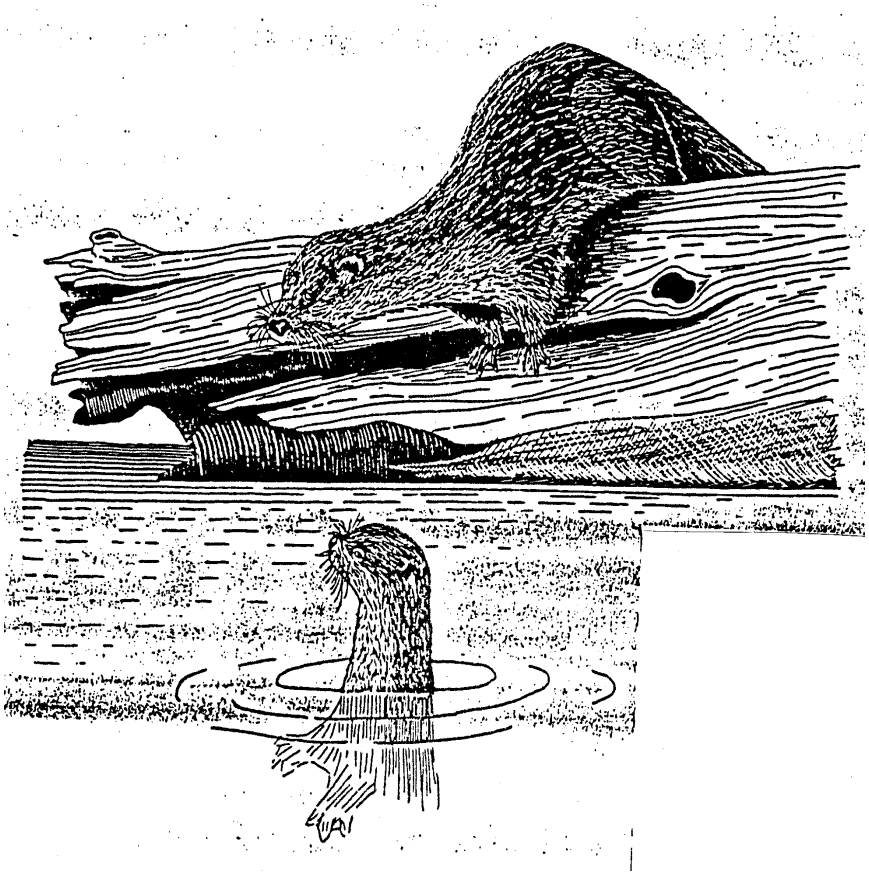
STATE OF COLORADO
RIVER OTTER RECOVERY PLAN

Revision of 1980, 1984, and 1988 Draft Plans



(Illustration from Tumlison and Shalloway, 1985)

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INTRODUCTION

A. Background

Free-ranging populations of river otter (*Lontra canadensis*) were extirpated from Colorado early in the 20th century. In 1973 the state directed the Colorado Division of Wildlife (CDOW) through the Colorado Wildlife Commission to begin protecting nongame, endangered and threatened wildlife via the Colorado Nongame, Endangered, or Threatened Species Conservation Act of 1973 (CRS 33-8-101-110). That act directed CDOW … "to manage all nongame wildlife for human enjoyment and welfare, for scientific purposes, and to insure their perpetuation as members of ecosystems; that species or subspecies of wildlife indigenous to this state which may be found to be endangered within the state should be accorded protection in order to maintain and enhance their numbers to the extent possible; this state should assist in the protection of species of wildlife which are deemed to be endangered elsewhere …".

To implement this policy the Wildlife Commission was directed to … "by regulation establish a list of those species and, where necessary, subspecies of wildlife indigenous to this state which are determined to be endangered within this state, giving their common and scientific names by species and, where necessary, subspecies." In addition the law provided that … "Except as otherwise provided in this article, it is unlawful for any person to take, possess, transport, export, process, sell or offer for sale, or ship and for any common or contract carrier to knowingly transport or receive for shipment any species or subspecies of wildlife appearing on the list of wildlife indigenous to this state determined to be endangered within the state".

The Colorado Wildlife Commission designated the river otter a state endangered species in 1975. The purpose of this document is to provide guidelines for restoring river otters to the state. Life history information will not be covered here as this information is well documented elsewhere (see Chanin 1985, Melquist and Dronkert 1987, Toweill and Tabor 1982).

B. Taxonomy and Genetics

Hall and Kelson (1959) reported 19 subspecies of *Lutra canadensis* (now *Lontra*) of which 3 were distributed in Colorado: *L. c. interior, L. c. nexa, and L. c. sonora.* Distribution boundaries for these subspecies did not appear to follow recognizable geographical or biogeographical features, and the

number of specimens for any of the subspecies was small. Van Zyll de Jong (1972) concluded from an extensive review of river otter systematics that the number of subspecies reported by Hall & Kelson (1959) and other taxonomists was not justified from the specimens. Van Zyll de Jong (1972) combined the 19 subspecies and 2 synonimized species (*L. mira*) into 7 subspecies. In his revised edition of *The Mammals of North America,* Hall (1981) follows the subspecies revisions of Van Zyll de Jong (1972). According to this new classification only 3 subspecies (*L. c. pacifica, L. c. lataxina, L. c. sonora*) were distributed in Colorado (Fig. 1).

The legitimacy of even these 3 subspecies has been questioned. Spicer (1987) reviewed the status of *L. c. sonora* in Arizona. He identified the problem of taxonomists who use multiple subspecies classifications because there are too few specimens to justify lumping, while there is also no way to obtain larger samples of specimens to test for legitimate subspecific status. For example, *L. c. sonora* was listed as occupying the entire Colorado River basin but was represented by only 3 specimens.

Of the 20 original subgroupings of Hall and Kelson (1959) the 3 subspecies which reportedly occurred in Colorado were represented by a total of 27 specimens of *L. c. pacifica, L. c. lataxina,* and *L. c. sonora,* collectively less than 4% of the total specimens on which the entire subspecies classifications were based. No doubt clinal variations occurred in river otters throughout North America. It is possible the anatomical differences among specimens used to designate subspecific status represented within species variation rather than distinctly different subspecies.

River otters from Minnesota, Michigan, Wisconsin, Newfoundland, Oregon, Washington, and Alaska have already been released into Colorado waters. Arizona has also released river otters from Louisiana into the Verde River. Utah obtained otters from Alaska and released them into the Green River near the Colorado border. It is doubtful that pure subspecific gene pools could be maintained even if original subspecies could be obtained for Colorado's recovery effort. These observations taken together indicate that recovery of river otters in Colorado is most realistically aimed at the specific rather than subspecific level.

Figure 1. Historic distribution of subspecies of river otter (*Lutra canadensis*) (Hall 1981:1032)

Guide to kinds

1. *L. canadensis canadensis*
2. *L.canadensis kodiacensis*
3. *L. canadensis lataxina*
4. *L. canadensis mira*
5. *L. canadensis pacifica*
6. *L. canadensis periclyzomae*
7. *L. canadensis sonora*
8. *L. canadensis annectens*

C. Distribution and Abundance

1. Historic Distribution and Abundance

There is sufficient evidence to suggest that river otters were probably present in most, if not all, major drainages in the state (Armstrong 1972, Cleland 1952, Warren 1942, Weber 1971). The American Southwest was trapped extensively for beaver (*Castor canadensis*) and river otter beginning in the late 18th century and over exploitation of both species was reported by 1830 (Cleland 1952, Polechla 2000, Weber 1971).

Most of the river otter collected in the state were sold to the commercial fur trade. Although never numerous, river otter pelts were high-priced and aggressively sought by trappers. Comparative prices from 1805-1810 at the Arkansas Post were: otter - $2.56, beaver - $2.48, black bear - $1.29, white-tailed deer - $0.73, red wolf and mountain lion - $0.50, fox - $0.21, and bobcat and raccoon - $0.19 per pelt (Polechla 1987).

Populations had been drastically reduced by the late 1800's, when the bulk of the zoological work was done in the West. Perhaps because of their commercial value and early population decline very few otters were collected for museum specimens. Since river otter were taken incidental to beaver trapping (Polechla 1987) their original distribution had also been altered considerably by the time intensive zoological investigations were begun.

The last confirmed river otter in Colorado was taken by trapper Nat Galloway in the lower canyon of the Yampa River in 1906 or 1909 (Evans and Belknap 1973). River otters continued to be reported from the canyons of the Colorado Plateau in Utah until the late 1930's (Gregory 1938, Kolb 1937).

2. Current Distribution and Abundance

Between 114-122 river otters were reintroduced to Colorado waters at 5 sites between 1976-1991 (Fig. 2). Appendices A-F provide details of the reintroduction efforts, including an explanation of uncertainties associated with numbers released. Reintroductions were made in Cheesman Reservoir (4 individuals released), the Gunnison River (22 individuals released), the Piedra River

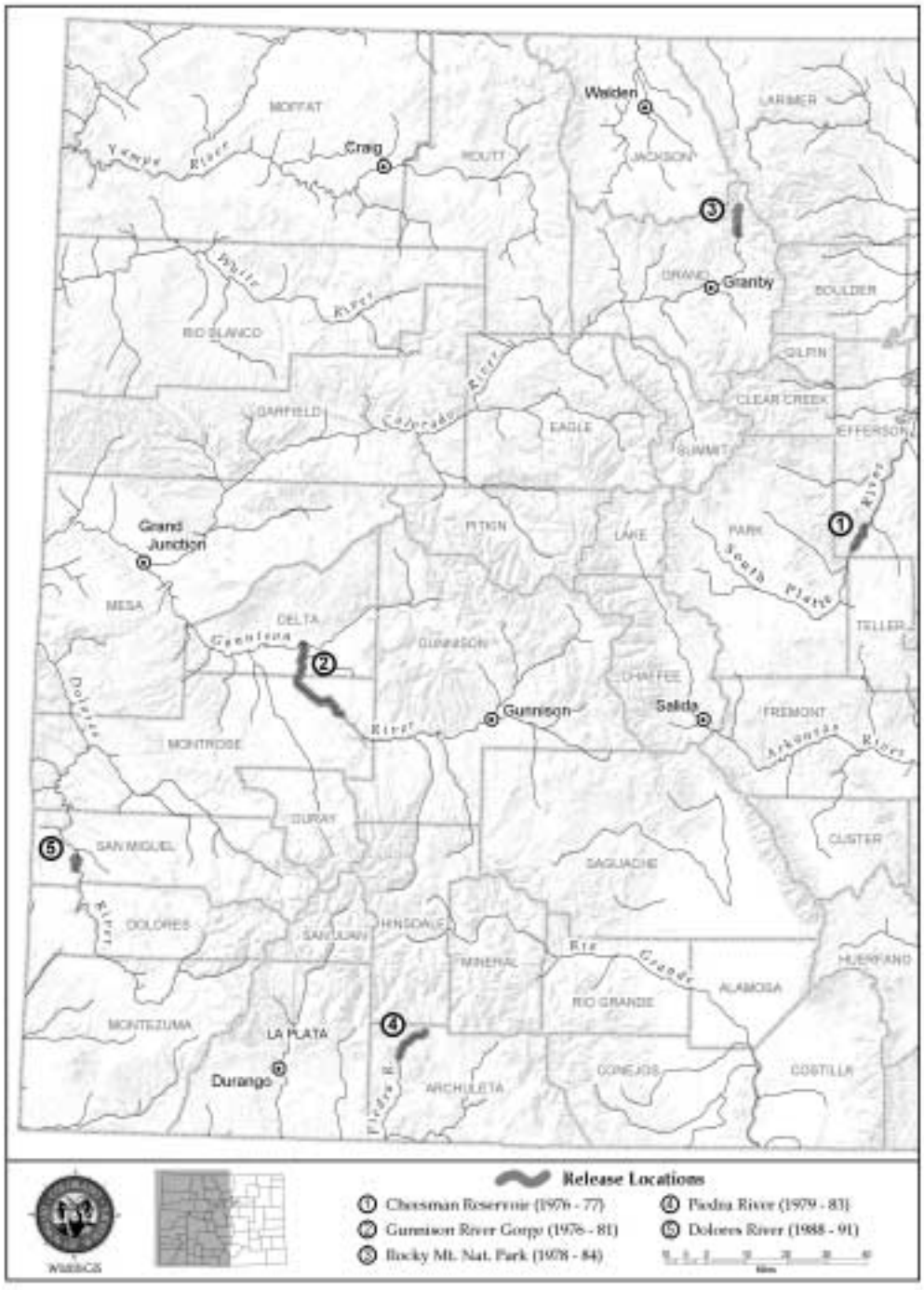
(between 16-24 released), Rocky Mountain National Park (45 individuals released), and the Dolores River (27 individuals released). In addition, Utah Department of Wildlife Resources released 67 river otters into the Green River, Utah, near the Utah/Colorado border, and river otter from that effort have made their way into Colorado in both the Green and Yampa rivers.

