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Abstract: There have been four main modes of introduction of reptiles and amphibians into Colorado: purposeful introduction, stowaways with plants or other transported materials, release of bait animals, and released or escaped captive pets. Information available for each introduced species is summarized and the potential impacts of introduced amphibians and reptiles are discussed.

Introduction

Individuals of several amphibian and reptile species have been introduced into Colorado or transported to new localities within the state. While most of these amphibians and reptiles have been waifs with little likelihood of establishing populations, some either have established extralimital populations or have the potential to do so. This note summarizes the records of amphibians and reptiles introduced into Colorado. The species list excludes some older records where the locality data or specimen identification are almost certainly in error. The species list also excludes reintroduction sites for the boreal toad, *Bufo boreas boreas*, a species endangered in Colorado.

Amphibians

Salamanders

Tiger salamander (*Ambystoma tigrinum*): YUMA: Near Wray (Langlois 1978); No specific locality, but believed to have been translocated and released into numerous localities by anglers using them as bait (Smith and Kohler 1978, Hammerson 1981, 1982a).

Salamander, species undetermined: JEFFERSON: Arvada, June 1993. A small, brownish salamander was transported to a plant nursery in the root ball of a tree from Gresham, Oregon (Greg Horstman, pers. com.).

Anurans

Northern cricket frog (*Acris crepitans*): BOULDER: A northern cricket frog (UCM 10232) was collected by T. P. Maslin from Varsity Lake on the University of Colorado campus in 1957. The record was included in both Maslin (1959) and Smith et al. (1965) without comment as to the origin of the frogs. According to Maslin (pers. com.), these frogs were introduced into the lake where they maintained a population for a few years until the lake was drained for maintenance.

Cuban treefrog (*Osteopilus septentrionalis*): ARAPAHOE: Aurora Mall, January 1989 (UCM Herptile Slide 108). Collected by Anika Livo. A truck from Florida with greenhouse plants went directly to the mall where it unloaded the plants. The treefrog was maintained in captivity for a couple of years. Greenhouse workers frequently encounter treefrogs and anoles with plant shipments (Anika Livo, pers. com.).

Pacific chorus frog (*Pseudacris regilla*): LARIMER: Estes Park, early 1980s, found in a plant shop (Anika Livo, pers. com.) (UCM Herptile Slide 109). MESA: Palisades, June 1994, found under a pallet in a plant nursery soon after the arrival of a shipment of plants from California (Greg Horstman, pers. com.) (UCM Herptile Slides 110-111).

Plains leopard frog (*Rana blairi*): WELD: 2 mi. W Milton Reservoir, 1 May 1950 (UCM 5935-5937). Hammerson (1981) considered these specimens to be the result of an artificial introduction or erroneous collection data.

Bullfrog (*Rana catesbeiana*): ADAMS, ALAMOSA, ARAPAHOE, BACA, BENT, BOULDER, DELTA, DENVER, DOUGLAS, EL PASO, GARFIELD, GUNNISON, JEFFERSON, KIT CARSON, LA PLATA, LARIMER, LAS ANIMAS, LINCOLN, LOGAN, MESA, MOFFAT, MORGAN, OTERO, PHILLIPS, PROWERS, PUEBLO, RIO GRANDE, SEDGWICK, WELD, and YUMA.

Although now widely distributed throughout low elevation areas of Colorado, bullfrogs are non-native. Hammerson (1982a) mapped bullfrog localities from 25 of Colorado's 63 counties. Since that time, bullfrogs have been reported from five additional counties: Bent (Wiese 1989 or 1990), El Paso (Norris et al. 1994), Garfield (Rybak et al. 1995), Larimer (Wiese 1989 or 1990), and Phillips (Chiszar et al. 1995). Brattstrom (1963) reported bullfrog tadpoles in Larimer County (Sheep Lake, Rocky Mountain National Park), however, he probably misidentified tadpoles of the northern leopard frog (*Rana pipiens*), which were reported by Corn et al. (1989) from the same locality.

African clawed frog (*Xenopus laevis*): SUMMIT: Bacchus et al. (1993) reported a single African clawed frog from beaver ponds on the SE side of US Rt. 6, 14.5 km NE Keystone.

Reptiles

Turtles

Snapping turtle (*Chelydra serpentina*): MESA: Colorado River at Grand Junction, 1970 (Clee Sealing, pers. com.).

Western painted turtle (*Chrysemys picta belli*): MESA: Grand Junction (unnamed pond in T1S, R1W, SE 1/4 Section 10), 21 April 1993 (UCM Herptile Slide 106). This represents an obvious introduction since no native turtle populations occur in Colorado's Grand Valley. MOFFAT: Two painted turtles were found in a ranch pond by Bonnie Weber approximately a mile south of Craig on the south side of the Yampa River, and ancedocal evidence suggests that a population of painted turtles might be present north of Craig (Jan Roth, pers. com.).

