Editorial Comment. – This section has been established as a forum for the exchange of ideas, opinions, position statements, policy recommendations, and other reviews regarding turtle-related matters. Commentaries and points of view represent the personal opinions of the authors, and are peer-reviewed only to the extent necessary to help authors avoid clear errors or obvious misrepresentations or to improve the clarity of their submission, while allowing them the freedom to express opinions or conclusions that may be at significant variance with those of other authorities. We hope that controversial opinions expressed in this section will be counterbalanced by responsible replies from other specialists, and we encourage a productive dialogue in print between the interested parties. Shorter position statements, policy recommendations, book reviews, obituaries, and other reports are reviewed only by the editorial staff. The editors reserve the right to reject any submissions that do not meet clear standards of scientific professionalism.

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Commercial Exploitation of Blanding's Turtle, *Emydoidea blandingii*, and the Wood Turtle, *Clemmys insculpta*, for the Live Animal Trade

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The live animal trade (or pet trade) has often been implicated as a contributing factor in the continued longterm declines evident in wild populations of a wide variety of the world's turtles and tortoises (Lambert, 1969, 1979; Burton, 1972; Choudhury and Bhupathy, 1993; Klemens and Moll, 1995; Salzberg, 1996; Moll and Klemens, 1997). North American species figuring prominently in such discussions have included various map turtles (Graptemys sp.), the eastern box turtle (Terrapene carolina ssp.), and spotted (Clemmys guttata), wood (C. insculpta), and bog turtles (C. muhlenbergii) (Muir, 1984; Herman, 1990; Tryon and Herman, 1990; Klemens, 1993; Palmer and Braswell, 1995; Breisch, 1997; Ernst, 1997; McCollough, 1997). Similar commentary, although certainly far less frequent, has also been included in occasional reports on the conservation status of Blanding's turtle, Emydoidea blandingii (Lang and Karns, 1988).

Unfortunately, no legitimate source of accurate statistical data currently exists documenting the extent of domestic trade activities involving any wild-caught (or captive-produced) native amphibians or reptiles within the United States. International trade statistics regarding such species remain surprisingly deficient as well, with only limited amounts of relevant data widely scattered throughout a complex and somewhat bewildering array of obscure governmental reports. This in turn has made it difficult if not impossible to provide anything other than "best guess" estimates regarding the actual impacts domestic and international trade activities may have on any North American chelonian. It is perhaps wisest to view previously reported numerical "data" on this subject with at least some degree of skepticism unless the circumstances of its publication unequivocally demonstrates otherwise.

In the absence of reliable statistics on the magnitude of domestic and international live turtle trade, other alternative resources must be analyzed to provide clues as to the extent of commercial activities involving most North American taxa. It seems reasonable to assume that the majority of available specimens of all domestic turtle species must somehow be publicly displayed or otherwise advertised in an attempt to attract potential purchasers. Such activities may also reasonably be expected to most likely occur within those arenas affiliated with the ever-burgeoning live reptile marketplace.

Methods and Results

To begin examining the extent of commercial activities involving Emydoidea blandingii, preliminary data regarding the species, as well as on the wood turtle, Clemmys insculpta, were gathered from a variety of sources commonly associated with the live reptile trade. The wood turtle was selected as a comparison species as this turtle has had a long and well publicized reputation of being a hardy, attractive, intelligent, and highly desirable captive (Babcock, 1919; Pope, 1939; Carr, 1952; Pritchard, 1967, 1979; Ashley, 1991). Collection for the commercial live turtle trade has, likewise, often been cited as a contributing factor in the declines evident in many wild C. insculpta populations (Harding, 1991, 1993, 1997; Ernst et al., 1994; Rosenberg, 1996). In addition, both species occur within the same general geographic regions of North America.