These releases of river otter have resulted in sightings of river otter in various state waters. Individual river otter have been reported from the headwaters of the Colorado River to the Colorado-Utah Stateline, the Roaring Fork River, the Eagle River, the Fraser and Blue Rivers, the Yampa and Green rivers, the Gunnison River, the Piedra-San Juan river complex, the Dolores River, the San Miguel River, the Illinois and Michigan rivers in North Park, as well as the Cache la Poudre, Laramie, and South Platte rivers.

Based on the numbers of sightings over long periods of time post-release as well as on recent surveys, it appears that river otters have established breeding populations in the headwaters of the Colorado River, the Piedra-San Juan River complex, the Dolores-San Miguel River drainages, and the Gunnison River. It also appears that river otters are established in the lower Yampa River and the Colorado portion of the Green River as a result of the Utah reintroduction. Summaries of recent survey efforts and results are included in Appendix H.

Absolute numbers of river otters in Colorado are unknown because a reliable inventory protocol has not been developed. There were intensive post-release evaluations of two reintroductions. Mack (1985) monitored the Rocky Mountain National Park release on the Colorado River and reported that only about 25% of the 57 river otters received for reintroduction survived the 4-year study period. Beck (1992) monitored the Dolores River release. Survival through the first three months was about 60%.

Figure 2. Locations of river otter reintroductions from 1976-1991.



D. Reasons for Population Decline

Trapping was most likely the predominant cause of river otter population declines in Colorado coupled with habitat degradation and loss. When the Native Americans were resettled to reservations around 1882, western Colorado was rapidly settled by thousands of miners, farmers, and ranchers with hundreds of thousands of livestock. River otter populations surviving into the late 1800's then faced major changes in aquatic habitats with hard-rock mining booms and subsequent agricultural dewatering of rivers.

Mack (1985) listed … "poor water quality, stemming from acid minewaste, and a high otter mortality incidental to beaver trapping in the 1900's …" as probable reasons for the disappearance of river otters from Colorado habitats. It is likely that the cumulative effects of over-exploitation and human impacts on both the quality and quantity of state waters resulted in extinction of Colorado river otter populations.

RECOVERY

A. Criteria

CDOW's goals are to reach state down-listing from Endangered to Threatened by 2005 and de-listing by 2010.

Recovery criteria should be considered dynamic. It is currently difficult to obtain accurate population estimates or even reliable indices of river otter population size, therefore a specific population objective is not verifiable. The recovery criteria account for these data collection constraints. An index based on extent of occupied habitat is currently the best available approach for developing goals. Efforts will be underway to develop better techniques for estimating population size; when those techniques are developed these criteria will be closely reviewed and modified if necessary.

Down-listing Criteria (from State Endangered to State Threatened):
The river otter will be considered for down-listing from Endangered to Threatened status when three populations are established on separate rivers, each of which meet the following criteria:

1. River otters occupy a minimum of 50 kilometer (km) (31 miles) of contiguous stream length.
2. River otter sign is present in each 5 km (3.1 mile) section of the 50 km (31 mile) stream length during the survey year, with the exception of up to a total of 10 km (6.2 miles) of unsuitable/unoccupied stream reaches, or reaches where surveys cannot be conducted.
3. Surveys conducted 5, 10, and 15 years after reintroduction indicate population persistence on each recovery stream. (If surveys were not conducted 5 or 10 years post-release, criteria met at 15 years post release would indicate population persistence.)
4. There are documented sightings of river otters on at least 2 connected tributaries or on an additional 15 km (9.3 miles) of the recovery stream outside of the 50 km (31 miles) occupied length.

Recovery Criteria (Removal from State Threatened list):
The river otter will be considered for de-listing from Threatened, and placed in the Species of Special Concern category for a minimum of 5 years, when three self-sustaining populations are established, each of which meets the following criteria:

1. River otters occupy a minimum of 120 km (74.6 miles) of contiguous stream length.
2. River otter sign is present in each 5 km section of the 120 km (74.6 miles) stream length during the survey year, with the exception of short sections of unsuitable/unoccupied stream

reaches or reaches where surveys cannot be conducted, up to a total of 20 km (12.4 miles) in length.

3. Surveys conducted 5, 10, and 15 years after reintroduction indicate population persistence on each recovery stream. (If surveys were not conducted 5 or 10 years post-release, criteria met at 15 years post-release would indicate population persistence.)
4. There are documented sightings of river otters on at least 3 connected tributaries or on an additional 20 km (12.4 miles) of the recovery stream outside of the 120 km (74.6) occupied length.

The average population density for otter in Idaho was found to be one per 3.9 km (2.4 miles) of waterway (Melquist and Hornocker 1983); findings from studies in Rocky Mountain National Park surveys are consistent with these results (Berg 1999). Establishing sign in each 5 km (3.1 miles) river segment during a continuous survey would indicate a minimum of 1 otter per segment. Persistence through the 10- and 15-year surveys will imply reproductive success. Documented sightings in adjacent drainages would indicate dispersal and possible range expansion. Monitoring efforts should then be made in these other areas to establish utilized range of river otters.

The recovery populations should be established in separate drainages to provide some protection from large-scale ecological disturbance; however, it is also desirable to have the 3 populations in the same basin. River otters dispersing long distances from one population would have a much better chance of establishing into a contiguous population. Selection of release sites should be directed by minimum areal requirements for a viable population (estimated at 120 km of river) and reasonable proximity to other release sites which is estimated at no more than 300 km (186.4 miles) of river distance between populations (Beck pers. comm.).

B. Approach: Step-down Outline

The following 6 steps provide the basic direction for meeting the recovery criteria. Each step is described in more detail in Section C below.

1. Monitor population presence and distribution at least 5, 10 and15 years post-release.
2. Develop a statewide river otter observation recording system and database.
3. Develop a system for evaluating potential river otter reintroduction sites.

4. Release a minimum of 30 river otters (15 males and 15 females) into each reintroduction site prioritized in Step 3 above.
5. Develop management procedures to minimize conflict between beaver control operation and river otter recovery and conservation efforts.
6. Develop and implement a river otter recovery public education and information program.

The recovery criteria could be met after completing Step 1, but may also not be reached until completing Step 6. Reintroductions made after the recovery criteria are reached would not necessarily require the same intensity of post-release monitoring as those that support the recovery criteria. Experience gained by meeting the recovery criteria will provide the basis for developing a river otter management plan. A management plan will be developed after the species is de-listed and prior to being taken off the Species of Special Concern list.

C. Approach: Narrative

1. Monitor population presence and distribution at least 5, 10 and 15 years post-release.

Distribution and persistence of introduced river otter populations will be monitored at 5-year intervals. The 5-year monitoring will indicate the suitability of the site for adult survival (ie. if no river otter remain at the site then it is likely that some component is critically lacking). Given the normal survival rates of adult river otters in the wild, it is reasonable to assume that the persistence of river otters for 10 and 15 years is a strong indication of successful reproduction and survival, especially if the entire river stretch is inhabited. The 15 year monitoring surveys should extend to river reaches adjacent to the 50 or 120 km cores and to neighboring drainages to document successful dispersal.

Five previous reintroduction sites will be inventoried:

1. Gunnison River (Otter released: 1976-1981)
2. Upper Colorado River (Otter released: 1978-1984)
3. Dolores and San Miguel Rivers (Otter released: 1988-1991)
4. Piedra-San Juan-Navajo-Pine and tributary streams (Otter released: 1979-1983)
5. Yampa and Green Rivers (Otter released: 1989-1992 by Utah on Green River)

Three of these sites (Gunnison River, Upper Colorado River and Piedra-San Juan-Navajo-Pine and tributary streams) may meet down-listing criteria since it has been more than 15 years since the reintroductions there. The remaining two sites (Dolores, Yampa and Green River) are 11-12 years post-release and would still need to be surveyed again at 15 years post-release. If any site does not demonstrate active river otter sign in each 5 km segment, that site will be analyzed to determine the factors contributing to population failure (e.g. insufficient number, inadequate sex ratio, marginal habitat, excessive mortality from uncontrollable sources, etc.). This analysis will help to determine whether more river otter should be released into these sites. Summary of recent survey efforts, as of 2002, is included in Appendix H.

Surveys for river otter signs (tracks, scat, slides, dens, prey remains, scent mounds and others) should be conducted during the early spring prior to either bank vegetation green-up or peak run-off flows in most rivers (Polechla 1987). This is the period when accumulated scat is most easily observed and when river otter are most active. Although winter surveys are intuitively appealing, experience on the Dolores River with radio-telemetered river otters indicates the river otters may use bank beaver dens for shelter and hunt under the ice, often going weeks without leaving any surface sign of their presence. In contrast, work in Rocky Mountain National Park indicates winter surveys can have local utility. Supplemental surveys at times other than early spring will be attempted as personnel are available; however, they will not replace spring surveys. Mid-summer surveys can be conducted on the Yampa, Green, and lower Colorado rivers once the discharge stabilizes at low flow levels. These river stretches have extensive sandbars that facilitate track surveys at low flow.

Each survey area will be delineated on maps and each river marked at 1 km intervals, with the initial measurement beginning at the mouth of the river or the state-line (River Kilometer 0 or RK 0). The specific areas for survey will be selected based on initial release site and subsequent sightings. This may involve several distinct drainages in close proximity. All sections of the river that cannot be surveyed because of private property issues or physical inaccessibility should be marked on the maps. Both banks should be examined continuously for river otter sign either by walking, or boating and using binoculars.

Presence or absence of sign and the specific evidence, as well as any actual sightings, should be recorded when seen. A Geographic Positioning System (GPS) will be utilized to gather the Universal Transverse Mercator (UTM) locational data. Photographs, using print film, should be

taken of all separate river otter track sets. Field notes will include: date, river surveyed, river kilometer, datum, UTM zone, UTM Easting (X value), UTM Northing (Y value), sign by type, comments, observer's name, whether or not scat was collected, number of samples of scat collected.

Crews will receive appropriate training in the recognition of river otter sign prior to surveys. Once started, a survey should be completed on consecutive days to reduce the impact of a single roaming river otter.

