IUCN OTTER SPECIALIST GROUP BULLETIN
VOLUME 7 PAGES 2 - 4

Citation: **Hancox, M. (1992)** Some Key Factors in Breeding, Conservation, and Sociology of Otters *IUCN Otter Spec. Group Bull*. **7**: 2 - 4

SOME KEY FACTORS IN BREEDING, CONSERVATION, AND SOCIOLOGY OF OTTERS

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Abstract: With the almost universal decline of otter populations worldwide due especially to over hunting and habitat impairment, captive bred releases for local restocking, or to either augment numbers or enhance genetic diversity may become increasingly important. And yet, otters have proved to be surprisingly difficult to breed in captivity. Life history characteristics of eight species of otter are reviewed, and the evolution of their sociobiology suggested. Recent reintroductions have had a low success rate, with animals vulnerable to the same environmental pollutants as probably caused their extinction in the first place.

With the almost universal decline of otter populations worldwide due especially to over hunting and habitat impairment, captive bred releases for local restocking, or to either augment numbers or enhance genetic diversity may become increasingly important. And yet, otters have proved to be surprisingly difficult to breed in captivity. Harris (1968) remarked that "comparatively little is known about the breeding of the otter, and it would seem that the only forms to have been bred successfully in captivity are the European *Lutra lutra*, the North American *Lutra canadensis* and, recently the Indian smooth-coated otter *Lutra perspicillata.* N. American otters were apparently initially easier to breed successfully, but Philip Wayre's pioneering use of underground observation dens viewed through a window from a darkened hide proved a success for badgers, beavers, as well as perhaps the 1970 first European otter breeding since those born at London zoo in 1846 and 1856, of which two individuals lived for over six years (Wayre 1972, 1979, Flower 1931).

Table 1: Overview of life history features of eight otters

Otter	Longevity (captive)	Puberty	Gestation	Litter Size	Development
Lutra lutra	11 - 13 y	♀1.5 - 2 y	60 - 63 d	1 - 5	Eyes open 30 - 35 d Wean 15 wk Independent 1 y +
L. canadensis	13 - 23 y	♀2 - 3 y	245 - 380 d (delayed impl.) 60 - 63 d true?	1 - 5	Eyes open 30 d Wean 12 - 17 wk Independent 1 y
L. perspicillata	11 - 15 y		60 - 63 d	1 - 4	
L. maculicollis			60 - 63 d	1 - 4	
Pteronura brasiliensis	12.8 y		65 - 70 d	1 - 5	Wean 12 - 17 wk Independent after next litter
Aonyx capensis	11 y +	♀1 y	63 d	2 - 3	Eyes open 30 - 35 d Wean 10 - 12 wk Independent 1 y +
A. cinerea			60 - 64 d	1 - 6	Eyes open 40 d Wean 11
\enhydra lutris	19 y	♀4 y ♂5 - 6 y	120 - 365 d (delayed impl) 60 d true?		

The difficulties of breeding otters in captivity are hardly surprising, since even allowing for the gaps in knowledge of the eight best known species (Table 1), otter spacing and reproductive behaviour ranges from the solitary and territorial to "non-social" aggregations of sea otters 2000 strong; litters every six months or only in alternate years; and with or without delayed implantation in the two closely related-

holarctic species. Given that otters are long-lived; slow to achieve independence and puberty; and that the basic small-based territoriality of mammals must be adapted to an amphibious life style (Hancox 1988), it is nevertheless possible to discern an underlying pattern to the sociobiological prerequisites for successful captive breeding. The closest approximation to the ubiquitous single-sex territoriality of carnivores is seen in the European otter, where current Scottish work (Kruuk pers. comm.) suggests partly overlapping adult female ranges but defended core fishing areas plus breeding dens both in freshwater and marine environments, and adult males of differing dominance status defending their breeding "rights" over several female ranges. N. American otters probably have a similar social organisation, and it hence is not surprising that males may only rejoin older family groups sporadically when the females are less intolerant of their presence. By contrast, a progressive tendency towards greater paternal care and long term membership of more closely bonded family groups is shown at the Indian *Aonyx* and giant otters (Partridge 1991).

