically positioned on an olive green carapace with dark reticulation; the eye-like markings becoming obscured with growth when the shell becomes darker. The plastron is dark in juveniles, turning light gray in adults. The head and limbs are olive green; the forehead has dark reticulations and large yellow or orange patches or spots, especially behind the eyes and across the snout, that are larger than those in its sister species, *N. nigricans*. These head markings are evident even in large individuals in which the carapacial pattern has been lost.

Males possess relatively longer and thicker tails than females, with the cloaca situated close to the tail-tip. No sexual dimorphism in shell color or patterns or size have been reported.



Figure 4. Juvenile *Nilssonia hurum* from Assam, India. Photo by Indraneil Das.



Figure 5. Juvenile *Nilssonia hurum* from Assam, India. Photo by Indraneil Das.

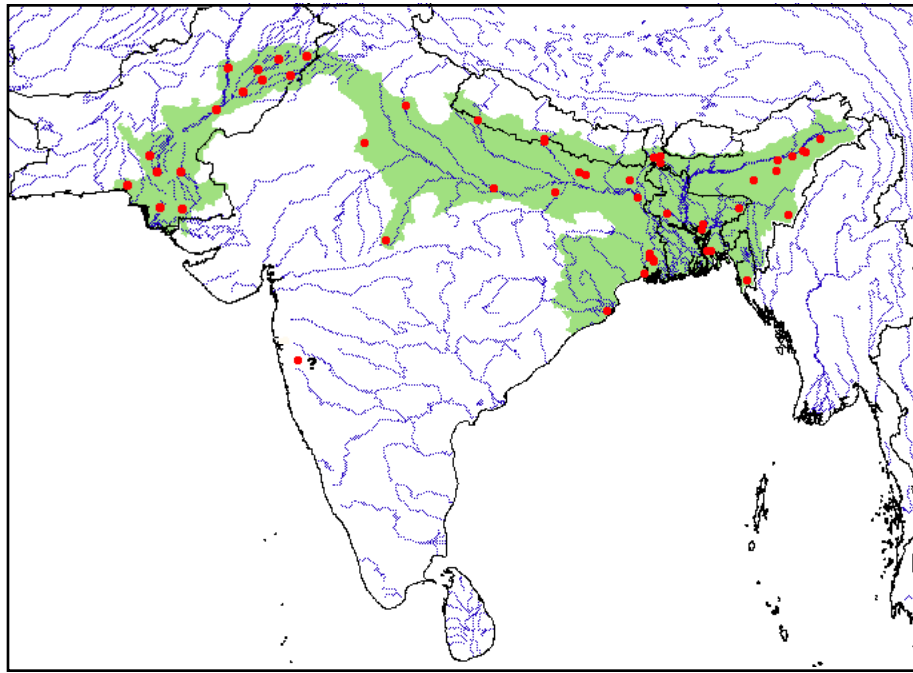


Figure 6. Distribution of *Nilssonina hurum* in Pakistan, India, and Bangladesh. Red points = museum and literature occurrence records based on Iverson (1992) plus more recent and authors' data; green shading = projected distribution based on GIS-defined hydrologic unit compartments (HUCs) constructed around verified localities and then adding HUCs that connect known point localities in the same watershed or physiographic region, and similar habitats and elevations as verified HUCs (Buhlmann et al. 2009), and adjusted based on authors' data. The question mark indicates the isolated questionable locality of Pune, Maharashtra.

The bony carapacial disk has eight pairs of costals and two (or sometimes three) neurals between the first pair of costals. The skull has ridgeless maxillary triturating surfaces with a median groove.

No subspecies have been described, although Rashid and Swingland (1997) suggested that the northern population differed from the southern one in color and snout shape.

The karyotype is unknown. Genetic work on the species has been conducted by Praschag et al. (2007), that allocate it to *Nilssonina*, and reveal a sister relationship with *N. nigricans*. Earlier, Engstrom et al. (2004) conducted a wider phylogeographic analysis of all extant species of Trionychidae, and revealed a relationship with the three South Asian species of large, softshell turtles (*Nilssonina gangetica*, *N. nigricans*, *N. leithii*), plus the Myanmar endemic (*N. formosa*), which they retained in the clade Aspideretini Hay (1903).