2. Develop a statewide river otter observation recording system and database.

A computerized database will be developed and maintained by the CDOW using software and database structure compatible with other CDOW species data base systems. A standard operating procedure (SOP) for data entry protocol will be developed. A rating system will be developed to quantify the reliability of the sightings. A proposed sighting form is presented in Appendix G. All sightings will be provided to the database administrator to establish sighting reliability and to ensure entry into the database.

3. Develop a system for evaluating potential river otter reintroduction sites.

A habitat evaluation SOP will be developed based on characteristics of the environments where river otters appear to be doing well in Colorado as well as information on river otter habitats from both the literature and personal contact with other biologists doing reintroduction work. In general, high prey biomass with predicted future stability, good water quality, dense bank cover, large contiguous blocks of suitable habitat, and minimal mortality sources such as roads, domestic dogs, and beaver trapping characterize good otter habitat. These factors, especially the need for large, connected blocks of habitat, usually favor low-elevation rivers rather than high elevation sites. Available information on historical distributions will also be considered. The system will be field-tested for repeatability and refined so that users trained in the use of the SOP will arrive at comparable ratings. The end product of the evaluation will be a qualitative classification of Colorado waterways into functionally meaningful habitat categories.

4. Release a minimum of 30 river otters (15 males and 15 females) into reintroduction sites prioritized in Step 3 above.

Assessment of the need for more releases should await the results of monitoring the 5 previous reintroduction sites for distribution and persistence of river otter activity. If this monitoring shows failure to reach recovery criteria, and analysis shows that a different site might be better, an appropriate new site or sites should be chosen from those evaluated by the system developed in Step 3 above. Releases should be made at as many appropriate sites as allowed by financial constraints. Efforts should be made to obtain all river otters for release in one year; source of otters is not a major consideration as long as all are North American subspecies.

Reintroductions should involve the release of a minimum of 30 river otters, although 40 would be better. Based on observed mortality and birth rates, a population starting from 40 animals would be 40% larger after 5 years than one starting from 30 individuals (Beck 1993). The faster a population can increase, the less impact incidental mortalities are to the reintroduction program's success.

River otters have demonstrated a remarkable adaptability to habitat in reintroductions. For example, coastal river otters from Alaska were released into the Green River, a high desert river of Utah (Maxfield, pers. comm.) while Louisiana river otters have been released throughout the upper MidWest (Iowa, Missouri, Illinois, Indiana, Tennessee, Pennsylvania). All reintroductions that have been in place long enough for evaluation appear to be successful in establishing river otter populations (Raesly 2001). It appears to be more important to obtain adequate numbers of animals during a short time period than to match genetics or habitat types.

Methods and equipment for trapping source river otters should be carefully examined to avoid injuries to animals (Serfass et al. 1996). All animals should be released at one site and selection of site should consider remoteness from mortality sources as a primary factor. Specific handling and transfer protocols will be developed and approved through CDOW's Animal Care and Use Committee and will conform to Animal Welfare Act and International Air Transport Association directives.

5. Develop management procedures to minimize conflict between beaver control operation and river otter recovery and conservation efforts.

The risk of fatal non-target captures of river otter during beaver control activities is much reduced since the restrictions on trapping equipment were enacted in 1996. Beaver trappers on public land must use live capture traps so river otter can be released. On private lands, landowners can use leg-hold, snares and kill-type gripping traps for a single 30-day period each year. If river otter recovery zones involve significant amounts of private land where beaver conflicts have historically occurred, then CDOW should provide landowners with modified equipment designed to minimize capture of river otter or allow for release. Such modified equipment includes snares with stops installed to restrict closure and conibear-type traps with modified trigger assemblies, such as those designed by John Kulish of Oconto, WI; as well as live traps (such as Bailey traps, BreatheEasy, Hancock). Initially, cooperation should be sought from landowners through the incentive of CDOW providing the equipment. If this does not work, appropriate regulations could be enacted for the release area.

6. Develop and implement a river otter recovery public education and information program.

It is important to maintain high public interest in the river otter recovery program to obtain public support - both financial and political – throughout the lengthy recovery period. A program will be designed to

a. Keep the public informed of the progress toward recovery,
b. Involve potentially affected interests in the recovery decision process,
c. Educate the public in the ecology and life history requirements necessary to retain viable populations of river otters in Colorado waterways. This part of the recovery program will be closely coordinated with CDOW's Watchable Wildlife Program.
d. Provide educational materials to address landowner/otter conflicts and legal options to reduce those conflicts.

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APPENDIX A

HISTORY OF CHEESMAN RESERVOIR RIVER OTTER REINTRODUCTIONS

Cheesman Reservoir is an 875-acre impoundment on the South Platte River. It had restricted public access, which was controlled and limited by the Denver Water Board. Goose Creek, Turkey Creek, and the S. Platte River are the major tributaries and have some open water year-round.

On 9 July 1976, 3 juvenile river otters (1 male, 2 females) from Oregon were released at the mouth of Turkey Creek. In March 1977 an adult female river otter from Oregon was released on the reservoir at Thickskin Gulch. An adult male river otter died prior to release.

Although there are year-round caretakers living at the reservoir, no subsequent sightings of river otter ever were reported or recorded. A single record of a river otter sighted 6 mi. upstream from the reservoir in the S. Platte River is the only evidence of river otter survival from these releases. An extensive 3-month survey of the reservoir and major tributaries was conducted in 1981 but no sign of river otters was found.

Subsequent experience with translocating river otters clearly indicates high mortality of juveniles. The combined effects of stress and abnormally abbreviated maternal/offspring bond likely contribute to the high mortality observed. Given that a small number of river otters was released, that 3 of the 4 released otters were juveniles with a tendency to disperse, and that intensive follow-up searches revealed no otter sign, it is safe to assume that this release has not resulted in a viable river otter population.

APPENDIX B

HISTORY OF RIVER OTTER REINTRODUCTIONS INTO GUNNISON RIVER

The Gunnison River site was the second area where river otters were reintroduced to Colorado. The core of the release area was a 27-mile segment through the Black Canyon of the Gunnison National Monument (13 mi.) and the Bureau of Land Management (BLM) administered Gunnison Gorge (14 mi.). The area was believed to have low human use and an abundance of forage fish. Bank access is limited by the steep canyon walls. River otters were first released into the area on 22 August 1976 (Table 1B.).

Whereas the initial strategy was to release river otters throughout the 27-mile core release area, the actual choice of release sites did not conform to that strategy. The first 10 river otters were released at the lower end of this core area (RM 72.7-73.5), (Table 1B.). The next 12 animals were released at the upper end of the area near RM 99.9, at a point just upstream of the Gunnison Tunnel diversion. Water from the Gunnison River is diverted through this tunnel for 6 miles to the Uncompahgre Valley, where it is distributed through a series of canals to farmland.

In the 2 years following the first release, 13 river otters were observed. Eleven were up to 5 mi. downstream of the first release area (the confluence of the Gunnison and N. Fork of the Gunnison Rivers), while 2 were reported from the N. Fork Gunnison (5 and 8 mi. upstream). River otter sightings were reported in 1979 and 1980 from much lower in the Gunnison River (RM 49, 36, 29). It is apparent that a significant portion of the animals released downstream in the core area dispersed further down the Gunnison River while at least 1 went up the N. Fork Gunnison.

The river otters released upstream near the Gunnison Tunnel also moved downstream. Two high concrete dams and their reservoirs restricted upstream dispersal. In August 1978 an adult river otter was observed in the South Canal 5 mi. east of Montrose. The South Canal is the terminus of the Gunnison Tunnel. Three records in 1979 include 2 from the Uncompahgre River between 10 and 20 miles south of Montrose and another in a canal 8 mi. north of Montrose. The 2 records in 1980 were from 1 mi. south of Montrose on the Uncompahgre River and in the Loutsenhizer Ditch 4 mi. north of Montrose (this ditch also connects to Gunnison Tunnel terminus). The rapid appearance of river otters in the canal system and the Uncompahgre River upstream of Montrose suggests that these river otters probably came through the Gunnison Tunnel.

Some river otters did enter the core area as evidenced by the regular sightings reported from the Gunnison Gorge from 1984-88. Sightings on the Uncompahgre River near Montrose (RM 25) still occur regularly. A survey of the Gunnison River from RM 72.7 down to RM 31 in January 1988 found river otter sign (tracks, scat, prey remains) in every mile from RM 72.7 down to RM 63.8. No sign was found below RM 63 with snow cover on both banks. BLM employees reported a female river otter with 3 young on 3 July 1988 at RM 75.0, the first confirmed evidence of reproduction.

Two river otters also appeared in the Colorado River about 40 miles downstream of the Utah-Colorado boundary in 1986. Sightings continued to occur throughout 1987 and 1988. It is plausible that they came from the Gunnison release as Utah DNR personnel do not believe there was a native river otter population in the area.

Dispersal undoubtedly reduced the effectiveness of this reintroduction, since instead of having 22 river otters released into a 27-mile core area, 22 animals were spread throughout 2 river systems covering over 150 miles. In addition, the trapping restrictions placed into effect in 1976 extended only from RM 99.9 downstream to RM 63.4 and 5 miles of the lower N. Fork Gunnison. As the river otters moved beyond the restricted areas, some were killed in traps (Table 2B).

Another unknown factor in this release was the sex of animals released. Sex was not recorded for 13 animals and our experience, and trapping data from other states, shows that males are more easily trapped than females. Thus it is possible that this release site could have had too few females too widely dispersed for effective reproduction. However, the continued existence of some river otters in the Gunnison Gorge and downstream 10 miles suggests the habitat is adequate to support a population. The Gunnison River should be considered as a potential candidate for additional river otter releases.

Table 1B. River otter release records, Gunnison River, 1976-1981.

Date	# Males	# Females	# Unknown	Release	Origin
08/22/76			6	Gunnison R. RM 72.7	Wisconsin or Newfoundland
09/23/77			2	Gunnison R. RM 73.5	Wisconsin
09/27/77			2	Gunnison R. RM 73.5	Wisconsin
10/??/77			2	Gunnison R. RM 99.9 (East Portal)	Wisconsin
10/19/77	1	2		Gunnison R. RM 99.9	Wisconsin
10/28/77	1			Gunnison R. RM 99.9	Wisconsin
11/01/77		1		Gunnison R. RM 99.9	Wisconsin
08/17/79		1		Gunnison R. RM 99.9	Washington
09/26/79	1			Gunnison R. RM 99.9	Wisconsin
10/31/79			1	Gunnison R. RM 99.9	Wisconsin
09/30/81		1		Gunnison R. RM 99.9	Wisconsin
10/24/81	1			Gunnison R. RM 99.9	Wisconsin
TOTALS	**4**	**5**	**13**		

Table 2B. Recoveries of river otter from Gunnison River releases, 1976-88.

