

## Tagging of the Big Amu-Dar Shovelnose *Pseudoscaphirhynchus kaufmanni* (Acipenseridae)

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**Abstract**—Distinctions of two forms of the big Amu-Dar shovelnose *Pseudoscaphirhynchus kaufmanni* are presented, wide-snouted and narrow-snouted. In 1999–2002, in the middle reaches of the Amu Darya, 374 specimens were tagged. Seven specimens were recaptured, and one specimen was captured twice. The intervals between tagging and recapture fluctuated from three days to 22.5 months. *Pseudoscaphirhynchus kaufmanni* stays in one area of the river, though some specimens make migrations of up to 15 km. The narrow-snouted form has an extremely slow growth rate, as was previously thought. The annual linear increment of specimens longer than 15 cm is not more than 1.5–2 cm. Light plastic T-shaped anchor type tags may be used for tagging comparatively small bottom rheophilic fishes living in rapidly flowing waters with suspended silt.

Tagging of the big Amu-Dar shovelnose *Pseudoscaphirhynchus kaufmanni* was done in 1999–2002 during a joint expedition of the National Institute of Deserts, Flora and Fauna, Ministry of Nature Protection of Turkmenistan, and of the University of Alabama, USA. In the present communication, the first results are summarized.

### MATERIALS AND METHODS

Shovelnoses were tagged by mechanical plastic tags of the anchor type (Dennison Mark III Floy T-bar Anchor Tag) produced for installation on small and average-sized fishes. The tag is T-formed and is a light plastic tube 25 mm in length and 2 mm in diameter. The

tube is colored bright yellow and bears an individual black four-digit number on the outside. The tube is supplied with plastic thread 20 mm long with a transverse bar on its free end, securing the tag in a perforating puncture through the fish body. The tags were installed in a soft base of one of the pectoral fins of shovelnoses (Fig. 1) by means of a fish tagging pistol (Dennison Mark III Pistol-Grip Swiftacher, Tool no. 10651).

The shovelnoses were caught by a three-walled capron net, so constructed that fishing could be done by bottom drifting. The length of the net is 65 m, the working depth 1.5 m, mesh size 30 mm, trammel mesh size 250 mm. Fishing was done on stretches of the river with a slow current and depth usually 1–2.5 m, situated aside from the mainstream, generally, along islands, in shal-



**Fig. 1.** Tagging of the big Amu-Dar shovelnose *Pseudoscaphirhynchus kaufmanni*: (a) plastic tag, (b) place of attachment of the tag on a shovelnose (indicated by the arrow).

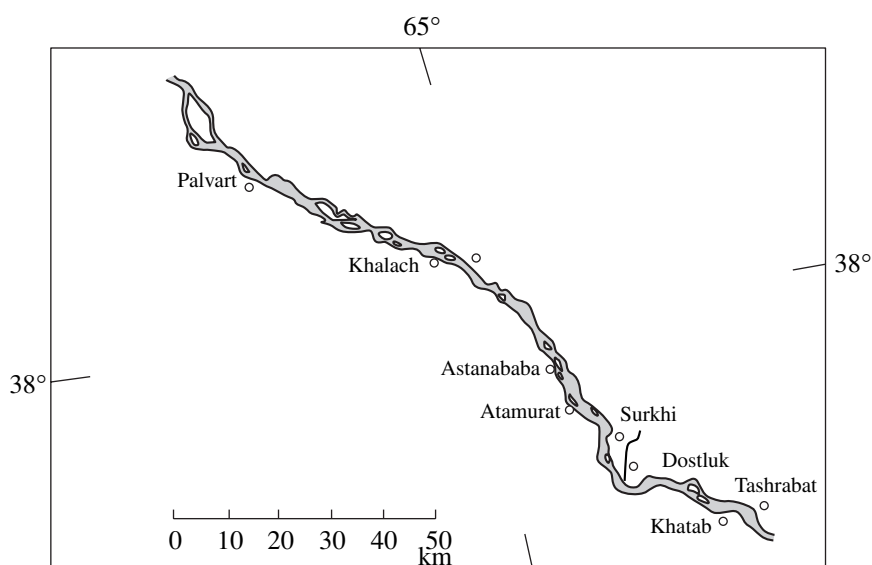


Fig. 2. Map of the stretch of the Amu Darya where tagging the big Amu-Dar shovelnose *Pseudosaphirhynchus kaufmanni* was done.