Midland painted turtle (*Chrysemys picta marginata*): BOULDER: Boulder, May 1947 (UCM 1918). Rodeck (1948) considered this to be an accidental introduction.

Mississippi Map Turtle (*Graptemys kohnii*): DENVER: Sloans Lake, considered to be a released pet (Rodeck 1950).

Desert tortoise (*Gopherus agassizii*): LA PLATA: Near Loma Linda, approximately 1966 (Albert Spencer, pers. com.); This specimen was noted as "E of Durango" by Langlois (1978).

Texas tortoise (*Gopherus berlandieri*): JEFFERSON: Lakewood, near 26th Avenue and Simms St., 12 September 1995 (Bruce Smith, pers. com.), being maintained in captivity.

Cooter (*Pseudemys floridana*): DENVER: Sloans Lake (Rodeck 1950), considered to be a released pet.

Ornate box turtle (*Terrapene ornata*): BOULDER: Collected in 1925 (UCM 711) (Rodeck 1949). CONEJOS: near La Jara, summer of 1965, residents reported seeing a "box turtle" (likely *Terrapene ornata*) crossing a highway (Hahn 1968). CUSTER: ca. 1 mi. NW Westcliff (T45S, R72W, Sec. 7), 18 June 1993, emaciated adult that evidently had been translocated to an apparently unsuitable elevation (GAH, pers. obs.). DENVER: Garfield Lake Park (LJL, pers. obs.); Denver, 1906 (UCM 280) (Ellis and Henderson 1913). DOUGLAS: Roxborough State Park (Gray 1992). This record may not be associated with the actual observation of box turtles in the area, but instead may have originated from information in the park's volunteer handbook, which lists box turtles as occurring in the area (Tom Sanglier, pers. com.). FREMONT: 3 mi. S Florence, 10 August 1963 (UCM 19649, specimen destroyed), reported by Smith et al. (1965) and mapped by Hammerson (1982a), but only sporatic records of single individuals, possibly all translocated, are known from the region encompassing this and adjacent counties, an area traversed by major highways and with high tourist use (GAH, pers. obs.). JEFFERSON: Lakewood, DOR on Jewell Ave. 1 km E Wadsworth Bldv., 19 July 1986 (LJL, pers. obs.). LA PLATA: 10 miles WSW from Durango on county road 141, found during the late 1980s, currently being maintained in captivity (Albert Spencer, pers. com.). Ornate box turtles are frequently found in the Durango area and brought in to Ft. Lewis College (Albert Spencer, pers. com.). LARIMER: Fort Collins, collected in 1947 (UCM 2558) (Maslin 1959). MESA: Several specimens, presumably released pets, found in the Grand Valley (Miller 1961); Near DeBeque on Road 45.50 south of the Colorado River, ca. 1990 (Tom Bieser, pers. com.). MONTEZUMA: Mesa Verde National Park, Campground No. 3 in 1963 (Douglas 1966); US 160 between Durango and Mesa Verde National Park (Douglas 1966). GUNNISON: on hwy 35 approximately 1 mi. S Crested Butte, 30 July 1992 (Susan Brown, pers. com.). RIO BLANCO: NE outskirts of Rangely, July 1995 (UCM 57381), considered by Rouse et al. (1995) as a possible natural occurrence. Other species typical of the Great Plains, such as *Heterodon nasicus*, have populations in

northwestern Colorado (Roth et al. 1989), so it is possible that *Terrapene ornata* followed the same dispersal routes and established natural populations in the area. However, the proximity of the turtle to a town and the lack of any other records for this easily found turtle increase the probability that it is an artificial introduction. YUMA: Beecher Island, September 1991, numerous turtles collected from "all over" released in area of Beecher Island after the annual turtle race (O'Driscoll 1991b). ADDITIONAL RECORDS: "SW Colo." (Langlois 1978).

Eastern box turtle (*Terrapene carolina carolina*): LA PLATA: Durango, ca. 1 km N Ft. Lewis College, found in a garden, late September 1995, (Al Spencer, pers. com.).

Three-toed box turtle (*Terrapene carolina triunguis*): BOULDER: Boulder, collected in 1947 (UCM 2159) (Rodeck 1949). Comments in the museum catalogue state that this turtle was "caught in garden, introduced with load of manure." LA PLATA: E of Durango (Langlois 1978). RIO BLANCO: Rangley (HMS, pers. obs.). YUMA: Wray (Rodeck 1949).

Gulf Coast box turtle (*Terrapene carolina major*): DENVER: Denver (Rodeck 1950), considered to be a released pet.