Date Recovered	Sex	Location	Cause of Death
06/??/79	Unk	Gunnison R. RM 94.5	Unk. Found dead on shore by fishermen
03/10/80	F	Uncompahgre R. RM 26.0	Trapped in 1½ Victor, clubbed to death by trapper
03/??/81	Unk	Gunnison R. RM 80.5	Unk. Found dead on shore by fishermen
12/??/82	M	Surface Cr. 3 mi. N. of Gunnison R. @ RM 60.8	Conibear trap set for beaver.
01/??/86	Unk	Gunnison R. RM 51.0	Found frozen in duck ponds near river, suspect shooting
12/10/87	F	N. Fk. Gunnison R. 28 mi. upstream from confluence with Gunnison R.	Conibear trap set for beaver

APPENDIX C

HISTORY OF RIVER OTTER REINTRODUCTIONS INTO PIEDRA RIVER

Release of river otters into the Piedra River drainage was first formally proposed by CDOW in October, 1975. Since most of the proposed release site was within the San Juan National Forest, an Environmental Assessment Report (EAR) was jointly prepared by the agencies and approved in September, 1978. CDOW personnel believed the suitable habitat was upriver from the Highway 160 bridge (RM 15.7) because of extensive riverbed alterations downstream. The release area included 21 miles of the Piedra River and the lower stretches of First Fork, Sand, Weminuche, and Williams Creeks. A density of 1 river otter per 5 miles of river was called for in the EAR, which would have resulted in 10 animals in 50 miles of habitat. This structure will not support a long-term, viable river otter population.

Trapping restrictions were placed on the East and Middle Forks Piedra River above Highway 160, the lower 9 miles of First Fork, and the lower 9 miles of Sand, Weminuche, and Williams Creeks in 1978. These restrictions prohibited the use of #3 leghold or larger steel traps and 220, 330 and larger conibear-type traps within 40 yards of the highwater line.

The first river otters were released into the Piedra River in October, 1979. Incomplete and/or lost records make it unclear how many animals were released. Available records only account for 11 river otters being released (Table 1C). However, internal CDOW reports and correspondence stated that at least 10 were released in 1979 and at least 12 were released by 1981. It appears that 3 were probably released in 1979, for which we no longer have records.

In a draft recovery plan for CDOW, Goodman (1984) reported that a total of 24 river otters were released into the Piedra River during 1979-83. There is only 1 record of any release after 1980, and that was of 4 animals released on 8/17/82. Supposedly, 5 were shipped from Granby so it is assumed 1 died enroute to the Piedra. Whether the "missing 8" were released is unknown. Conversations with retired District Wildlife Managers for the area did not confirm the release of 12 animals after 1980, and no written record can be found except for the 4 released in 1982. In summary, between 16 and 24 river otters were released into the Piedra River during 1979-83 and 3 mortalities were recovered. One mortality occurred within 24 hours of release, 1 occurred at release, and no written record of the third can be found.

Of the 12 river otter recorded, only 5 were marked in some way. The male released on 9-24-80 was tattooed on the inside of his right cheek with the letters PO. The 2 females released on 8-17-82 were ear-tagged with metal tags (#12, #13) as were the 2 males released on that date (#17, #15 and #16 in 1). These 5 animals were also measured (Table 2C).

Reported observations of river otters and signs have been limited (Table 3C). Low numbers of observations can be attributed to limited access at river level, few systematic searches, low human density, and no convenient way to report sightings such as a drop-box at a campground. The section from RM 19 to RM 36 is also difficult to adequately search.

No dead river otters have been reported since 1983. More recent observations suggest river otters inhabit the Piedra River from Navajo reservoir upstream at least 27 miles. Possibly some observations have been made and reported, but no record made. The only record of reproduction was the observation of a single juvenile river otter at RM 36.2 on the Piedra River made by a CDOW employee on 1 and 9 July 1987.

Table 1C. River otter release records on Piedra River, 1979-83

Date	Number Males	Number Females	Number Unknown	Location of Release	Origin
10/04/79		1		RM 26.0, Piedra R.	Wisconsin
10/19/79	1		2	RM 26.0, Piedra R.	Wisconsin
10/24/79			1	RM 26.0, Piedra R.	Wisconsin
11/03/79			1	RM 22.5, Piedra R.	Wisconsin
09/24/80	1			RM 30.2, Piedra R.	Wisconsin
08/17/82	2	2		Williams Cr., 1 mi. below Reservoir	Wisconsin

*Note: This table only includes known records of released otters; incomplete or lost records make it unclear as to total number of animals released.

Table 2C. Selected measurements of river otters released into Piedra River

Tag No.	Date	Sex	Wt. (kg)	Total Length (cm)	Tail Length (cm)	Chest Girth (cm)	Neck Girth (cm)	Head Girth (cm)
PO tattoo	09/24/80	M	5.9	113.0				
17, ear	08/17/82	M	2.0	82.0	32.5	25.8	19.2	12.3
15 & 16, ear	08/17/82	M	3.0	85.0	30.0	28.5	20.4	12.8
13, ear	08/17/82	F	3.6	87.0	28.0		22.5	12.0
12, ear	08/17/82	F	3.2	84.0	26.0	33.0	21.0	12.0

Table 3C. River otter observations on Piedra River and nearby waters, 1979-88.

Date	Observation	Location	Made by
06/??/80	2 river otters	Inlet at Williams Cr. Res.	CDOW
06/??/80	1 river otter	William, Cr. Res.-boathouse on W shore	CDOW
06/??/80	2 river otters	Piedra R. RM 30.2	Unknown
06/??/80	1 river otter	Piedra R. RM 26.0	CDOW
Fall/86	1 river otter	Piedra R. RM 16.0	Unknown
05/??/87	1 river otter	Piedra R. RM 6.7	CDOW
??/??/87	1 juv. river otter	Piedra R.	CDOW
07/06/88	1 river otter	Navajo Res. Elves Canyon, N.M.	Unknown
07/15/88	1 river otter	Navajo Res. 2 mi. SE Arboles Marina	Sportsman
07/18/88	1 river otter	Navajo Res. E. shore, near state line	Unknown
07/31/88	1 river otter	Navajo Res. Arboles State Park	Sportsman
10/02/88	1 river otter	Piedra R. RM 26.4	CDOW
04/26/88	1 river otter	Los Pinos River, N. of Hwy 251 Bridge	CDOW

CITATIONS

Goodman, P. 1984. River otter (*Lutra Canadensis)* recovery plan. Unpubl. Rep. Colo. Div. Wildl. Denver, Colo. 24 pp.

APPENDIX D

HISTORY OF RIVER OTTER INTRODUCTIONS INTO ROCKY MOUNTAIN NATIONAL PARK - NORTH FORK OF THE COLORADO RIVER

Personnel at Rocky Mountain National Park (RMNP) first proposed reintroducing river otters into the Kawauneeche Valley on the North Fork Colorado River (NFC) in 1973. Initial attempts to obtain animals were unsuccessful in 1974 and 1975. In 1976 the CDOW joined the RMNP effort as a full cooperator.

The North Fork Colorado River is 30.3 miles long from its headwaters at LaPoudre Pass Lake (elev. 3,135 m/10,190 ft.) down to Shadow Mountain Lake (elev. 2,578 m/8,380 ft.), nearly all within the boundaries of the national park (Fig 1D). The Kawauneeche Valley is a broad valley where the river meanders a great deal and several tributary streams come in. Beaver ponds and willow (*Salix* spp.) thickets cover extensive areas. There are 16.5 miles of the NFC in the 8.8 mi long valley with a gradient of 30 ft/mi. The 5.8 miles of river above the valley has a gradient of 188 ft/mi while the 8.0 miles below drops 28 ft/mi. No trapping restrictions were placed on any of the streams in the area as it was assumed that most of the river otters would stay within RMNP boundaries.

Fifty-eight river otters were obtained for release into RMNP between 1978 and 1984, of which 45 actually were released or escaped into the area. Four river otters (1 male, 3 female) escaped from pens in Ft. Collins (1 in 1982, 3 in 1983). Seven animals died while in captivity prior to release (3 male, 3 female, 1 unknown) and 2 females were donated to zoos because of severe trap injuries. Two river otters, sex unknown, escaped from holding pens in Shadow Mountain Lake in 1982, so they were counted toward the reintroduction effort. Forty-three river otters were released into the Valley, and 28 of those were instrumented with radio transmitters (Table 1D).

Standard measurements of 37 of the released river otters were recorded and are summarized in Table 2D. Measurements included weight, length of body and tail, and girth of chest, neck and head.

There have been 13 confirmed mortalities and 1 suspected mortality (F-29). A male was killed in a beaver trap in Ft. Collins in 1984. In the RMNP reintroduction area, 2 males and 2 females died within a week of release, and 1 male died of unknown causes within 2 months of release. Three animals were killed by canids, presumably domestic dogs from the extensive human development near Grand Lake. A

tagged male was killed by a canid 2 months after release, a tagged female was killed by a canid 7 months after release, and an unmarked male was killed by dogs on Granby Reservoir on 3/5/88. The transmitter, and presumably the carcass, of 1 male was located in Granby Reservoir off Harvey Island in 15 m. of water in June, 1984. Three males were killed in beaver traps outside the park. One tagged male was killed near Windy Gap on the Colorado River (T2N R77W Sect 28 E ½ E ½) in March, 1985, 46 km downstream from his release site. An untagged male was killed in January, 1986, in the Colorado River (T2N R76W Sect 22), and an untagged male was taken in the fall of 1986 in the Fraser River (TIN R76 1/21W Sect 1). Two untagged male river otters were caught in snares set for beaver in Soda Creek in April, 1985, but both were released alive. The fate of tagged female F-29 is in doubt. She was reported as dead in monthly reports, but no carcass was found nor was the transmitter recovered. No evidence was given to support the conclusion of death.

Sightings of river otters throughout the N. Fork Colorado and the 3 lakes below RMNP (Grand, Shadow Mountain, Granby) have been common since 1978. River otters have been regularly seen in the main Colorado River from Windy Gap Reservoir to below Hot Sulfur Springs while at least 2 river otters have been killed on the highway at the west end of Byers Canyon. Based on sign surveys and a few radio transmitter-equipped animals, some of the river otters moved out of the N. Fork Colorado drainage to the Poudre River, Michigan River, Forest Canyon, Willow Creek, Laramie River and Fraser River. Some of these dispersals required crossing the Continental Divide at elevations above 10,000 ft (3,077 m). The only confirmed evidence of reproduction was a sighting of a female with 2 young in July, 1988, in the Colorado River below Windy Gap Reservoir (outside the main release area). The rapid appearance of river otters in these dispersed locations and some of the radio-tracking data suggest that the Kawauneeche Valley developed a stable population with the number released there. Dispersion has occurred from this reintroduction with sightings reported in the Fraser River, Blue River, Willow Creek, Colorado River down to Gypsum, as well as in North Park.

Figure 1D. River otter reintroduction study area in Rocky Mountain National Park and adjacent waterways in Grand County, Colorado.