Data resources analyzed included the stock/price lists of live animal dealers (both within and outside the United States), classified and display advertisements in regional, national, and international herpetological and animal trading periodicals, and extensive personal experiences at an assortment of amphibian and reptile stores, swap-meets, and expositions. Each of these data resources were examined for the occurrence of *E. blandingii* and/or *C. insculpta* and, while generating little information on the actual number of specimens traded, this exercise did provide some indication of the level of interest in both wood and Blanding's turtles, the open market value of each species and (in general terms

1995

1996

1997

1998

37

46

51

50

at least) the overall extent of commercial trading activities.

Commercial Dealer Price Lists. — In the initial phases of data collection, the stock availability and price lists of over 160 different U.S. live reptile dealers and/or breeders were examined for the presence or absence of turtles. While publication dates generally span the time period of 1980–98 inclusive, significantly greater numbers of price lists were available for examination from more recent years of the sample. The proliferation of live reptile dealers and increasing reliance on Internet communication, as well as an enhanced "survivability" of printed lists produced more recently, are the major contributing factors to this phenomena.

Live reptile traders whose price lists did not include turtles or tortoises were then eliminated from the sample, leaving a total of 54 U.S. dealers or breeders that routinely offered chelonians of one type or another for sale. These 54 turtle dealers were distributed throughout the U.S. with 22 different states having at least one former or existing representative. Florida and California, with 15 and 12 turtle traders respectively, led all states in terms of total number of individual dealers sampled. Other states with multiple sampled dealers included Ohio and Texas with 3 each and Arizona, North Carolina, and Washington with 2 dealers apiece. Alabama, Alaska, Arkansas, Illinois, Iowa, Maryland, Michigan, Missouri, Nevada, New Hampshire, New Jersey, New York, Pennsylvania, Utah, and Virginia each contributed a single sampled dealer to the survey. A total of 145 individual price lists were reviewed, including multiple examples for 23 of the 54 U.S. commercial turtle traders, with late 1997 or 1998 price lists being utilized in all cases of dealers included by virtue of a single sampled catalogue. Price list survey results have been summarized in Table 1.

Data analysis revealed Blanding's turtle being offered for sale at one time or another by 8 of the 54 U.S. turtle dealers. It is important to note, however, that this number includes at least 2 and possibly 3 dealers brokering animals included on the price lists of other sampled traders. Blanding's turtle dealers, including those brokering animals, were located in California, New Hampshire, Ohio (1 per state), and Florida (5 dealers). The inclusion of New Hampshire in the preceding list is of particular interest as Emydoidea blandingii is currently fully protected by that state's non-game wildlife legislation (Levell, 1997). The protective status of Blanding's turtle throughout the species range has been summarized in Table 2. With the exception of the one California dealer whose catalogues have consistently included hatchlings since at least 1989, Emydoidea appears to be a relatively recent and sporadic addition to the livestock lists of all active dealers sampled to date. Blanding's turtles are virtually absent from other sampled lists prior to 1996 and the species was not included in the catalogues of 2 of the remaining dealers until late 1997 or early 1998. In all cases, specimens available for sale were advertised as captive-bred hatchlings.

In comparison, wood turtles have been offered for sale at one time or another by 14 of the 54 dealers sampled. Clemmys insculpta traders are located in Florida (7 dealers), North Carolina (2 dealers), and in California, Iowa, New Hampshire, Ohio, and Texas (1 per state). Wood turtles are legally protected by the endangered species and/or non-game wildlife legislation of two of the states (Iowa and New Hampshire) included in the preceding list (Levell, 1997). The protective status of the wood turtle throughout the species' range is summarized in Table 2. Unlike Blanding's turtle, C. insculpta is a long time "staple" item on the livestock catalogues of most active dealers with specimens being included on multiple price lists for all but 3 of the wood turtle dealers sampled to date. Only one price list was available for examination, however, for each of the 3 previously mentioned single occurrence