low side channels and in channels between islands. During a typical haul, the net made a distance 50–100 m, capturing on average 0.6–1.1 specimen, although sometimes up to 10–15 specimens. In the captured fish, the standard length (SL, the distance from the tip of the snout to the last scute with a spine in the caudal peduncle) and body weight were measured. Each specimen was assigned to the wide-snouted form or to the narrow-snouted form. As the sex dimorphism in the shovelnose is not expressed, usually the sex was not determined (except adult mature females with eggs seen through the thin wall of the belly). After tagging, the fish were released at the place of capture.

Tagging was done along the stretch of the Amu Darya about 150 km long, from the Tashrabad settlement to the Palvart settlement. The position of capture sites of shovelnoses, their release after tagging, and of recapture of the tagged fish was noted in relation to nearby settlements. Altogether, eight such sites were designated: Tashrabad, Khatab, Dostluk, Surkhi, Atamurat (former Kerki), Astanababa, Khalach, and Palvart (Fig. 2). A more detailed record of the position of the sites of capture and release of tagged fishes was done in relation to fixed coastal landmarks. The distances were determined from maps, from route data between river harbors, and by visual estimation.

In the case of recapture of the tagged shovelnoses, the data and site of capture were recorded, as well as the length of the captured fish. Then the fish, supplied with a new tag, was released. In some cases, the recaptured fish were subjected to biological analysis. Tagging of shovelnoses and subsequent test fishing for tagged fish recapture were done mainly in spring and in winter 1999–2002.

## RESULTS

### Identification of Morphological Forms of the Big Amu-Dar Shovelnose

The intraspecies polymorphism of the Big Amu-Dar Shovelnose was noted by Sagitov (1968, 1969) and Tleuov and Sagitov (1973). They discerned in *P. kaufmanni* two morphoecological forms, a common form and a dwarf form. According to these authors, the dwarf form differs from the common form in smaller size, stunted growth, earlier maturation, low fecundity, diet, and in other biological traits. Its is darker and its snout is comparatively narrow. There are also differences in some meristic and morphometric characters between these forms. Recent investigations dispute dwarfism in the biological sense, regarding the Big Amu-Dar Shovelnose. Thus, it is suggested that the common and dwarf forms of the shovelnose be designated as the wide-snouted and the narrow-snouted forms, respectively, as there is a hiatus between these forms in the relative size of the snout width. Its is supposed that both forms may be independent species, but it is not yet decided (Kuhajda *et al.*, 2000; Sal'nikov *et al.*, 2001, 2003). Polymorphism of the Big Amu-Dar shovelnose should be taken into consideration in monitoring, in censuses, and in elaboration and realization of measures for species conservation. In the present study, several morphological characters are used for reliable identification of the wide-snouted form and of the narrow-snouted form of the big Amu-Dar shovelnose under field conditions (Table 1). The characters are based on the available published data (Sagitov, 1968, 1969; Tleuov and Sagitov, 1973) and on the original morphobiological analysis of 138 specimens of the big Amu-Dar shovelnose.