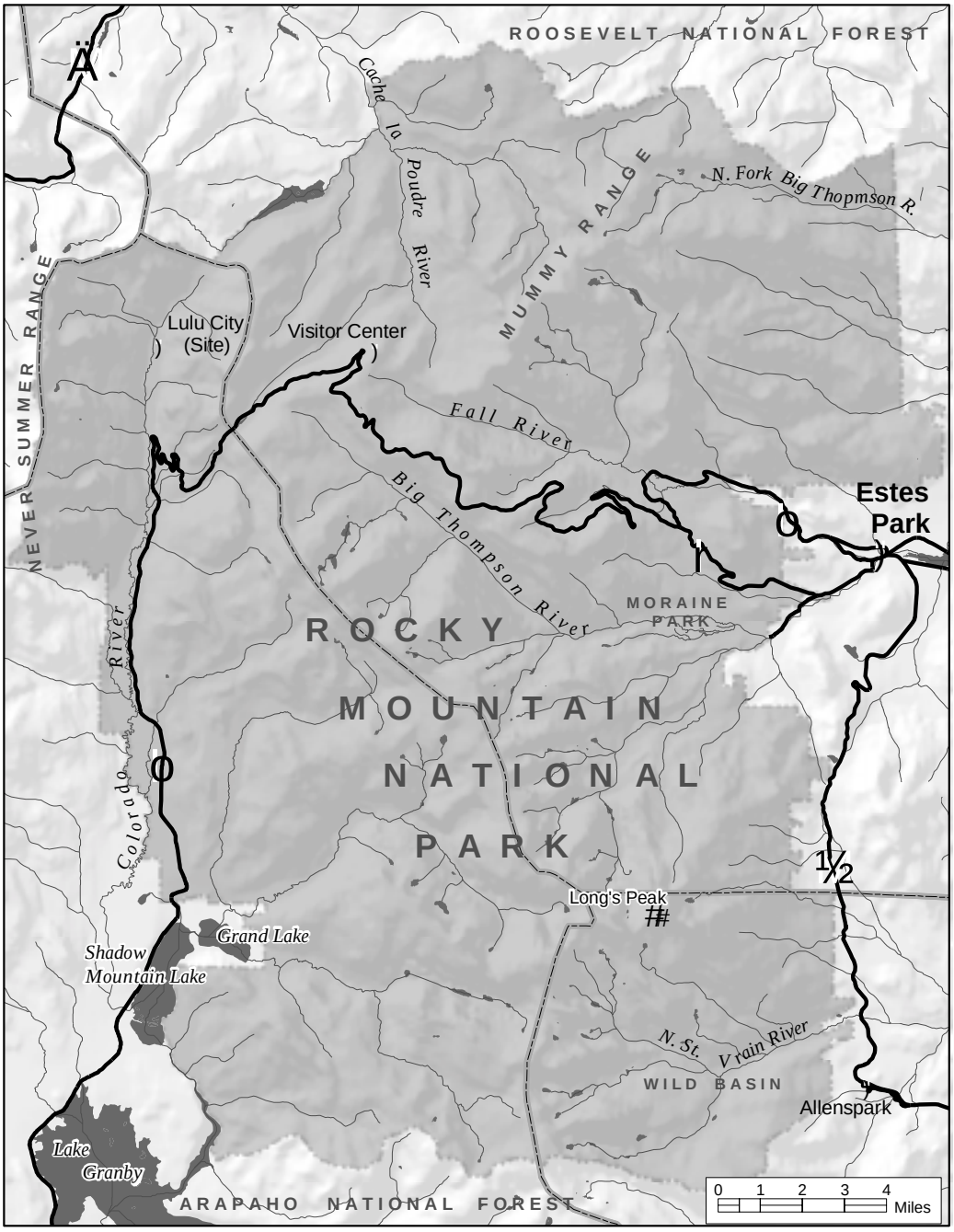


Table 1D. River otter release records for Rocky Mountain National Park, 1978-84.

I.D.	Ear Tag	RT[1]	Sex	Age	Wt. (kg)	Origin	Date Released	Release Site	Fate
	None	N	F	Ad		WA	09/23/78	Timber Lake NFC[2]; RM 24.1	
	None	N	F	Ad		WI	09/27/78	Red Mtn Trl. Bridge, NFC; RM 24.8	
	None	N	M	Ad		WI	09/27/78	Red Mtn Trl. Bridge, NFC; RM 24.8	
	None	N	Unk	Ad		WI	09/29/78	Red Mtn Trl. Bridge, NFC; RM 24.8	
	None	N	F	Unk		WI	10/06/78	Red Mtn Trl. Bridge, RM 24.8	
	None	N	Unk	Ad		WI	10/06/78	Red Mtn Trl. Bridge, NFC; RM 24.8	
	None	N	Unk	Juv		WI	10/06/78	Red Mtn Trl. Bridge, NFC; RM 24.8	
M-1	1	Y	M	Ad	7.6	WI	10/03/80	Timber Cr. Cmpgrd, NFC; RM 22	Died within 2 days
M-2	2	Y	M	Ad	7.6	WI	10/09/80	Timber Cr. Cmpgrd, NFC; RM 22	
M-3	3	N	M	Ad	8.6	WI	10/14/80	Timber Cr. Cmpgrd, NFC RM 22	
M-5	5	Y	M	Ad	8.6	WI	10/18/80	Timber Cr. Cmpgrd, NFC; RM 22	
M-8	8	Y	M	Juv	2.7	WI	10/15/81	Timber Cr. Cmpgrd, NFC; RM 22	Killed by canid 12/10/89
M-10	10	Y	M	Ad	5.9	MI	12/31/81	NFC	Died 1/2/82
F-11	11	Y	F	Juv	3.2	MI	01/01/82	NFC	Died by 01/04/82
F-6	6	Y	F	Juv	5.5	WI	10/19/81	Timber Cr. Cmpgrd, NFC; RM 22	

Table 1D (Cont.)

I.D.	Ear Tag	RT[1]	Sex	Age	Wt. (kg)	Origin	Date Released	Release Site	Fate
M-14	None	N	M	Ad	7.3	VA			Died prior to release
M-19	19	Y	M	Ad	9.1	MN	10/15/82	11-ton bridge N of Dick Ranch, NFC; RM 15.7	
M-31	20	Y	M	Ad	6.8	WI	10/17/82	11-ton bridge N of Dick Ranch, NFC; RM 15.7	
M-22	22	Y	M	Ad	7.7	WI			Died 3 days post-surgery prior to release
F-211	18	Y	F	Ad		MN	09/26/82	Beaver Ponds Picnic Area, NFC; RM 23.5	Died within 2 days
M-23	23	Y	M	Juv	5.5	MN	10/28/82	NFC	
F-21	21	Y	F	Ad	6.8	MN	10/26/82	Timber Cr. Cmpgrd, NFC; RM 22	
F-28	None	N	F	Ad	6.8	MN			Donated Denver Zoo-leg injury
	None	N	M	Ad		MN			Died of halothane anesth. during surgery 9/?/83
	None	N	F	Ad		WA	04/?/83	NFC	
M-33	33, 50	Y	M	Ad	7.5	MN	10/21/83	Beaver Ponds Area, NFC; RM 23.5	Killed in area 4.6km, dwnstrm 4/5/85
M-37, 38	36, 37	N	M	Ad	7.3	WI	10/09/83	Beaver Ponds picnic area, NFC; RM 23.5	
M-32	32	Y	M	Ad	7.6	WI	10/29/83	Lower Holzwarth Meadow, NFC; RM 20	Died 12/83
F-28	28	Y	F	Ad	7.1	WI	09/20/83	Beaver Ponds picnic area, NFC; RM 23.5	

Table 1D (Cont)

I.D.	Ear Tag	RT[1]	Sex	Age	Wt. (kg)	Origin	Date Released	Release Site	Fate
F-29	29	Y	F	Ad	7.3	MN	09/30/83	Beaver Ponds picnic area, NFC; RM 23.5	Reported dead
M-31	31	Y	M	Ad	7.5	MN	10/07/83	Beaver Ponds picnic area, NFC; RM 23.5	
F-35	35	Y	F	Ad	7.5	MN	10/21/83	Beaver Ponds picnic area, NFC; RM 23.5	
F-00	None	N	F	Unk		MN	11/11/83	Lower Holzwarth Meadow, NFC; RM 20	
M-00	None	N	M	Ad		MN	10/21/83	Lower Holzwarth Meadow, NFC; RM 20	
M-24, 27	24, 27	N	M	Juv.	4.1	WI	09/06/83	Beaver Ponds picnic area, NFC; RM 23.5	
M-34	34	N	M	Ad	7.3	MN	10/29/83	Lower Holzwarth Meadow NFC; RM 20 (no external ears birth defect	
M-38	38	Y	M	Juv	5.9	WI	11/11/83	Lower Holzwarth Meadow, NFC; RM 20	
M-39	39	Y	M	Ad		WI	11/11/83	Lower Holzwarth Meadow, NFC; RM 20	Presumed dead – transmitter at bottom of Lake Granby 6/84
F-30	30	N	F	Juv	4.6	WI	09/20/83	Beaver Ponds picnic area, NFC; RM 23.5	
F-26	26	N	F	Ad	5.0	WI	10/10/83		Died in captivity
F-25	25	N	F	Juv	2.7	WI	09/06/83	Beaver Ponds picnic area, NFC; RM 23.5	
F-36	None	Y	F	Ad	6.0	MN	10/21/83	Beaver Ponds picnic area, NFC; RM 23.5	

Table 1D (Concl)

I.D.	Ear Tag	RT[1]	Sex	Age	Wt. (kg)	Origin	Date Released	Release Site	Fate
F-40	40	Y	F	Ad	7.3	MN	10/29/84	Sun Valley Ranch, NFC; RM 7.5	
F-42	42	Y	F	Ad	6.1	MN	11/12/84	Lower Holzwarth Meadow, NFC; RM 20	
F-43	43	Y	F	Ad	6.7	MN	11/12/84	Lower Holzwarth Meadow, NFC; RM 20	
F-45	45	Y	F	Ad	5.7	MN	11/12/84	Lower Holzwarth Meadow, NFC; RM 20	
F-46	46	Y	F	Ad	5.9	MN	11/12/84	Lower Holzwarth Meadow, NFC; RM 20	
F-44	44	Y	F	Ad	6.6	MN	11/28/84	E. Shore Grand Lake	Died 06/?/85; suspect canids

RT[1] = Radio – Transmitter implanted Y=yes; N=no

NFC[2] = North Fork Colorado River RM=River miles above Shadow Mtn Reservoir

*Note: This table does not include information on 2 escapees (sex unknown) that are considered in the total number of otters "released". These 2 otters were from Michigan and escaped at Shadow Mountain Lake.

Table 2D. Selected measurements of river otters released into the North Fork of the Colorado River – Rocky Mountain National Park release area.

Tag No.	Date	Sex	Wt. (kg)	Total Length (cm)	Tail Length (cm)	Chest Girth (cm)	Neck Girth (cm)	Head Girth (cm)
M-1	10/07/80	M	7.26	-----	----	----	----	----
M-2	10/09/80	M	7.26	-----	----	----	----	----
M-5	10/18/80	M	8.60	-----	----	----	----	----
M-10	12/31/81	M	5.90	104.8	39.0	12.0	12.5	14.0
F-6	10/19/81	F	5.45	10.0	39.0	35.0	26.5	14.0
M-8	10/15/81	M	2.73	94.0	31.0	32.5	21.0	11.7
F-11	01/01/82	F	3.18	97.0	36.0	27.5	21.5	12.8
M-14	10/01/82	M	7.27	119.0	47.0	37.2	30.5	13.0
M-19	10/15/82	M	9.09	119.0	39.0	----	32.0	13.0
M-311	10/17/82	M	6.82	95.0	37.0	30.8	26.0	13.0
M-22	10/15/82	M	7.73	116.4	39.5	36.0	29.0	12.5
F-211	09/26/82	M	6.80	109.3	34.0	32.8	26.5	11.7
M-23	10/12/88	M	5.45	97.5	35.0	31.5	26.5	13.0
F-21	10/26/82	F	6.80	109.0	40.0	31.0	24.0	11.0
F-2/8	10/12/82	F	6.80	-----	----	----	----	----
M-32	10/29/83	M	7.64	119.8	42.0	35.5	27.4	13.5
F-28	09/20/83	F	7.14	116.0	42.0	35.0	27.0	12.0
F-29	09/30/83	F	7.27	114.0	41.5	35.5	26.5	12.5
M-31	10/07/83	M	7.50	116.0	38.0	35.5	27.5	13.5
F-35	10/21/83	F	7.53	118.0	43.0	38.5	27.5	14.0
M-24/27	09/05/83	M	4.09	-----	----	----	----	----
M-34	10/29/83	M	7.27	117.4	52.4	36.2	26.8	13.5
M-38	11/11/83	M	5.90	104.0	40.0	35.0	34.0	14.0
M-39	11/11/83	M	----	111.0	39.5	36.5	28.0	12.0
F-30	09/20/83	F	4.64	-----	----	----	----	----
F-26	08/25/83	F	5.00	112.0	43.0	35.5	23.0	13.5
F-25	09/03/83	F	2.73	85.0	29.0	31.5	22.0	12.0
F-360	10/21/83	F	6.00	-----	----	----	----	----
F-44	11/28/84	F	6.60	115.0	39.4	34.5	25.0	12.6
F-46	11/12/84	F	5.90	108.0	32.0	32.0	27.0	12.0
F-45	11/12/84	F	5.70	111.0	35.7	32.6	27.6	13.7
F-42	11/12/84	F	6.10	111.2	41.5	34.5	26.5	12.0
F-43	11/12/84	F	6.70	113.0	39.0	36.0	26.3	12.6
F-40	10/29/84	F	7.30	113.5	42.5	40.0	28.0	12.4
M-37/38	10/29/83	M	7.27	115.0	45.0	38.0	30.5	14.0
M-33	10/21/83	M	7.45	117.0	55.5	38.5	30.0	13.2
-----	Fall 86	M	11.35	122.0	44.5	----	----	----

A summary of observations of radio-transmitted river otters is presented below:

M-1 Released on 10/03/80, recovered dead on 10/05/80.

