

Singh, L. A. K. (2000): Interpreting visual signs of the Indian crocodile. Crocodile Specialist Group Newsletter, 19(1), January 2000-March2000:7-9pp. with picture and Protocol inputs from [www.geocities.ws/laksingh33/croctracking](http://www.geocities.ws/laksingh33/croctracking) (concept and design by Lala A. K. Singh, 2000).

# **WESTERN** **ASIA**

## **India**

**INTERPRETING VISUAL SIGNS OF THE INDIAN CROCODILE.** The various signs that may be available in the field for interpretation are the spoor marks of head, body, tail and pug, the faecal pellets and feeding signs. From these field evidences an idea can be obtained about the sizes of crocodilians in the area.

Feeding signs for species identification:  
Feeding signs, particularly half-eaten fish, fish-heads and dead fish with jaw marks are often met with in the field. These are, however, difficult, except in exceptional circumstances, to interpret for size of crocodilians. This difficulty persists even when the gharial (*Gavialis gangeticus*) and mugger (*Crocodylus palustris*) are occurring in the same habitat although gharials have the characteristic long saw-like snout with finer teeth than the mugger. Only occasionally the jaw impressions on dead fishes are very clear when a fish had escaped the jaw-hold of a gharial.

Faecal pellets as field evidences: Faecal pellets are very seldom found for gharial as they defaecate mostly in water. Mugger pellets, however, are very common on the land. When pellets are in proper shape, an idea can be obtained about the size or age-class (juvenile, young adult, large adult, etc.) of the crocodilian.

Using head impressions for size estimation:

Head impressions on sand or mud can sometimes give an accurate measurement for the total body length of the animal. The length of the lower jaw is almost equal to the length of the head from snout-tip to the back of the post-occipital scutes in gharial and mugger. In gharial the body size is roughly five times this head length, and in the mugger it is about 6.5 times. In saltwater crocodile (*Crocodylus porosus*), it is also six and a half times.

Using hind pugmark for size estimation: The clear pugmarks are usually of the hind limbs because of quadruped locomotion. The hind pugmark is easier to interpret than the front pugmark, if present. The hind pug consists of four digits – three clawed and one soft and fleshy. On good substratum, the pugmark may even show the scute impressions from which an otter pugmark can be separated out. Otter will not have the scutes but have hairs. A pugmark selected for size interpretation must show the distance between the heel and the point up to the beginning of the claws. The length of the pug is about one twelfth to one fourteenth of the total body length in mugger. Gharial pugs are relatively small. The use of hind pugmark length for size estimation is more reliable in *palustris* than the use of tail scute length.

Using tail scute spoor for size estimation:

The most often met spoors in case of a crocodilian are the tail spoors. These show characteristic curved lines running parallel to each other. The space between two lines

indicates the size of a ventral tail scute. Measurements (length in mm) of at least two or three 'large' scutes are required to correctly interpret the size of gharials. The body length  $TBL = 53.6 + 62.7(\text{mean scute length})\text{mm}$ . A thumb rule for field workers is  $TBL = 70$  times the mean tail scute length (in mm) in case of gharial. The relationship has not been established in mugger and saltwater crocodiles. It is, however, approximately 65. The reason for this change from 70 to 65 appears to be related to the number of caudal scutes. In gharial, the number of such scutes is about 24 whereas, in mugger it is from 16-18, sometimes only 14, depending on a geographical race of *palustris*. Hence, the size of each tail scute in gharial is smaller than that of mugger. Therefore, the conversion factor for scute length to TBL is higher in gharial than mugger.

Distinguishing tracks of crocodilians, turtles and otters: The body spoor is a sure indication to determine the species when there is a possibility of confusion between gharial, mugger, otter and turtles. To a new observer the drag impression from a log of wood may appear as a crocodilian body drag. In such cases the tail spoor and pugmarks must be searched.

A crocodilian track (of a juvenile), a turtle track and an otter track may also appear similar to an untrained eye. Crocodilian body spoor is accompanied with the impressions of scutes from the body, tail and pugs. In a turtle track a tail drag may be there, particularly if it is a male, but the pug marks are spaced apart over a small distance and these draw two parallel impressions on either side of the body drag. In an otter, the tail drag may have a brooming effect due to the hairs, apart from the fact that the spoors due to moving pug are curved inside too much.