Slider (*Trachemys scripta*): BOULDER: Sawhill Ponds (T1N, R70W, NE 1/4 Section 23) 19 June 1992 (LJL, pers. obs.); Pond north of Coal Creek (T1S, R70W, NW 1/4 Section 33), 26 May 1995 (LJL, pers. obs.); Varsity Pond, University of Colorado Campus, June 1991 (GAH, pers. obs.). DENVER: Washington Park at the south end of Grasmere Lake (T4S, R68W, N 1/2 Section 23), 25 February 1996 (LJL, pers. obs.); Garfield Lake (T4S, R68W, NE 1/4 Section 19), 5 July 1984 (LJL, pers. obs.); Denver (Ellis and Henderson 1913). MESA: Grand Junction (unnamed pond in T1S, R1W, SE 1/4 Section 10), 4

August 1994 (UCM Herptile Slide 107). RIO BLANCO: in or near Rangely Reservoir (verified by photographic slides dated August 1991 and taken by Philip Bonds).

Crocodilians

Alligator (*Alligator mississippiensis*): BOULDER: Boulder Country Club, June 1978 (Kilzer 1978), an escaped pet from a nearby local residence. MESA: Colorado River near Fruita, July 1991, two alligators escaped into the river from a roadside zoo, one was later recovered (O'Driscoll 1991a).

Lizards

Bark anole (*Anolis distichus*): ARAPAHOE: Aurora Mall, September 1989 (UCM 570430). This lizard represents a stowaway from a Florida greenhouse, as a truck from Florida with greenhouse plants went directly to the mall where it unloaded the plants that included this juvenile lizard (Anika Livo, pers. com.). BOULDER: Boulder, 20 June 1991, a hatchling discovered on a newly installed, large potted plant (Richard Daum, pers. com.). JEFFERSON: Arvada, ca. October 1995; A few hatchling *Anolis* were found in a grocery store, probably brought in with a shipment of plants from Florida (Pat Kuckes, pers. com.).

Collared lizard (*Crotaphytus collaris*): MOFFAT: 1 mi. W Craig, 1991, adult female (Jan Roth, pers. com.). Additional specimens were seen near Browns Park and near Dinosaur National Mounuemt (Jan Roth, pers. com.). All Moffat County specimens are believed to be released individuals that originally had been captured in the Grand Valley (Jan Roth, pers. com.).

Mediterranean gecko (*Hemidactylus turcicus*): DENVER: Presbyterian/St. Luke's Hospital (T3S, R68W, Section 35), hatchling found 15 September 1995 on a patient recently arrived from California (UCM 57421).

Lesser earless lizard (*Holbrookia maculata*): BOULDER: Boulder (UCM 216), September 1907, large adult female in good condition. Since there are no other records of this species for the Boulder area, this lizard was likely translocated. It is unlikely that *Holbrookia* would have been extripated from the Boulder area since the usual syntopic lizards such as *Phrynosoma douglassii* and *Cnemidophorus sexlineatus* still occur.

Texas horned lizard (*Phrynosoma cornutum*): BOULDER: University of Colorado Boulder campus, 1911 (UCM 124); Boulder, 1935 (UCM 742) (Rodeck 1936); 320 31st. St., Boulder, 1964 (UCM 25648). DENVER: Denver, 1872 (Ellis and Henderson 1913). LARIMER: Fort Collins, 1919 and 1957 (UCM uncatalogued).

Roundtail horned lizard (*Phrynosoma modestum*): OTERO: 5.3 mi SE Fowler, 14 April 1963, 2 adults, now at the University of New Mexico in Albuquerque, collected by Tom Fedde. An isolated population of this species is present in the panhandle of Oklahoma (Stebbins 1985), making it possible that the two specimens are from a similar disjunct population rather than the result of an introduction. Such a distribution would also resemble that observed for Couch's spadefoot (*Scaphiopus couchii*) and the green toad (*Bufo debilis*), which also have disjunct populations in Otero County.

Snakes

Cottonmouth (*Agkistrodon piscivorus*): BOULDER: Marshall Reservoir, 6 mi SE Boulder, UCM 13880 (Smith et al. 1965). Notes added to the museum catalogue in 1984 state, "Introduced by farmer to scare away fishermen."

Boa constrictor (*Boa constrictor*): ADAMS: Lowell Ponds (Anonymous 1994).

Eastern diamondback rattlesnake (*Crotalus adamanteus*): County not specified: "Bijou Cr. drainage" (Langlois 1978). Hammerson (1981) considered this report based only on hearsay.

Western diamondback rattlesnake (*Crotalus atrox*): LAS ANIMAS: Trinidad, 1912 (Ellis and Henderson 1913), considered by Hammerson (1981) to be either misidentified or artificially introduced individual.

Arizona black rattlesnake (*Crotalus viridis cerberus*): ARAPAHOE: T4S, R64W, Sec. 30, collected by Ivan Littlejohn, 6 October 1993 (Livo and Chiszar 1994). Another rattlesnake collected at the same site was the species normal for the area, *Crotalus viridis viridis*.

Corn snake (*Elaphe guttata guttata*): LARIMER: Fort Collins (T7N, R69W, Section 23), ca. 1976, found under a produce pallet in a grocery store (P. Stephen Corn, pers. com.).

Brown water snake (*Nerodia taxispilota*): DENVER: Sloans Lake, mid-1980s, large adult (GAH, pers. obs.).