Distribution. — The Indian peacock softshell turtle is widespread in the northern and central parts of the Indian subcontinent, but the southern and eastern limits of its distribution remain unclear. Verified examples have come from the tributaries of the rivers Indus, Ganga, Brahmaputra, and Subarnarekha, as well as their numerous tributaries (Smith 1931; Moll and Vijaya 1986), as well as from isolated bodies of water, sometimes far from major river drainages, for example: Puri, Orissa (Annandale 1912b); Pune, Maharashtra (Varghese and Tonapi 1986); Bhopal, Madhya Pradesh (Das 1987); Bharatpur, Rajasthan (Bhupathy and Ajith Kumar 1988); Misrik, Uttar Pradesh (Pai and Basu 1988); and Jiribam, Manipur (Singh 1995).

The record from Dohazari, south of Chittagong, in extreme southeastern Bangladesh (Das 1989), is of inter-

est, and suggests that *N. hurum* might conceivably occur in western Myanmar as well, although that remains unverified, and the international border east of Chittagong corresponds to a mountain range that separates river systems in the two countries. Mertens (1969) reported a specimen from Pakistan, and this species has since been confirmed from the Indus drainage by Khan (2006), Noureen (2007), Noureen and Khan (2007, 2008), and Noureen et al. (2008). The records from Nepal are from the western, central, and Terai regions (Mitchell and Rhodin 1996; Schleich and Kästle 2002).

Old records of the species from Indo-China (Mocquard 1907), the Malay Peninsula (Flower 1899), and Borneo (de Rooij 1917), are based on erroneous identifications (see Annandale 1912a).

Habitat and Ecology. — The Indian peacock softshell turtle utilizes rivers, lakes, and ponds, from the upper reaches of the rivers, to the lowest, while apparently avoiding the saline river mouths. Its ability to burrow into the mud, while not as developed as that of *Lissemys*, may be associated with its ability to inhabit ponds and other lentic environments that may dry up during the dry season. Individuals were observed to surface every after 20–30 min in the Sarju River in the summer, comparatively more frequent than other sympatric softshelled turtle species such as *N. gangetica* or *L. punctata*. Adults were observed to utilize deeper sections of the river, while yearlings appears to stay in the shallower parts. Rashid and Swingland (1997) mentioned that the species migrates from drying ponds, and that is known to bask on the surface of water. The low abundance of this species in rivers like the Chambal in the western parts of its distribution may be due to the

increasing gravelly nature of river beds, in comparison to the clayey beds of rivers in the eastern regions.

The species is reportedly primarily nocturnal (Noureen and Baruah 2010) and omnivorous; juveniles have been observed feeding on mosquito larvae and fish in captivity, and the stomach of a wild-collected adult in northern India contained fragments of snail shells (Das 1991). In Bangladesh, stomach samples contained earthworms (*Pheretima posthuma*), molluscs (*Pila globosa*), prawns, fish (including *Amblypharyngodon mola*, *Mystus tengra*, and *Nandus nandus*), frogs, as well as carrion and vegetable matter (Rashid and Swingland 1997; Schleich and Kästle 2002). Khan (1987) reported the species to be omnivorous. Animals maintained at a temple tank in Puri, Orissa, eastern India, took rice and sweetmeats made of palm sugar (Annandale 1912b). Individuals maintained in the temple tanks and village ponds in Uttar Pradesh and Assam, India, were seen to feed on puffed rice, bread, and material generated as garbage as a result of religious activities (S. Singh, pers. obs.).

Flower's (1899) description of courtship in the species, reportedly underwater, with the males biting the females, and vocalizing, may refer to *Amyda cartilaginea* or an unknown turtle species, as *Nilssonina hurum* does not occur in southeast Asia.