M-2 Released on 10/09/80 near RM 22 on NFC (Timber Cr. Campground), which is at the upper end of Kawauneeche Valley. He remained in the area through 12/31/80. There were no locations during January-June, 1981, and he used an 8-mi stretch of the Kawauneeche Valley between RMs 16 and 24 during July-December, 1981. The transmitter apparently quit in December, 1981.

M-5 Released on 10/18/80 near RM 22 on NFC (Timber Cr. Campground) where he stayed through 12/31/80. No signal was ever found upon resumption of radio-tracking in April, 1981.

M-8 Released on 10/15/81 near RM 22 on NFC (Timber Cr. Campground) and soon moved into the Mineral Creek area lower down the valley (RM 12) where he stayed until being killed by a canid on 12/10/81.

M-10 Released on 12/31/81, recovered dead on 01/02/82.

F-11 Released on 01/01/82, recovered dead on 01/04/82.

F-6 Released on 10/19/81 near RM 22 on NFC (Timber Cr. Campground). She remained in the extensive beaver ponds near the mouth of Beaver Creek (RM 22.5-24) through 12/31/81. She was located on 23 occasions in October and November and 13 in December. No signal was ever found upon resumption of tracking in 1982.

M-19 Released on 10/15/82 near RM 15.7 on NFC (Dick Ranch road). Eighty-one locations were recorded through 02/22/84. From release through April 1983 he used a 4-mi stretch of Kawauneeche Valley upstream of Onahu Creek. In mid-May he moved downstream with M-311 into Shadow Mountain and Granby Lakes. June was spent in Arapaho Bay (E end of Lake Granby), again in the company of M-311. In late July he moved back into the Kawauneeche Va11ey but had returned to Columbine Bay (Lake Granby) by 08/07/82. There were no locations in September, only 1 in October (Columbine Bay), 1 in November (Monarch Lake, E of Lake Granby), and none in December. In 1983 the 5 locations were all at the inlet of Lake Granby

where the Colorado River enters Columbine Bay, the last being 02/22/84. A spawning run of kokanee occurs at this site during January and February. No signal was heard after 02/22/84.

M-311 Released on 10/17/82 near RM 15.7 on NFC (Dick Ranch road). Seventy-four locations recorded through August, 1983. During January-March, 1983, he used a 2-mi stretch of the N Fk. Colorado above Shadow Mountain Lake (RM 1-3), then he moved up the NFC to the mouth of Onahu Creek (RM 9.5), where he stayed in association with M-19 through late May. His movement pattern was the same as M-19's, returning to Columbine Bay on 08/07/83. That was the last location for him.

M-22 Died 3 days post-surgery, prior to release.

F-211 Released on 09/26/82 and died within 2 days.

M-23 Released on 10/18/82 at an unspecified site on the N. Fk. Colorado. Fifty-two locations recorded through 07/12/83. During January-March, 1983, he used a 4-mi stretch in Kawauneeche Valley above Onahu Creek (RM 9.5) and mostly stayed within the Baker Creek drainage in the valley. He moved downstream in April to RM 5-6.5 on NFC where he stayed through May. In late May and June he traveled extensively on the lower 6 miles of NFC, N. Supply Creek (W of NFC), Soda and Stillwater Creeks (tributaries to Lake Granby), and Lake Granby. He had stayed on a 5-mi stretch of Stillwater Creek in July until contact was lost after 07/12/83.

F-21 Released on 10/26/82 near RM 22 on NFC (Timber Cr. Campground), 191 locations through 07/12/84. She used the lower 1 mile of Onahu Creek during January-March, 1983, then spent most of April in a small area near the head of Onahu Creek 6 miles upstream from the wintering area. She moved back to mouth of Onahu Creek by late April and used 4 miles of NFC above Onahu Creek in May. The only location in June (5^{th}) was at the mouth of Onahu Creek. She moved upstream and stayed on NFC between RM 15-21 during July-December, 1983. Most of January was spent on NFC between RM 9-12, and then she moved into lower Onahu Creek for most of February and March. She stayed in the area in April and May with a few excursions up the NFC as far as Bowen Creek (RM 15.5). During much of this time she traveled with F-28 and was found in the same den several times in June. She continued moving up the valley through June and July and was last found on 07/12/84 near RM 24.

M-33 Released on 10/21/83 near RM 23.5 on NFC (Beaver Ponds picnic area), 69 locations through July 1984, killed in beaver trap on 04/05/85. During November-December, 1983, he stayed at the north end of Kawauneeche Valley upriver from the release site, generally within a 2.5-mi area. In January he moved downstream as far as Bowen Creek (15.5) but centered his activity below Beaver Creek (RMs 21-23). February found him moving downstream farther with most use between RM 15 and 8. In March he continued downstream through the lower 8 miles into Shadow Mountain Lake and on into Lake Granby by 03/27. Limited locations in April and May were all in Lake Granby. On 06/14 he was found in Willow Creek north of the C Lazy U Ranch. He could have left Lake Granby by either of two routes: down the Colorado River to the mouth of Willow Creek (4.2 mi) and up 4 mi into Willow Creek Reservoir or up the Willow Creek pump canal, which runs from Willow Creek reservoir to Rainbow Bay on Lake Granby, a distance of 3 miles. He stayed in Willow Creek throughout Ju1y in an area 3 miles up from Willow Creek Reservoir. He was never located after July until he was caught in a beaver trap along the Colorado River near Windy Gap (T2N R77W, Sect 28 E ½ E ½) on 04/05/85. The trap location is approximately 11.5 miles downstream from the dam at Lake Granby.

M-32 Released on 10/29/83 near RM 20 on NFC (lower Holzwarth Meadow), limited tracking in November found him using the lower two miles of NFC (RM 0-2), and he apparently died in early December of unknown causes. The carcass was not found until late January.

F-28 Released on 09/20/83 near RM 23.5 on NFC (Beaver Ponds picnic area); 110 locations through 06/13/85. In October-December, 1983, she consistently used a 2-mile stretch of Kawauneeche Valley somewhere between RM 12 and RM 17. In January, 1984, she concentrated her activity between RM 12-15 in the NFC and Baker Creek. In February she moved a great deal and was often in company with F-21 and M-39 near Onahu Creek. Most locations were between RM 9.5-12. Most of March was in lower Onahu Creek with 1 recorded trip up to Baker Creek. Limited locations in April-May were still near the confluence of Onahu Creek and NFC. June movements were greater, covering roughly 8 miles from RM 8-16, and she was found sharing dens with F-21. July activity was concentrated near Baker Creek, but she made several long excursions, going upstream as far as RM 24. In August she used from RM 17.5-22 with most activity in the extensive beaver pond complex below RM 22. No locations were recorded during September-December, 1984, and limited tracking in 1985 found her using the entire length of Kawauneeche Valley (RM 8-24.5) with most use between RM 7-10. She was observed copulating on 04/25/85

and appeared to stay with the male for 3 days. The transmitter was still working at the end of field studies on 06/13/85.

F-29 Released on 09/30/83 near RM 23.5 on NFC (Beaver Ponds picnic area) 35 locations through 06/13/85. She was not found during 11 days of searching in October and was finally located from the air on 11/16 in the Michigan River in North Park, roughly 2 miles upstream from Gould. There are several possible routes, all of which require crossing the Continental Divide. She remained at the same place 2 miles from Gould on all 8 locations in December-February and the 5 locations in March. She was not located in April or May, and on 06/29/84 she was found on E Inlet Creek 0.5 mi upstream from Grand Lake. This was over 125 km by the most probable route from her winter locations. She used N and E Inlet Creeks and the shoreline of Grand Lake between the 2 creeks throughout July. In August she moved to the southern end of Shadow Mountain Lake and then came back to Grand Lake and the Inlet Creeks. No locations were recorded in September-December. Limited locations in January-May showed restricted movement in a 0.5 mi stretch of E Inlet Creek nearly 3 miles upstream from Grand Lake. Field workers reported that she died sometime during the winter but presented no supporting evidence.

M-31 Released on 10/07/83 near RM 23.5 on NFC (Beaver Ponds picnic area); 29 locations through 06/13/85. There are no specific locations for October-November, just that he was localized within RMNP. The only movement in December (1 location) was when he left Columbine Lake, a private lake near RM 5. Reports on January-February movements indicate use of the NFC between RM 8-11 and activity centered around RM 15 in March. Field personnel reported the transmitter was failing on 03/23 and quit the next week. However, other personnel found him on 07/10 about 2.5 miles up Onahu Creek. Most of July was spent around Chickaree Lake, where he associated with M-34. By the end of July he cruised up to RM 24 and back to Chickaree Lake at least twice. In September he moved up into the Big Meadows area of Tonahutu Creek, but his route is not known. There were no locations in September-December and very few in January-June, 1985. In 1985 he was found throughout NFC up to RM 24, in Grand Lake, and both N and E Inlet Creeks. The transmitter was still operating on 06/13/85.

M-38 Released on 11/11/83 near RM 20 on NFC (Lower Holzwarth Meadow), 93 locations through June, 1985. No specific locations are given for November-December, 1983, but most of January, 1984, was spent at the mouth of Beaver Creek (RM 23.5) in the extensive pond complex. Most of activity in February-March was between RM 22 and 25. During April and May, he swam

down NFC and went into Shadow Mountain Lake and on into Lake Granby. Most of June was spent in Shadow Mountain Lake with sporadic forays into NFC and N Supply Creek. The 3 July locations were all near the confluence of N Supply Creek and NFC (RE 0.9), while the 5 August locations were between RM 5 and 8. There were no locations in September-December and very few in 1985. The 1985 movements were spread throughout the Kawauneeche Valley and also Big Meadows on Tonahutu Creek.