Python, species undetermined (*Python* sp.): PITKIN: Castle Creek Valley, September 1993 (Anonymous 1993).

Plains garter snake (*Thamnophis radix*): BOULDER: Minnie Lake, 9 mi. NE Ward (UCM 10740), collected 13 August 1957. Evidently introduced into the lake at summer camp, although the data possibly are erroneous.

Discussion

Most releases of non-native amphibians and reptiles simply result in the death of the released animals (Murphy 1981). This is particularly true for tropical and subtropical specimens released into temperate-zone climates such as found in Colorado. When the released animal is a venomous snake, it also has the possibility of harming humans. At least occasional venomous snakes have been released in Colorado (see above) but none appear to have established populations.

From a biological standpoint, introduced non-native species can have a variety of negative impacts on native species, including: 1) competition or predation, 2) genetic contamination, and 3) introduction of pathogens (Bury and Luckenbach 1976, Smith and Kohler 1978, Murphy 1981). Also, the widespread transportation and release of animals can make determination of the natural range limits an impossible task for zoogeographers (Anonymous 1982). Each of these issues will be discussed in more detail below.

Established populations of non-native species such as the bullfrog (*Rana catesbeiana*) have been implicated in the decline of native leopard frogs (*Rana pipiens* and *R. blairi*) in Colorado, possibly through predation and/or competition (Hammerson 1982b, Livo 1984, 1986, but see also Hayes and Jennings 1988).

Other non-native frogs potentially could be introduced into Colorado through import of warmwater fishes in tanks contaminated with anuran tadpoles. In a recent survey of fish farmers in Arkansas and Florida, Kane et al. (1992) found that 98 percent of the responding facilities stated that tadpoles were present in their fish culture ponds. Bullfrogs, leopard frogs, green frogs, tree frogs, and "toads" were among the anurans that contaminated the fish cultures (Kane et al. 1992). Of these species, the green frog (*Rana clamitans*) has both the possibility of establishing extralimital populations in Colorado and of having a detrimental effect on native anurans. Although this species has not been reported from Colorado, it has become established elsewhere in western North America, including Utah, Washington, Hawaii, British Columbia, and possibly Montana (Smith and Kohler 1978, Stebbins 1985).

Several opportunities exist for the genetic contamination of native amphibian and reptile populations. The plains leopard frogs (*Rana blairi*) found west of Milton Reservoir, Weld County, are within the range of the northern leopard frog, (*Rana pipiens*). Elsewhere in Colorado, *Rana blairi* and *Rana pipiens* hybridize where the two forms occur sympatrically, such as along the Big Sandy Creek drainage in east-central Colorado (Gillis and Pettus 1974, Gillis 1975, Cousineau and Rogers 1991). Consequently, it is possible that the artificial introduction of one leopard frog species into the range of the other species would result in genetic contamination of the latter species.

An even greater opportunity for genetic contamination exists for Colorado's tiger salamander (*Ambystoma tigrinum*), which exhibits considerable variation in the state. This species is used as bait by anglers and there almost certainly has been widespread introduction within Colorado of individuals into sites geographically distant from the animals' origins (Smith and Kohler 1978, Anonymous 1982), although the degree of such contamination has not been assessed.

When non-native animals are released, even if the released individuals do not survive, they may expose native animal populations to new pathogens. The spread of pathogens has been implicated as a potential cause of amphibian declines and, as noted by Laurance (1995), "Our general impression is that the role of disease in amphibian populations is underestimated. In particular, we suspect that exotic

pathogens could pose a dramatic threat to non-immune host populations." Amphibians are not the only animals susceptible to introduced diseases: Upper Respiratory Tract Disease (URTD) is often fatal to desert tortoises (*Gopherus agassizii*) and the disease is spread through contact among the tortoises (Esque 1994). Whether this disease could "jump species" and infect native Colorado turtles is unknown, but captive tortoises in the genus *Geochelone* appear to be susceptible to the URTD affecting desert tortoises (Deal et al. 1994).

Artificial introductions serve to confuse the natural limits of the introduced species. Consequently, there has been speculation about the reliability of a number of locality records of Colorado amphibians and reptiles. Ludlow (1981) questioned whether a record of painted turtle (*Chrysemys picta*) from the Ken-Caryl Ranch area in Jefferson County represented an introduced animal. The Ken-Caryl record was the first for the county. However, in the intervening years, numerous painted turtles have been observed at three additional sites in Jefferson County (Crown Hill, Belmar Park, and Prospect Park; LJL pers. obs.), making it seem more likely that the Ken-Caryl specimen was a natural occurrence.

Similarly, Maslin (1950) questioned the validity of the state's first record of lined snakes (*Tropidoclonion lineatum*) since it was from Denver. Since that initial record, lined snakes have been found at numerous other locations in Colorado (Hammerson 1982a) and the Denver record probably represents a natural population.