In Bangladesh, nests are 10–30 m away from the edge of water, and 15–25 cm deep; the spherical, ca. 30 mm in diameter, brittle-shelled eggs, numbering 20–30 eggs in a clutch are produced during the winter months, and there is evidence of multiple clutching in Bangladesh (Rashid and Swingland 1997). Nesting of *N. hurum* in the Chambal occurs along with that of *N. gangetica* in the months of August to November, and hatching takes place in June–July of the following year. Clutch range in the Chambal is 10–30, with a mean of 18 (D. Basu, pers. obs.). Hatchling takes place just before the main monsoons (mid-June to mid-July) on the Sarju River, in the north Indian Terai (foothills of the Himalayas). One recently hatched nest was examined from a dried-up *nullah* (stream) adjacent to the Sarju River. The mean carapace length of three hatchlings was 46 mm.

The trematode parasite, *Cephalogonimus mukerjii* is known to infect this turtle (Rai 1961).

Population Status. — No information on population sizes is available. This appears to be the most common large softshell turtle in the lower parts of the Ganges system; however, in the central and upper regions the species appears to be outnumbered by *N. gangetica*. In the Chambal River, *N. hurum* nests comprised < 2% of *N. gangetica* nests (D. Basu, unpubl. data). The species was fairly abundant in slow-flowing rivers and wetlands in the Terai of northern India, but populations seem to be declining due to commercial exploitation and habitat alteration. The notable north Indian habitats, where large populations of the species have recently been recorded, are Sarju, Kane, and Rapti rivers, and a few oxbow lakes in the area (S. Singh, pers. obs.). In Azam and Randhawa's (2008) study site in Pakistan's Punjab Province (at Head Punjnad and Head Trimmu), *N. hurum* was the most abundant turtle species (after *Pangshura smithii*), and

was described as “plentiful” in “shallow muddy ditches, lakes and marshes”. In another study in the same province of Pakistan, Akbar et al. (2006) described the species as frequently encountered. In Bangladesh, this appears to be the most abundant large softshell turtle (Rashid and Swingland 1997), although the concept of *N. hurum* at the time also included the often sympatric and morphologically similar *N. nigricans*.

Threats to Survival. — Annandale (1912a) reported a consignment of over 500 individuals from Khulna, currently in Bangladesh, in the early 1900s, mentioning that the trade was restricted to the month of October. Based on market surveys conducted in the early 1980s, Moll (1983) found the species to be the third most commonly exploited turtle in eastern India, after *L. punctata* and *N. gangetica*. Threats in the River Ganga to the species are those generic for all large river turtles, including reduction of fish stock, as a result of overfishing, pollution, increase in river traffic, and sand-mining, among others (Rao 2001).

The species is extensively hunted in all of northern and eastern India for its meat and calipee (the outer cartilaginous rim of the shell), which is extracted from live turtles by removing up to ca. 10 cm of the rim from limb to limb. The calipee is dried and sold along with that of sympatric species such as *N. gangetica* and *Chitra indica*. The calipee commands a higher price (due to low fat content) in comparison to that of the Indian narrow-headed softshell, *Chitra indica*, and one kilo of dried calipee fetching fishermen 1700 Indian Rupees (ca. US\$ 22) from middlemen. It is probable that the final destinations are the markets of China and/or Southeast Asia, via Bangladesh, where it is used in cuisine and Traditional Chinese Medicine (TCM). A single animal of 30 kg can produce about 650 g of dried calipee. In the state of Uttar Pradesh, turtlers typically locate the species using an iron probe during the dry season, baited and unbaited “thousand hook” lines before and after the monsoons, and fall and set nylon nets during the winter. In the state of Uttar Pradesh, the species was recorded in five of 11 live and dead consignments (comprising over 500 turtles of different species) seized by the Uttar Pradesh Police Department in 2009. Noureen and Baruah (2010) reported that in the first week of November, large numbers of eggs of this species are excavated from islands on the Brahmaputra, for local consumption or sale.