M-39 Released on 11/11/83 near RM 20 on NFC (Lower Holzwarth Meadows), 70 locations through 06/13/84. During November-January, there were few locations, and they were scattered downstream from the release to RM 7. Most of February was spent near the lower end of Onahu Creek, often in the company of F-21 and F-28. He continued to use the part of Kawauneeche Valley where Bowen and Onahu Creeks enter throughout March. In April he moved down to Shadow Mountain Lake and Lake Granby where he stayed through May. After nearly 3 weeks with no signal, the transmitter was located off the E end of Harvey Island in 15 m of water in Lake Granby on 06/13. The signal was greatly attenuated, and boat searches on 06/17 and 06/19 confirmed the signal was stationary. It was presumed M-39 was dead and had sunk to the bottom, as a free transmitter would float to the surface. Cause of death was unknown, but possibilities include collision with a boat and shooting.

F-360 Released on 10/21/83 near RM 23.5 on NFC (Beaver Ponds picnic area). She was never located after release.

F-40 Released on 10/29/84 near RM 7.5 on NFC (Sun Valley Ranch). She promptly moved downstream to the spillway area below Shadow Mountain dam where she stayed until May. From mid-May until end of fieldwork on 06/13 she cruised the east shores of Shadow Mountain and Grand Lakes with ventures up into E and N Inlet Creeks.

F-42 Released on 11/12/84 near RM 20 on NFC (Lower Holzwarth Meadows). She was never located after release.

F-43 Released on 11/12/84 near RM 20 on NFC (Lower Holzwarth Meadows). She moved downstream promptly and wound up in Cutthroat Bay on Lake Granby by early January. She remained in Cutthroat Bay and lower Soda Creek through mid-May when she expanded her use

in Lake Granby to include the entire NE shoreline. She was still in Lake Granby at the end of fieldwork on 06/13/85.

F-45 Released on 11/12/84 near RM 20 on NFC (Lower Holzwarth Meadows). She spent January-May steadily moving up the Kawauneeche Valley and in early June crossed LaPoudre Pass and moved down toward Long Draw Reservoir in the Poudre drainage. She went up the main stem of the Poudre to Hague Creek by the time fieldwork ended on 06/13/85.

F-46 Released on 11/12/84 near RM 20 on NFC (Lower Holzwarth Meadows). She moved downstream and spent January-May in the lower 5 miles of NFC, N Supply Creek, and Shadow Mountain Lake. In early June she made a rapid movement through Shadow Mountain Lake and Lake Granby and went down the Colorado River 8 miles to the mouth of the Fraser River. She went up the Fraser approximately 26 miles to Jim Creek (above Winter Park), where she remained at the end of fieldwork.

F-41 Released on 11/12/84 along the E shore of Grand Lake. She stayed along the E shore of Grand Lake and both N and E Inlet Creeks, often using boat docks and boathouses for denning areas. A large canid, probably a domestic dog, killed her in June 1985.

These observations do not present a clear picture of river otter behavior at this release site because there were few relocations per animal, large gaps in tracking during some seasons, and a low percentage the original population fitted with transmitters. Of the 28 animals instrumented, 7 died before any appreciable data was collected, 2 were never relocated, 10 were relocated fewer than 30 times, 6 were relocated between 31 and 90 times, and only 3 were relocated more than 90 times. Of the 3 most-often tracked river otters (F-21, F-28, M-38), the 2 females were often together in the central portion of Kawauneeche Valley.

The wide dispersal of animals made adequate tracking difficult. It appears that the later releases nearly all left the Kawauneeche Valley quickly, suggesting habitat saturation. The movements N into the Poudre and Michigan Rivers also occurred later in the program. River otters also consistently moved downstream to the large lakes in mid-May each year, at the beginning of spring run-off. Since most of the animals stayed in the lakes, it is difficult to believe these movements were just a response to seasonal habitat changes.

Dispersal over mountain passes generally resulted in single otters or small numbers inhabiting widely separated drainages (Willow Creek, Jack Creek, Michigan River, Poudre River, Forest Canyon). Except for the upper Poudre River basin, it is unlikely these animals will contribute to population growth. A lot of dispersal occurred downstream into the lakes and the Colorado River. These areas became mortality sinks for this population with 4 documented deaths in the lakes and 3 trapping deaths in the Colorado River, compared to 1 death in Kawauneeche Valley.

APPENDIX E

HISTORY OF RIVER OTTER REINTRODUCTIONS INTO THE DOLORES RIVER

The Dolores River in southwest Colorado was the first low-elevation river with highly turbid water to be used as a river otter release site. Twenty-seven river otters, obtained mostly from Oregon, were released during 1988-1991 (Table 1E). The actual release site was at RM 147, approximately 37 miles downstream from McPhee Dam, near the town of Dolores (Figure 1E). The core area was a 98-mile river segment from Bradfield Bridge downstream to Bedrock, in Paradox Valley. Low flows in summer are approximately 50 cfs while spring run-off may exceed 3,000 cfs. Late-summer thunderstorms in the region can cause short fluctuations in water flow in the lower reaches of the river, with flows changing from 100 cfs to over 1,000 cfs in a few hours.

River otters often do not transplant easily and stress related deaths may occur prior to transport, during transit, and soon after release. Of 40 river otters captured in Oregon, only 27 (15 males, 12 females) survived to release in the Dolores River. Within the first 2 weeks post-release, 6 river otters died in the canyon, 2 climbed out of canyon and died, and another became trapped on a cliff and would have died had he not been recaptured. Within 6 months, 2 otters had moved into the San Miguel and Colorado rivers where they established ranges. They had moved 125 miles and 190 miles from the release site. Thus the new population had to develop from an effective start of 17 river otters.

Two untagged female river otters were killed in traps outside of the primary release area, which had trap restrictions in force, in 1991 and 1992. This would indicate successful reproduction during the first 3 years of release. In addition, an adult female released in 1988 was killed in a trap 5 miles above McPhee Reservoir in 1991; she was lactating at time of capture.

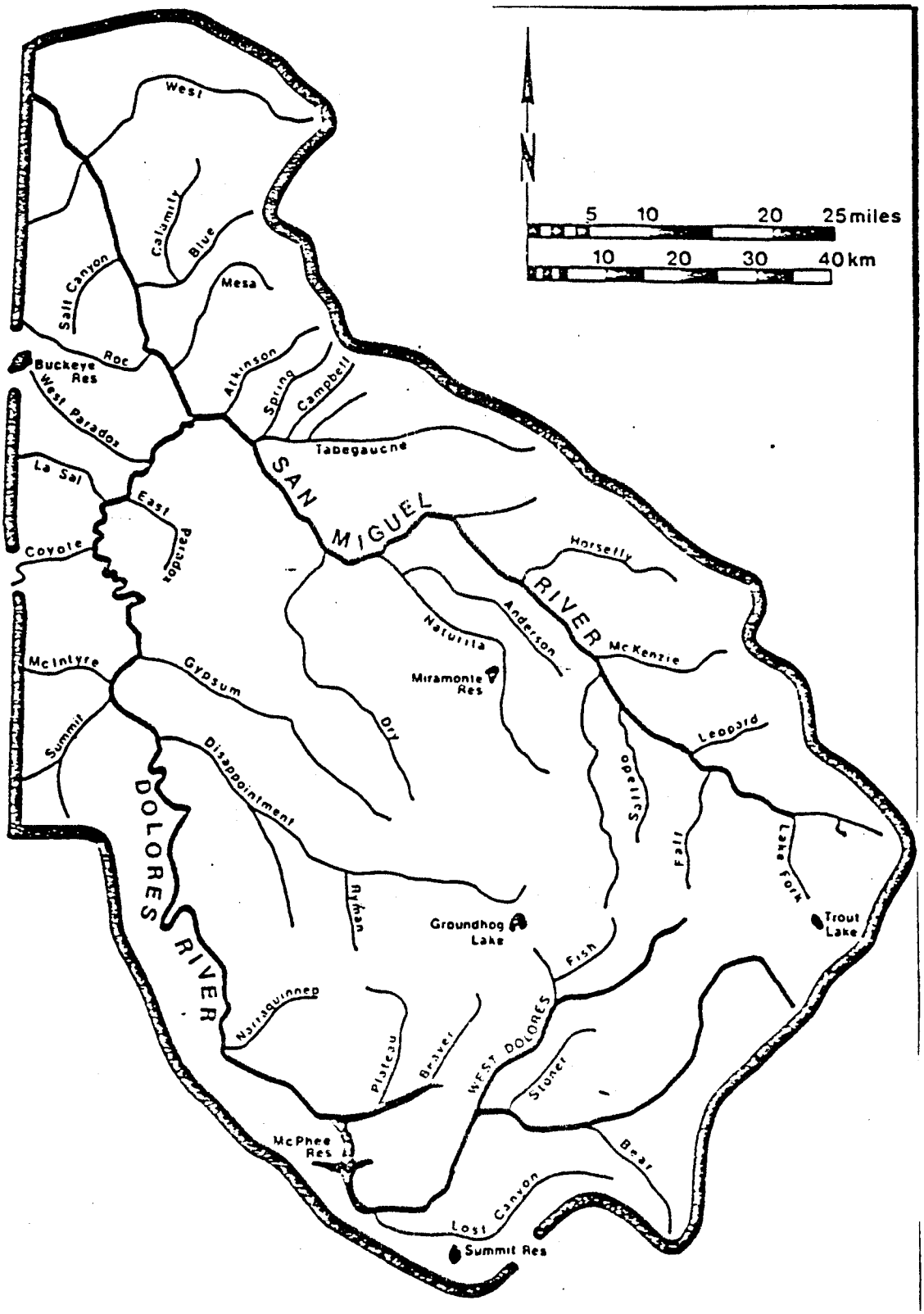
Radio-tracking of river otters in the Dolores River suggested ranges of 10-25 miles of river. Ten years post-release, river otter sightings have been recorded throughout the entire 260 mile length of the drainage as well as through about 30 miles of the San Miguel, a tributary. Movement through McPhee Reservoir (11 miles in length) appears to be common. Highest use areas, based on sign surveys, appear to be the region from the McPhee Dam downstream to Disappointment Creek. This 60-mile stretch has a very high density of crayfish (*Orconectes virilis* group), often approaching 25 crayfish/square meter, as well as a variety of fin fish. Primary den and resting sites are old bank beaver dens. Once the river ices up river

otters often emerge under the ice directly from the dens, leaving no surface sign. In the more turbid waters below the confluence with Disappointment Creek, common carp, channel catfish, and flannelmouth suckers are the primary prey items.

Table 1E. River otter released in Dolores River, 1988-91.

Ident	Age	Sex	Wt (kg)	Tag No.	Origin	Year Release
RO-1	AD	M	7.3	1	Alaska	1988
RO-2	AD	F	5.8	2	Alaska	1988
RO-3	SUBAD	M	5.4	3	Oregon	1988
RO-4	AD	M	6.0	4	Alaska	1988
RO-5	AD	F	8.0	5	Oregon	1988
RO-6	JUV	M	3.6	6	Oregon	1988
RO-7	AD	M	7.3	7	Oregon	1988
RO-12	AD	M	5.2	12	Oregon	1989
RO-15	AD	M	8.3	15	Oregon	1989
RO-17	AD	M	10.9	17	Oregon	1989
RO-21	SUBAD	F	5.9	21	Oregon	1989
RO-22	JUV	F	5.4	22	Oregon	1989
RO-23	AD	F	8.3	23	Oregon	1989
RO-24	JUV	M	4.8	24	Oregon	1989
RO-25	AD	F	7.4	25	Oregon	1989
RO-26	AD	F	7.3	26	Oregon	1989
RO-27	JUV	F	4.1	27	Oregon	1989
RO-28	JUV	F	4.6	28	Oregon	1989
RO-29	AD	F	6.1	29	Oregon	1989
RO-31	AD	F	7.5	31	Oregon	1989
RO-32	AD	M	8.3	32	Oregon	1989
RO-35	JUV	M	3.9	35	Oregon	1990
RO-36	JUV	M	5.2	36	Oregon	1990
RO-37	JUV	M	6.0	37	Oregon	1990
RO-38	AD	M	12.1	38	Calif.	1991
RO-39	AD	F	8.9	39	Calif.	1991
RO-40	AD	M	8.1	40	Oregon	1991

Figure 1E. Intensive river otter recovery site within the Dolores River drainage, southwestern Colorado.