A softshell observed in Garfield Lake, Denver (Livo 1993) may represent either an introduced animal or a dispersed animal. Since additional softshells have been observed elsewhere in the Denver area (Livo 1993, Engeman 1994), the possibility exists that the Garfield Lake record represents a natural occurrence, albeit in an unnatural setting.

Most or all of the *Terrapene ornata* records for the western edge of the range in Colorado undoubtedly represent introductions. In its natural range, individuals of this species often are observed crossing roads and picked up by tourists and other travelers. Frequently the turtles later escape or are released considerable distances from the point of origin.

Tropical and subtropical species (such as the Cuban treefrog, African clawed frog, Mediterranean gecko, and boa constrictor) have the least likelihood of becoming established in Colorado. However, the ability of tropically adapted species to survive winter has not been thoroughly examined. The possibility exists that some species, especially those derived from temperate-zone taxa, might have both the capacity to survive extended periods of cold weather and to establish feral populations. In addition, thermal features such as hot springs may provide opportunities for the establishment of some warmth-adapted aquatic species. This occurred along Hot Spring Creek in Gunnison County, where a population of *Rana catesbeiana* became established in a site that otherwise would be too cold (Hammerson 1982a). Some tropical invertebrates have been established in warm springs. The red-rim melania (*Melanoides tuberculata*), a non-native freshwater snail, has become established in warm springs in Fremont and Saguache Counties (Wu 1989), and the tropical snails *Thiara granifera* and *Helisoma scalare* as well as the freshwater shrimp *Palaemonetes paludosus* have become established in a warm spring near Wellsville in Fremont County (Wu and Brown 1980). Many exotic tropical fishes and even alligators are raised in warm-spring-fed ponds in the San Luis Valley (Meyers 1994). A slim possibility exists that an exotic species such as the African clawed frog could be established if released in a similar situation.

Many of the turtles native to Colorado's eastern plains appear to have a relatively high chance of becoming established if transplanted in sufficient numbers into suitable areas of western Colorado which, except for the painted turtle in La Plata and Archuleta counties, lacks native turtles. Establishment of ornate box turtles, painted turtles, or snapping turtles would appear to be associated with little risk of having a negative impact on other native amphibians or reptiles, but their possible impacts on other vertebrate groups are unknown.

As noted in this paper, there are several records of sliders (*Trachemys scripta*) from various locations in Colorado. This adaptable species, popular in the pet trade, has established populations in Arizona, Florida, Michigan, New Jersey, Pennsylvania, Maryland, and near Washington, D.C. as well as in many foreign countries (Ernst et al. 1994). Although there is no evidence at present that any feral

populations are present in Colorado, this species may be capable of establishing extralimital populations in the state. Adults of this species at least occasionally can survive winters in Colorado, as demonstrated by the discovery of a specimen soon after ice had melted from an urban lake. This turtle was found basking on the shore in late February. Fishing line, still connected to an embedded hook, had worked a deep and clearly old notch into the lower jaw of the turtle.

There have been a limited number of purposeful introductions of non-native amphibians and reptiles into Colorado. By far the most widespread and well established non-native amphibian is the bullfrog, where coordinated efforts to establish the species began in the early 1900s (Ellis and Henderson 1915, Hammerson 1982b). Bullfrogs were introduced into the Grand Valley of western Colorado in the mid-1950s as a potential sport animal, with both adults and tadpoles captured in the vicinity of Bonny Reservoir in eastern Colorado and flown to western Colorado (Dwight Owens, pers. com.). These animals were released at several sites, including in the Grand Junction area in Connecticut Lake, near Rifle, between Delta and Olathe on the Uncompagre River, at the fish hatchery near Hotchkiss, and north of Mack in Highline Lake. The bullfrogs did well along the Colorado River for a few years, with frogs being found in subsequent years down to the Utah State Line (Dwight Owens, pers. com.).

Bullfrogs may have been spread further throughout the state by inadvertent shipment as tadpoles with fish stocking operations (Hammerson 1982b). Wiese (1989 or 1990) found bullfrogs established at three state fish units in eastern Colorado: Wray, Las Animas, and Chatfield Reservoir. Wiese (1989 or 1990) stated, "The possibility of spreading bullfrogs to new areas with the fish stock should be a major concern at these units." Further, Wiese (1989 or 1990) recommended that bullfrogs and their tadpoles should be deleted from the lists of baits that can be used in Colorado.

Other introduced amphibians and reptiles appear to have been brought to the state or transported within it as 1) stowaways, mainly with plant shipments, 2) as released bait animals, or 3) as released or escaped captive pets, including those used in classrooms. It would be difficult to reduce the number of

amphibian and reptile stowaways on plants imported into Colorado. Further, most of the stowaways appear to present minimal danger of establishing feral populations.