Tracks of 'high-walk' to distinguish gharial and mugger: For gharial and mugger, when a tail drag is without a body drag, it is that of a species that can perform a high walk. Gharials have weak limbs and cannot lift their body to perform a 'high walk'. Therefore, gharials must leave their body spoor along with the tail track. In habitats where gharial and mugger occur together it is a sure procedure to distinguish mugger tracks from the gharial. But, if a tail drag is accompanied with body drag, other visual indications are considered for species identification.

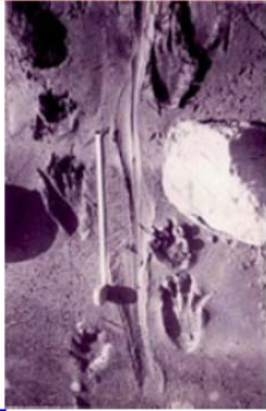
Application of these and similar visual indications should be developed on a species

specific basis for other crocodylian species. --  
Lala A.K. Singh, *Project Tiger, Similipal Tiger Reserve, Khairi-Jashipur, Orissa, India 757091*

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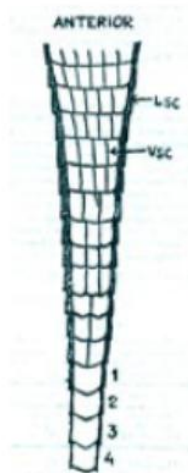
Using hind pugmark for size estimation:



mugger highwalk

shows tailspoor between rows of front and hind paw spoor.

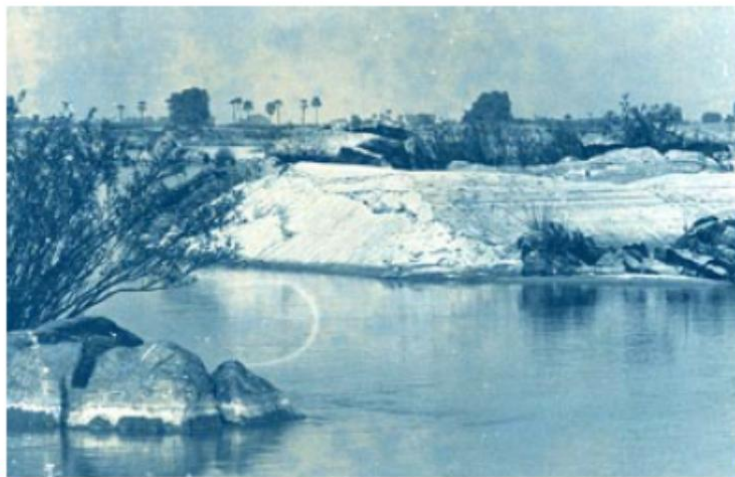
Using tail scute spoor for size estimation:



gharial:tail scutes in ventral view



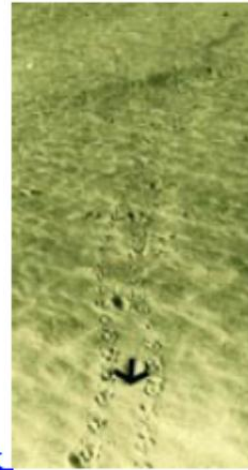
gharial tail spoor



gharial nesting site



[otter-track](#)



[freshwater turtle-track](#)

## Similipal Tiger Reserve: 2000 CROCODILE MONITORING

### What to look for

#### A. Basking crocodiles

Crocodiles, when left undisturbed, bask in the sun in the morning and afternoon.

During winter days, they may bask for entire day.

Basking sites: islands, slopy banks near deep water.

#### B. Signs for tunnels

Mugger crocodiles avoid very months and very hot seasons. They dig tunnels and enter into it.

These tunnels open into water and have narrow mouth. Height of the mouth may be about 30-60cm. These may be upto 5 meters deep.

#### C. Body spoor

When a crocodile comes out for basking on sand and returns back to water it will

Leave the marks of its body, tail and paws on the ground.

### Estimation of Body length

#### A. From Direct sighting

Mention approximate total length from eye-estimation.

#### B. Body size from tracks

##### (1) From hind paw mark

body length = approx. 14xpaw length



**(2) From tail mark**

From lines drawn by tail-drag:

When a crocodile basks on land, because of movement of tail it draws parallel

lines. The parallel lines are equal to the length of tail-scutes.

Body length =

approximately 65 times the maximum distance between two lines.

**What to record during the field work**

Date:----- River System: -----

Division-----Range-----Section-----Beat-----

Place	Body length	Number of crocodiles Directly seen	Number of crocodiles identified from tracks	Remarks: (mention, whether tail track or paw mark were used)