In the course of tagging, the forms of the shovelnose were usually quite readily identified by external appear-

**Table 1.** Distinctive characters for identification of forms of the big Amu-Dar shovelnose *Pseudosaphirhynchus kaufmanni*

No.	The form of shovelnose	
	wide-snouted	narrow-snouted
1	Coloration of the body and head in freshly captured specimens in dorsal view (from light-brown to bluish-white in larger specimens).	Coloration of the body and head in freshly captured specimens in dorsal view darker (from brown to dark-gray, sometimes almost black).
2	Head and snout wide, snout in dorso-ventral view spade-like (Fig. 3a).	Head and snout comparatively narrow, snout in dorso-ventral view as triangle stretching forward (Fig. 3b).
3	Width of the snout at the level of bases of outer barbels over 46% of head length measured from the tip of the snout to the outer edge of operculum.	Width of the snout at the level of bases of outer barbels less than 46% of head length measured from the tip of the snout to the outer edge of operculum.
4	SL attains 50 cm and more.	SL does not surpass 30 cm.

ance—color, snout form, and body size. In uncertain cases, the morphometric criterion was applied, attributing a specimen to the wide-snouted form or to the narrow-snouted form by the results of two measurements of the head (Table 1, no.3).

### Composition of the Tagged Shovelnoes

Altogether, 374 big Amu-Dar shovelnoes were tagged, including 137 in 1999, 123 in 2000, and 64 in 2002. These, 50 belonged to the wide-snouted form and 324 to the narrow-snouted form. The data on the number of tagged shovelnoes in different years and in different areas of the river are shown in Table 2. Among the tagged shovelnoes, the narrow-snouted form considerably prevails, as they are more numerous in the river in comparison with the wide-snouted form.

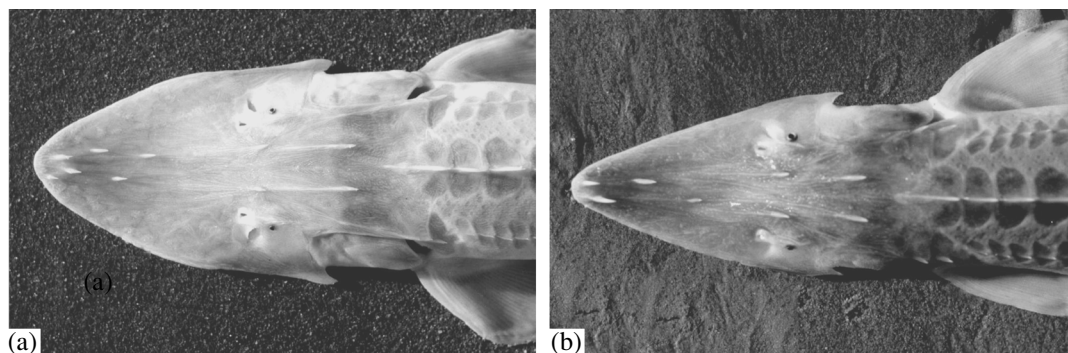
Length of the tagged fishes varied from 144 to 460 mm, body weight from 21 to 656 g in the wide-snouted form and from 118 to 278 mm, body weight from 12 to 119 g in the narrow-snouted form. The size-weight composition of the tagged fishes is shown in Table 3.

### Recapture of the Tagged Shovelnoes

During the period of sampling from the beginning of tagging till the end of 2002, seven shovelnoes were recaptured and one tagged specimen was captured twice (Table 4). They all belonged to the narrow-snouted form. The return of tags thus was 2.6% for the dwarf form. Questioning revealed at least three more captures of tagged shovelnoes by local residents, but no precise data for these captures were obtained.

Intervals from the first tagging of shovelnoes and their recapture were from three days to 22.5 months. Five specimens (nos. 0017, 0031, 0120, 0152, and 0208) were recaptured at an interval from 1 to 18.5 months in the area of tagging (at a distance not more than 0.5–2.0 km from the place of release). Of these, the shovelnose with tag no. 0017 was recaptured approximately 1.5 km downstream, and tag no. 0152 was found 2 km upstream from the site of tagging. Two shovelnoes (no. 0125 and no. 0129) made a rather long migration, about 15 km upstream, from Dostluk to Khatab. The intervals between tagging and recapture of these specimens were 1.5 and 16.5 months, respectively.