A potentially more serious problem is the establishment of populations through the transportation and release of bait animals (primarily larval tiger salamanders) and release of captive amphibians and reptiles. These forms of introduction should be actively discouraged. Colorado Division of Wildlife regulations already forbid the release of captive amphibians and reptiles. However, these policies are not well known or understood by many members of the public. To minimize future introductions of non-native or transported amphibians and reptiles in the state, the Colorado Division of Wildlife should develop and distribute educational materials. Some of these materials should be directed to anglers and contain information about the proper disposal of unused live bait animals, such as tiger salamanders. Other materials should be developed for pet stores, biological supply houses, and individuals involved in purchasing or keeping animals as pets or for classroom use. These materials should explain the current regulations and describe the reasons captive animals should not be released. Additionally, the materials could also contain contact information of organizations, such as local herpetological or humane societies, that provide "adoption services" for unwanted captive amphibians and reptiles.

Finally, for the benefit of future zoogeographers, voucher specimens from introduced populations should be deposited in museums along with any known information pertaining to the source of the introduction.

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4 October 1996

Clint Miller
City of Boulder Open Space Department
66 South Cherryvale Road
Boulder, Colorado 80303

Dear Clint,

Enclosed please find the four quads that cover the Boulder Open Space areas. Each quad is numbered separately to indicate where amphibians and reptiles were observed during my 1996 field work. The attached listing contains site numbers (with the "B," "E," "L," and "N" representing the first letter of the quad name), the species present at the site, and the observation dates. As you will see, there are a few "supplementary reports" -- observations from people that I regarded as reliable. The diskette contains this listing and was produced with WordPerfect 6.1 for Windows. Finally, I attached the site number sheets to the quads so you can add observations from your field people if you want.

After you folks get this digitized, I'll add the pre-1996/historic locality information to overview-type maps we discussed that will be included with the report. Also, since I'll have to complete the paperwork for this year's scientific collection permit, would it be possible for me to get the list of UTM's for these sites after you get this information digitized?

Please feel free to contact me if you have any questions about this locality information.

Best wishes,

Lauren J. Livo

see xls file @
I:\shared\research\96\lhcsp.xls
for data

Boulder Quadrangle		
Site Number	**Species present**	**Date(s)**
B1	*Rana catesbeiana* *Chrysemys picta* *Trachemys scripta*	5 April 1996 16 April 1996 16 April 1996
B2	*Pseudacris triseriata*	9 May 1996
B3	*Pseudacris triseriata*	1 June 1996
B4	*Tantilla nigriceps*	1 June 1996
B5	*Sceloporus undulatus*	30 June 1996
B6	*Sceloporus undulatus*	30 June 1996
B7	*Thamnophis radix*	30 June 1996
B8	*Pituophis catenifer*	28 July 1996
B9	*Bufo woodhousii*	28 July 1996
B10	*Bufo woodhousii*	28 July 1996
B11	*Coluber constrictor*	18 August 1996
B12	*Thamnophis radix*	15 September 1996
B13	*Pituophis catenifer*	17 September 1996
B14	*Pituophis catenifer*	17 September 1996
B15	*Lampropeltis triangulum (approximate location only)*	8 September 1996 (Supplementary report; C. Carey, pers. com. 17 September 1996)
B16	*Crotalus viridis*	June 1996 (Supplementary report; C. Harper, pers. com. August 1996)
B17	*Crotalus viridis*	July 1996 (Supplementary report; C. Harper, pers. com. August 1996)

Eldorado Quadrangle		
Site Number	**Species present**	**Date(s)**
E1	*Rana pipiens* *Pseudacris triseriata*	4 May 1996 4 May 1996
E2	*Pseudacris triseriata* *Ambystoma tigrinum*	4 May 1996 4 May 1996
E3	*Pseudacris triseriata*	8 June 1996
E4	*Bufo woodhousii*	8 June 1996
E5	*Bufo woodhousii*	24 July 1996
E6	*Bufo woodhousii*	4 August 1996
E7	*Bufo woodhousii*	4 August 1996
E8	*Bufo woodhousii*	4 August 1996
E9	*Thamnophis elegans*	4 August 1996
E10	*Thamnophis elegans*	4 August 1996
E11	*Pseudacris triseriata* *Bufo woodhousii*	24 August 1996 24 August 1996
E12	*Sceloporus undulatus*	7 July 1996 (Supplementary report; S. Wilcox, pers. com. 7 July 1996)

Louisville Quadrangle		
Site Number	**Species present**	**Date(s)**
L1	*Pseudacris triseriata*	6 April 1996
L2	*Pseudacris triseriata*	6 April 1996
L3	*Pseudacris triseriata*	6 April 1996
L4	*Pseudacris triseriata*	6 April 1996
L5	*Pseudacris triseriata*	6 April 1996
L6	*Pseudacris triseriata*	6 April 1996
L7	*Pseudacris triseriata*	6 April 1996
L8	*Pseudacris triseriata* *Chrysemys picta*	6 April 1996 6 April 1996
L9	*Pseudacris triseriata*	6 April 1996 4 May 1996
L10	*Pituophis catenifer*	26 April 1996
L11	*Pseudacris triseriata*	4 May 1996
L12	*Pseudacris triseriata*	4 May 1996
L13	*Pseudacris triseriata*	4 May 1996
L14	*Rana pipiens*	19 May 1996
L15	*Rana pipiens* *Bufo woodhousii*	19 May 1996 19 May 1996
L16	*Chrysemys picta* *Bufo woodhousii* *Thamnophis radix*	7 July 1996 7 July 1996 7 July 1996
L17	*Chrysemys picta*	7 July 1996
L18	*Rana pipiens*	20 July 1996
L19	*Rana pipiens*	20 July 1996