Ecological conditions may determine local behaviour adaptations, but there are remarkably little data on for example, breeding holt criteria in even the well-studied European otter, and although litters have been found in clumps of blackthorn or bramble, reedbeds or yellow flags; at high density or in northerly regions a more secure holt may be an essential defence against possibly infanticidal males, and cold, using suitable bedding material (Harper 1981, Mallinson 1978, Wayre 1979). Further studies of seasonally in breeding will doubtless show close links to water level or climatic factors in food availability, as with precocial pups of sea otter and the variable delay in implantation in both N. American otters. Body size and the latitudinal potential for rapid maturation as shown contrastingly by short-clawed and sea otters, are at opposite poles in terms of reproductive strategies.

Perhaps the most interesting question concerning otters is the evolutionary origins of their sociobiology. Loose aggregations may occur as a result of short term ecological conditions over-riding flexible territorially in European and N. American otters, while other groups may consist of immature or subdominant non-breeders, particularly males, evicted or on local migration in spot necked and sea otters. Sociality in carnivores has been attributed elsewhere to either cooperative hunting as in lions and wolves; or a defence of kills or against raptors as in mongooses foraging in loose packs diurnally for invertebrates. The large rafts of sea otters may conceivably serve to confuse cruising sharks; but amongst the less "social" breeding population, pups weakened by storms or starvation may be very vulnerable to bald eagle predation, amounting of 20 % of pup deaths in Amchitka. The related white-tailed eagle (*Haliaetus*) kills otters occasionally in Scandinavia and scavenges off the remains of otter prey, but surprisingly there appear to be no records of golden eagle attacks on coastal otters in Scotland even though they attack fox, wildcat, badger, marten and polecat, as well as wolf and lynx on the continent of Europe. Giant otter families may mob prowling caiman (Dunstone pers. comm.). There is very little evidence of cooperative hunting amongst otters either, although N. American females and cubs, and two families of Indian otters were reported herding fish into the shallows. Giant otters may similarly show cooperative fishing, although group members may merely benefit from confusion of the prey, just as pied kingfishers are commensal benefiting indirectly from Cape clawless otter foraging. Differences in foraging behaviour may have an alternative impact on sociality, however, since whereas giant and river otters {*Lutra*} catch very mobile fish prey with the mouth most efficiently via solitary hunting; prehensile hands and exploratory playful behaviour are epitomised by anvil and other tool use and relatively stationary favoured shellfish foods of *Aonyx* and sea otter. There is thus little food niche competition amongst the sympatric clawless and spot-necked otters and marsh mongoose in S Africa (Rowe-Rowe 1977). The development of sociality in otters may hence have arising almost by default, there being no selective pressures against group foraging, particularly on crabs or in muddy rivers in the tropics (Hancox 1988), quite apart from additive secondary advantages in reproductive strategies.

The importance of captive bred releases and translocation has so far been best demonstrated as regards the European and sea otters, but monitoring these projects has also revealed the inherent pitfalls. Reintroducing sea otters to parts of their former range has been partly successful, but only 31 out of 60 individuals in one translocation survived locally in 1988, and perhaps lethal levels of TBT anti-fouling boat paint were found in autopsies elsewhere (International Zoo News 206:37). The Otter Trust reared 30 European otter cubs between 1976 and 1981; four groups were released in East Anglia between 1983 and 1985 amounting to some 13 otters by 1988, which had in turn given rise to a dozen or so wild bred cubs. The decline of populations has been variously attributed to dieldrin and heptachlor pesticide in Britain, organomercury pesticide or pulp industry effluent in Sweden and elsewhere, and PCBs in Sweden and Oregon. Although there has been an improvement in water quality with the banning of the worst of the organochlorine pesticides, such toxins are still found in even Hebridean otters. Otters and

other mustelids may be particularly vulnerable to PCBs, and one unweaned Minsmere cub was probably already sterile via maternal contamination. Pollution may also present a hazard to populations as well as reintroduction schemes, in countries such as France, Greece, Holland, Italy, Portugal and Spain (Anon 1988, Chanin 1985, Jefferies 1988, Mason & Macdonald 1986).

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