In Bangladesh, *N. hurum* is the most heavily exploited species, most animals caught ending up in markets in Southeast Asia (Das 1990; Rashid and Swingland 1990). Export peaked between the mid-1980s and early 1990s, when ca. 10,000 metric tonnes of the species were exported annually (Rashid and Khan 2000). Fugler (1984) noted that in Bangladesh, these turtles are caught with hooks fixed to short cords, which are attached at intervals of about half a meter to a 60–600 m cord, and baited with offal, mussel, shrimp or fish.

In Pakistan, the species is exploited for export to China, both as meat and calipee (Noureen and Khan 2007, 2008; Noureen et al., 2008); other local threats being incidental

capture in fishing gear, canal closure, and desiltation of water bodies (Akbar et al. 2006). Trade reports for China (Zhang et al. 2008) confirm the importation of this turtle for use in the food and indigenous medicine trade. In Nepal, the species is reportedly used for food and medicine (Shah and Tiwari 2004).

Conservation Measures Taken. — The species is listed under Appendix I of CITES, Schedule I of the Indian Wildlife (Protection) Act 1972, Appendix III of the Wildlife Protection Ordinance for Sindh, Punjab, Balochistan, and Northwest Frontier Agency (all in Pakistan), and Schedule III of the Bangladesh Wildlife (Preservation) Act of 1974. Its export from Pakistan has been banned by the Pakistan Export Policy, 2006–2007. Nonetheless, continuing illegal export to China for TCM, especially from Bangladesh and Pakistan, appears to occur frequently (Rashid and Khan 2000; Noureen and Khan 2007, 2008; Noureen et al. 2008). The species is included in the Red Data Book for Nepal (Shah and Tiwari 2004). The IUCN Red List categorizes the species as Vulnerable (www.iucnredlist.org).

This species occurs in several protected areas within its natural range, including the Pakhui Wildlife Sanctuary (Arunachal Pradesh), Mupa-Lanteng Reserve Forest (Assam), Bherihari Wildlife Sanctuary (Bihar), Hastinapur Wildlife Sanctuary (Uttar Pradesh), Sarnath Turtle Sanctuary (Uttar Pradesh), the National Chambal Sanctuary (Madhya Pradesh and Rajasthan), and Keoladeo National Park (Rajasthan) in India and the Sunderban Wildlife Sanctuaries (comprising East, West and South sectors) of Bangladesh. Some efforts to restore the heavily polluted River Ganga via pollution control have begun in the past decade (Rao 2001).

Conservation Measures Proposed. — Trade in the species may be difficult to stop in the short-term, and the protection of nesting grounds, especially during the breeding season, and other critical habitats of the species, in addition to better enforcement, especially addressing transborder trade, may be a more suitable strategy. Thus, better enforcement and partial amendments of the existing laws may be warranted, to allow some sustainable utilization of this large, commercially valuable species. These include annual quotas on numbers removed or a closed season system, as well as protection of nesting areas. The turtle hunters may need to be rehabilitated through encouragement to opt for more river-friendly livelihoods, rather than catching turtles for middlemen for nominal monetary gains

Captive Husbandry. — Annandale (1912b) reported a population of this species in captivity at a temple in Puri, Orissa State, eastern India, but P.C.H. Pritchard reported in the 1980s (pers. comm.) that this captive colony appears to have died out. Juveniles maintained in captivity ate fishes and mosquito larvae (I. Das, pers. obs.). Varghese and Tonapi (1986) classified the species as carnivorous, reporting annelids, molluscs, arthropods, fish fingerlings, and tadpoles in its diet in captivity. These authors also reported that while macrophytes are generally avoided, floating root-tips of plants are ingested when starved for 1–2 weeks. Animals kept in temple ponds in eastern India feed on offerings from

pilgrims, including cakes, fruits, animal viscera and rice (Noureen and Baruah 2010). Such animals are vulnerable to both inbreeding, aggression as a result of high stocking densities, and fungal attack. One large die-off in August 2008, involving about 13 turtles at the Madhab Temple at Hajo, Assam, in eastern India was reported by Noureen and Baruah (2010).

Current Research. — The reproductive biology and scale of trade of the species is being studied by Shailendra Singh, supported by the Turtle Survival Alliance, in northern India.

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