Louisville Quadrangle		
Site Number	**Species present**	**Date(s)**
L20	*Rana pipiens*	20 July 1996
L21	*Rana pipiens*	20 July 1996
L22	*Rana pipiens* *Thamnophis radix*	20 July 1996 20 July 1996
L23	*Rana catesbeiana* *Bufo woodhousii* *Chrysemys picta*	20 July 1996 20 July 1996 20 July 1996
L24	*Rana pipiens*	20 July 1996
L25	*Bufo woodhousii*	23 July 1996
L26	*Pseudacris triseriata* *Rana blairi*	24 July 1996 24 July 1996
L27	*Pituophis catenifer*	24 July 1996
L28	*Bufo woodhousii*	24 July 1996
L29	*Bufo woodhousii*	24 July 1996
L30	*Bufo woodhousii*	24 July 1996
L31	*Bufo woodhousii* *Pseudacris triseriata*	31 July 1996 12 September 1996
L32	*Rana catesbeiana*	31 July 1996
L33	*Bufo woodhousii*	4 August 1996
L34	*Bufo woodhousii*	4 August 1996
L35	*Bufo woodhousii*	4 August 1996
L36	*Coluber constrictor*	24 August 1996
L37	*Bufo woodhousii*	1 September 1996
L38	*Pseudacris triseriata*	12 September 1996

Louisville Quadrangle		
Site Number	**Species present**	**Date(s)**
L39	*Pseudacris triseriata*	12 September 1996
L40	*Pseudacris triseriata*	12 September 1996
L41	*Pseudacris triseriata*	12 September 1996
L42	*Pseudacris triseriata*	12 September 1996
L43	*Pseudacris triseriata*	12 September 1996
L44	*Pseudacris triseriata*	12 September 1996
L45	*Pseudacris triseriata*	12 September 1996
L46	*Pseudacris triseriata* *Thamnophis radix*	12 September 1996 12 September 1996
L47	*Pseudacris triseriata*	12 September 1996
L48	*Ambystoma tigrinum*	12 September 1996
L49	*Pseudacris triseriata*	12 September 1996
L50	*Pseudacris triseriata*	12 September 1996
L51	*Pseudacris triseriata*	12 September 1996
L52	*Pseudacris triseriata*	12 September 1996
L53	*Ambystona tigrinum* *Rana pipiens*	12 September 1996 13 September 1996
L54	*Bufo woodhousii*	12 September 1996
L55	*Pseudacris triseriata* *Bufo woodhousii*	12 September 1996 12 September 1996
L56	*Pseudacris triseriata*	12 September 1996
L57	*Pseudacris triseriata*	22 September 1996
L58	*Ambystoma tigrinum*	22 September 1996

Louisville Quadrangle		
Site Number	**Species present**	**Date(s)**
L59	*Pseudacris triseriata*	22 September 1996
L60	*Coluber constrictor*	22 September 1996
L61	*Chrysemys picta* *Rana pipiens*	22 September 1996 22 September 1996
L62	*Thamnophis radix*	22 September 1996
L63	*Lampropeltis triangulum*	September 1996 (Supplementary report: Greg Hayes, pers. com. 22 September 1996)
L64	*Phrynosoma douglassii*	Summer 1996 (Supplementary report: Greg Hayes, pers. com. 22 September 1996)
L65	*Coluber constrictor*	Summer 1996 (Supplementary report: Greg Hayes, pers. com. 22 September 1996)
L66	*Bufo woodhousii*	Summer 1996 (Supplementary report: Greg Hayes, pers. com. 22 September 1996)

Niwot Quadrangle		
Site Number	**Species present**	**Date(s)**
N1	*Rana catesbeiana*	22 Feb1996 28 June 1996 29 June 1996 6 July 1996 28 July 1996 18 August 1996
	Thamnophis sirtalis	27 March 1996
	Nerodia sipedon	28 June 1996
	Chrysemys picta	30 June 1996 18 August 1996
N2	*Rana catesbeiana*	27 March 1996 6 July 1996
	Rana pipiens	6 July 1996
	Chrysemys picta	6 July 1996
N3	*Pseudacris triseriata*	27 March 1996
N4	*Chrysemys picta*	6 May 1996
N5	*Pseudacris triseriata*	9 May 1996
N6	*Bufo woodhousii*	9 May 1996
	Pseudacris triseriata	9 May 1996
N7	*Pseudacris triseriata*	9 May 1996
N8	*Pseudacris triseriata*	9 May 1996
N9	*Pseudacris triseriata*	9 May 1996
N10	*Pseudacris triseriata*	9 May 1996
N11	*Pseudacris triseriata*	9 May 1996 9 July 1996
	Bufo woodhousii	9 July 1996
N12	*Bufo woodhousii*	9 May 1996
N13	*Coluber constrictor*	15 May 1996