APPENDIX F

SUMMARY OF RIVER OTTER INTRODUCTIONS INTO THE GREEN RIVER, UTAH BY UTAH DEPARTMENT OF WILDLIFE RESOURCES

Utah Northern River Otter Release Locations

Green River

Year	Total Released	Release Location	Origin
1989	9	Red Creek (jct. with Green River)	5 Nevada, 4 Alaska
1990	14	Little Hole (along Green River)	14 Alaska
1991	32	11 Island Park (Dinosaur NM) 6 Rainbow Park (Dinosaur NM) 9 Ouray NWR 6 Pariette Wetlands	32 Alaska
1992	12	2 Flaming Gorge Reservoir 10 Sand Wash (along Green River)	12 Alaska
TOTALS	**67**		

APPENDIX G

RIVER OTTER OBSERVATION DATA ENTRY FORM

1. SPECIES: O–River Otter
2. REC_NO - _____ (LEAVE BLANK)
3. OBSERVER NAME _____
4. CITY_STATE_ZIP _____
5. PHONE - _____(303) 947-2929 format
6. DATE_KNOWN - _____MM/DD/YY i.e. 04/27/92
7. DATE_EST - _____YY-MM i.e. 92-04 for 1992 April
8. YR_KNOWN - _____i.e. 1992
9. YR_EST - _____i.e. 1930
10. DATE_UNK - _____enter an "X" if no date is known or estimated
11. SEASON - Circle one:
    S - Spring - March 21 - June 20
    H - Summer (Hot) June 21 - Sept 20
    F - Fall Sept 21 - Dec 20
    W - Winter Dec 21 - March 20
12. County - _____ GUNNISON, Etc.
13. GMU _____ (game management unit) i.e. 1, 23, 444.
14. HABITAT - _____
    _____
    _____Enter a description of the plant community where the sighting occurred
15. Name of water body for otter sighting: _____
16. ELEV - _____ Elevation of sighting in feet above MSL
17. UTM_ZONE - 12 or 13 (Circle one)
18. UTM_X - _____ enter a 6-digit number i.e. 346000
19. UTM_Y - _____ enter a 7-digit number i.e. 4327000
20. LAND_ADMIN - circle one
    National Forest - White River, Routt, Arapaho, Roosevelt, Pike, San Isabel, San Juan, Rio Grande, Uncompahgre, Gunnison, Grand Mesa,
    BLM - Bureau of Land Mgmt.
    SLB - State Land Board
    ROCKY MTN NP - Rocky Mountain National Park
    DOW - Div. of Wildlife Land
    PRIV - private land
21. Comments – who, what, when and where, description of animal and/or sign, conditions of sighting – light, weather, distance, optics, measurements, diagrams, and/or photos will be appreciated.

_____

_____

_____

_____

_____

_____

_____

_____

_____

21. RATING - A, B, C or F (ratings given by staff reviewing citing)

Return forms to: Pam Schnurr, Colorado Division of Wildlife, 711 Independent Ave., Grd. Jct. CO 81505
Phone: (970) 255-6180, FAX (970) 255-6111

APPENDIX H

SUMMARY OF RIVER OTTER SURVEYS IN COLORADO, 2002

A. CDOW Species Conservation Section Surveys *(based upon Recovery Plan monitoring protocol.)*

Gunnison River (DePue 2002)

- 138 Km (80.4 miles) surveyed, from Chukar Trail in Gunnison Gorge to Redlands Diversion Dam in Grand Junction.
- Continuous survey conducted May 4, 2002 – May 7, 2002.
- River otter sign (tracks, scat, and prey remains) recorded at 42 locations.
- Sign located fairly consistently along stretch of River except for a 40 km section near Delta. This area devoid of sign most likely due to poor habitat (many farms + ranches, heavy grazing provided little bank vegetation. In addition, banks were littered with old cars and broken blocks of concrete).
- At 3 locations within 2 km of each other, a set of small tracks was found adjacent to larger set - both traveling in the same direction. Surveyor postulated that this was a pup and its mother.
- Conclusion was that the frequency and dispersal of otter sign as well as presence of small tracks indicates the section of the Gunnison River surveyed supports a viable river otter population.

Green River (DePue 2002a)

- 65 Km (39 miles) surveyed, from Swinging Bridge to the Colorado/Utah State Line.
- Continuous survey conducted July 16, 2002 – July 20, 2002.
- River otter sign recorded at 32 locations.
- Sign recorded for every 5 km segment except for 1 (between km 10- km 15).
- In 8 instances, multiple sets of tracks of the same vintage were located and headed in the same direction, indicating that 2 or more otters were traveling together.
- Conclusion was that frequency and dispersal of otter sign as well as presence of multiple tracks indicates the Colorado section of the Green River supports a viable river otter population.

Los Pinos River (Polechla 2002)

- 64 km (39.8) miles surveyed from Vallecito Reservoir to La Boca Gauging Station near CO/UT state line.

- Survey conducted March 23-29, 2002.
- No sign of river otter recorded.
- Conclusion: no established river otter population on this river.

Piedra River (Polechla 2002)

- 56.3 km (35 miles) surveyed from Piedra Picnic Grounds to the inlet of Navajo Reservoir in addition to lower portions of several side streams.
- Survey conducted April 8-17 and 28-30, 2002.
- River otter sign recorded at 29 localities.
- Otters were noted in all general regions of the surveyed area including upper, middle, and lower reaches.
- Otter sign observed every 1.84 river km on average.
- Conclusion was that Piedra River satisfies otter sign/each 5 km section of the river, with the exception of the Lower and Upper Boxes of the Piedra, which were not surveyed, and intervals 5-10 and 20-25, in which access was unavailable. Also concluded that the Piedra probably has a reproducing population of otters.

San Juan River (Polechla 2002)

- 57.9 km (36 miles) surveyed from Pagosa Springs to the inlet at Navajo Reservoir in addition to the lower end of 2 major tributaries (Rio Blanco and Navajo Rivers).
- Survey conducted May 1-10, 2002.
- River otter sign recorded at 1 locality.
- Conclusion: no established river otter population on this river.

B. CDOW Volunteer Survey Efforts

(NOTE: Volunteer surveys did not utilize monitoring protocol developed in Recovery Plan; surveys were not continuous. River otters are known to move great distances in a short period of time, so survey results could lead one to believe more river otter exist in a stretch than may actually occur. Additional years' survey results included if available.)

Cache la Poudre River

2002 Survey not conducted.

2001 Survey (Johnston 2002)

- 13 teams of volunteers completed 26 surveys from 7/7/01 – 11/12/01 along 5 survey routes.
- Teams instructed to search for any sign of river otter.

- Survey area included parts of Laramie River, Beaver Creek, Cache la Poudre River and the South Fork of the Cache la Poudre River.
- Results: Survey teams observed 4 river otter total on the Laramie and Poudre River. Possible tracks were observed on Beaver Creek.
- Appears river otter do use the area. Survey report stated that "it also appears a minimum of 3-4 river otters were residing along the Poudre River, the Laramie River, and possibly on Beaver Creek during the summer and fall…."

2000 survey (Johnston 2001).

- Survey of same routes as outlines in 2001.
- No actual animals were sighted.
- Otter scat and tracks observed along the Laramie River in June and on the Poudre River during October.

South Platte River

2002 Survey (Johnston 2002a)

- 12 teams of volunteers completed 24 surveys on 12 different survey routes between 2/23/2002-5/30/2002.
- State Wildlife Areas (SWA) were surveyed in search of river otter sign.
- Sign of river otters were observed at Atwood, Cottonwood, Dodd Bridge, Dune Ridge, Elliot, Julesburg, Pony Express, and Tamarack SWA's.
- Result of survey – "..it appears at least one river otter may have been residing on the South Platte River during the February 23 – May 30, 2002 timeframe."

2001 Survey (Johnston 2001a).

- 13 teams of volunteers completed 25 surveys along 11 survey routes between 3/3/2001-7/7/2001.
- SWA's were surveyed.
- Possible river otter sign observed at Bravo, Brush, Cottonwood, Dodd Bridge, Dune Ridge, Elliott, and Knudson SWA's. One possible sighting was made at Knudson SWA.
- Result of survey – "..it appears that at least one otter may have been residing on the South Platte River during the March-June 2001 timeframe."

North Park

- 2002 Survey (Walker 2002)
- 15 volunteers conducted 14 surveys from 1/12/02 – 4/20/02.

- Surveys conducted on Michigan and Illinois Rivers and on Jack Creek.
- Sighting of 2 adult river otters made during one of the 14 surveys. Otter sign observed during 4 of the surveys.

C. Other known survey efforts

Rocky Mountain National Park (RMNP)

2002 Survey (Rocky Mountain National Park 2002).

- 28 volunteers and employees of RMNP + CDOW completed 12 of 14 survey routes.
- This work repeated surveys conducted in 1989, 1990, 1992, 1994, 1996, 1998, and 2000.
- Survey routes conducted on the same day: March 2, 2002.
- Results indicate that river otters are using most of all available habitat along the Colorado River and to some extent, its tributaries within RMNP. Less sign was seen than in past surveys due to poor snow conditions and the fact that 2 routes were not surveyed. The survey does indicate RMNP's otter population remains at a healthy level. An estimated 12 otter are using the area, compared to 22 in 2000, 16 in 1998, 15 in 1996, 17 in 1994, and 15 in 1992.
- Conclusion: river otter population appears stable within the park.

2001 Survey by University of Wyoming with assistance by Wyoming Student Chapter of the Wildlife Society. (Herreman and Ben-David 2001).

- Surveys conducted during 2 different sampling periods: April 28-29 and September 22-23, 2001.
- Total stream length surveyed in the spring was 7.41 km and in the fall was 8.49 km.
- River otter sign recorded at 18 different sites in the spring and 12 sites in the fall.
- Extrapolation of results to the entire RMNP stream segments estimated a population size of 18 river otters.
- Conclusion: the study demonstrates that a viable population of river otters exists in RMNP.

2002 Survey by University of Wyoming with assistance by Wyoming Student Chapter of The Wildlife Society (TWS) and Colorado State University Student Chapter of TWS. (Herreman and Ben-David 2002).

- Surveys conducted during 2 different sampling periods: May 4-5 and September 21-22, 2002.

- Total stream length surveyed in the spring and fall was 20.0 km.
- River otter sign recorded at 46 different sites in the spring (2.3 site/km of river) and 12 sites in the fall.
- Spring density was comparable to spring, 2001 (2.4 sites/km of river); however, fall densities were 43% less for 2002 compared with 2001 (0.6 sites/km and 1.4 site/km respectively). Changes between 2001 and 2002 likely resulted from responses to lower water levels in the Colorado River rather than an actual decline in otter numbers.

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