One shovelnose (no. 0242) captured and tagged at Dostluk was recaptured three days later at the place of its first release, and released again in the same place.



**Fig. 3.** Visual differentiation of two forms of the big Amu-Dar shovelnose *Pseudosaphirhynchus kaufmanni* by the shape of the snout: (a) wide-snouted form, (b) narrow-snouted form.

**Table 2.** Number of tagged specimens of the big Amu-Dar shovelnose

Years	Number of specimens										
	sites at the Amu Darya								altogether		
	Tashra-bat	Khatab	Dostluk	Surkhi	Atamu-rat	Astana-baba	Khalach	Palvart	both forms	wide-snouted form	narrow-snouted form
1999		13	69	6	30	23	9		150	13	137
2000		36	58	18	12	10	8	14	156	33	123
2002	3	21	27			17			68	4	64
1999–2000	3	70	154	24	42	50	17	14	374	50	324

**Table 3.** Length and weight of the body of tagged specimens of the big Amu-Dar shovelnose

Years	SL, mm			Weight, g		
	<i>lim</i>	<i>M</i>	<i>n</i>	<i>lim</i>	<i>M</i>	<i>n</i>
Wide-snouted form						
1999	144–335	235	13	21–240	98	13
2000	151–460	305	33	23–656	228	33
2002	224–325	254	4	65–186	106	4
1999–2000	144–460	283	50	21–656	184	50
Narrow-snouted form						
1999	123–265	183	137	13–102	41	137
2000	118–278	177	123	12–100	36	123
2002	157–267	205	64	23–119	58	64
1999–2000	118–278	185	324	12–119	42	324

Note: *lim*—range of values, *M*—mean, *n*—number of specimens.

**Table 4.** Recaptures in the Amu Darya of tagged specimens of the big Amu-Dar shovelnose

Tag number	Capture date	Capture site	Length, mm
0017	Apr. 7, 1999	Atamurat	189
	Oct. 21, 2000	"	200
0031	Apr. 8, 1999	Atamurat	166
	Sept. 15, 1999	"	—
0120	Oct. 28, 1999	Dostluk	186
	Jan. 13, 2000	"	—
0125	Oct. 28, 1999	Dostluk	200
	Mar. 11, 2001	Khatab	213
0129	Oct. 28, 1999	Dostluk	212
	Dec. 11, 1999	Khatab	—
0152	Feb. 20, 2000	Atamurat	131
	Apr. 17, 2000	"	136
0208	Apr. 14, 2000	Khatab	164
	May 18, 2000	"	165
0242	Nov. 14, 2000	Dostluk	157
	Nov. 17, 2000	"	—
	Sept. 28, 2002	Khatab	195

This shovelnose was captured for the third time in 22.5 months later, already at Khatab, about 15 km upstream.

Two shovelnoses (no. 0017 and no. 0125) recaptured about 1.5 years after the first capture manifested a comparatively small length increment, 11 and 13 mm, respectively. One shovelnose (no. 0242) recaptured almost two years after the first tagging (22.5 months) had a length increment of 38 mm. The age of this specimen, determined by the section of the first ray of the pectoral fin, was three years (3+) at a body length of 195 mm.

## CONCLUSION

The tagging results demonstrate that big Amu-Dar shovelnoses show different migratory activity: they either stay for a long time in the same stretch of the river or they make rather long migrations. The obtained data confirm that the narrow-snouted form of the big Amu-Dar shovelnose is characterized by an extremely slow growth rate under natural conditions. Having attained a length over 15 cm, the individual annual linear increment may not be more than 1.5–2 cm. In the

technical aspect, it is shown that light plastic T-shaped anchor type tags may be used for tagging comparatively small bottom rheophilic fishes living in rapidly flowing waters with suspended silt.

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