Niwot Quadrangle		
Site Number	**Species present**	**Date(s)**
N14	*Pseudacris triseriata*	17 May 1996
N15	*Chrysemys picta* *Rana catesbeiana* *Chelydra serpentina*	10 June 1996 23 August 1996 10 June 1996 23 August 1996 23 August 1996
N16	*Coluber constrictor*	10 June 1996
N17	*Chrysemys picta* *Chelydra serpentina*	1 July 1996 21 July 1996
N18	*Trachemys scripta*	6 July 1996
N19	*Rana catesbeiana* *Chrysemys picta*	6 July 1996 6 July 1996
N20	*Cnemidophorus sexlineatus*	6 July 1996
N21	*Pituophis catenifer*	6 July 1996
N22	*Pituophis catenifer*	6 July 1996
N23	*Bufo woodhousii*	6 July 1996
N24	*Coluber constrictor*	6 July 1996
N25	*Bufo woodhousii*	6 July 1996
N26	*Bufo woodhousii*	6 July 1996
N27	*Pseudacris triseriata*	9 July 1996
N28	*Bufo woodhousii*	9 July 1996
N29	*Pseudacris triseriata*	9 July 1996
N30	*Bufo woodhousii*	9 July 1996
N31	*Pseudacris triseriata*	9 July 1996

Niwot Quadrangle		
Site Number	**Species present**	**Date(s)**
N32	*Bufo woodhousii* *Pseudacris triseriata*	9 July 1996 9 July 1996
N33	*Pseudacris triseriata*	9 July 1996
N34	*Bufo woodhousii* *Pseudacris triseriata*	9 July 1996 9 July 1996
N35	*Bufo woodhousii*	9 July 1996
N36	*Bufo woodhousii*	9 July 1996
N37	*Bufo woodhousii*	9 July 1996
N38	*Rana catesbeiana*	9 July 1996
N39	*Ambystoma tigrinum*	9 July 1996
N40	*Rana catesbeiana*	9 July 1996
N41	*Rana catesbeiana*	9 July 1996
N42	*Spea bombifrons* *Bufo woodhousii*	9 July 1996 9 July 1996
N43	*Pseudacris triseriata*	9 July 1996
N44	*Bufo woodhousii*	28 July 1996
N45	*Thamnophis radix*	28 July 1996
N46	*Thamnophis radix*	28 July 1996
N47	*Bufo woodhousii*	28 July 1996
N48	*Bufo woodhousii*	28 July 1996
N49	*Bufo woodhousii*	4 August 1996
N50	*Rana pipiens*	4 August 1996
N51	*Rana pipiens*	4 August 1996

Niwot Quadrangle		
Site Number	**Species present**	**Date(s)**
N52	*Bufo woodhousii* *Thamnophis radix* *Pseudacris triseriata*	4 August 1996 4 August 1996 15 September 1996
N53	*Bufo woodhousii* *Pseudacris triseriata* *Thamnophis radix*	23 August 1996 23 August 1996 23 August 1996
N54	*Coluber constrictor* *Thamnophis sp.*	23 August 1996 23 August 1996
N55	*Thamnophis elegans*	23 August 1996
N56	*Rana catesbeiana*	15 September 1996
N57	*Pseudacris triseriata* *Pituophis catenifer*	15 September 1996 15 September 1996
N58	*Bufo woodhousii*	15 September 1996
N59	*Pituophis catenifer*	15 September 1996
N60	*Rana catesbeiana* *Thamnophis radix*	15 September 1996 15 September 1996
N61	*Rana catesbeiana* *Pseudacris triseriata*	15 September 1996 15 September 1996
N62	*Pituophis catenifer*	15 September 1996
N63	*Cnemidophorus sexlineatus*	15 September 1996
N64	*Bufo woodhousii*	15 September 1996
N65	*Cnemidophorus sexlineatus*	15 September 1996
N66	*Pseudacris triseriata*	15 September 1996
N67	*Cnemidophorus sexlineatus* *Bufo woodhousii*	15 September 1996 15 September 1996

Niwot Quadrangle		
Site Number	**Species present**	**Date(s)**
N68	*Pituophis catenifer*	Summer 1996 (Supplementary report; Greg Maniero, pers. com. June 1996)
N69	*Nerodia sipedon*	May 1996 (Supplementary report; David Chiszar, pers. com. June 1996)
N70	*(approximate locations):* *Thamnophis radix* *Thamnophis elegans* *Pituophis catenifer* *Rana pipiens*	May 1996 (Supplementary report; David Chiszar, pers. com. June 1996)