\$75-\$150

\$75-\$150

\$75-\$150

\$75-\$150

Average Purchase Price (per Specimen) Total No. Number of Dealers Offering E. blandingii C. insculpta Turtle Adult/Subadult Year Dealers E. blandingii C. insculpta Hatchling Adult/Subadult Hatchling 1980 2 N/A \$35-\$45 3 \$35-\$45 1981 1 N/A 4 2 \$35-\$45 1982 N/A 22 4 \$35-\$45 N/A 1983 1984 4 \$40-\$50 N/A 2 1985 6 N/A \$40-\$50 1986 6 2 N/A \$40-\$50 77 2 1987 N/A \$50-\$75 3 \$50-\$75 1988 \$25-\$35 \$25-\$35 8 3 N/A \$50-\$75 1989 \$20-\$30 8 3 \$20-\$30 \$50-\$75 1990 N/A \$25-\$35 1991 9 4 N/A \$30-\$40 \$75-\$100 \$25-\$35 5 \$75-\$150 1992 11 \$25-\$35 N/A \$35-\$50 6 1993 14 \$25-\$35 N/A \$35-\$50 \$75-\$150 9 1994 28 \$35-\$50 \$75-\$150 \$25-\$35 N/A

\$30-\$40

\$40-\$60

\$75-\$90

\$100-\$125

N/A

N/A

N/A

N/A

\$35-\$50

\$35-\$50

\$35-\$50

\$35-\$50

10

13

13

12

3

5

8

Table 1. Availability of Blanding's (*E. blandingii*) and wood turtles (*C. insculpta*) on price lists of 54 U.S. reptile dealers routinely offering turtles and tortoises for sale 1980–98.

dealers. While active traders have consistently advertised available wood turtles as being captive bred, adult and subadult specimens have occasionally been offered for sale by 4 of the sampled dealers. This includes at least 2 adult pairs offered for sale as recently as early 1998. The occasional (and in most cases, comparatively recent) inclusion of Emydoidea on the price lists of 6 of the 14 currently active wood turtle dealers may also be potentially significant.

Display and Classified Advertisements. — Secondary data gathering activities included a review of the classified and display advertisements contained within the pages of 11 different regional and national herpetological and animal trading periodicals published in the U.S. during the time period of 1983-98 inclusive. Data collection mirrored that of the dealer price list survey, with each periodical's issues being systematically examined for the presence of both Blanding's and wood turtle advertisements. Results are summarized in Table 3.

While not as informative as the dealer price list survey (collected data included wanted, for sale/trade, and advertisements duplicated in consecutive issues), this periodical

1994).

advertisement review may still provide at least some indication of the level of interest in Blanding's and wood turtles demonstrated by U.S. turtle collectors. The inclusion of traditional classified ads, as well as commercial display advertisements, enables the recovery of information on the activities of private individuals that would otherwise remain unavailable and which could conceivably account for a significant percentage of all trading activities. At the same time, any and all commercial turtle traders participating in the placement of display or classified advertisements for either wood or Blanding's turtles (or both) were equally well represented in final survey results.

Summarized briefly, data analysis seemed to reveal significantly less overall interest in Emydoidea in comparison to C. insculpta among American turtle collectors, an observation which may be further supported by the relative scarcity of advertisements of available specimens for the former species on the part of commercial reptile dealers. Combined classified and display advertisements for Blanding's turtle, for example, numbered 31, of which 11 were seeking to obtain animals (wanted) rather than offering

U.S. State or Canadian Province Emydoidea blandingii Clemmys insculpta Connecticut Considered Non-indigenous¹ Protected No Special Protection Delaware Not Indigenous Illinois No Special Protection Considered Non-indigenous²

Table 2. Protective status of Blanding's and wood turtles (1998) (Sources of distributional data: Froom, 1976; Iverson, 1992; Ernst et al.,

A A A A A A A A A A A A A A A A A A A	Tto bpeela Trotection	considered i ton-margenous
Indiana	Endangered	Not Indigenous
Iowa	No Special Protection	Endangered
Maine	Endangered	Commercial Exploitation Prohibited
Maryland	Not Indigenous	Limited Possession ³
Massachusetts	Threatened	Special Concern (Legally Protected)
Michigan	Special Concern (Legally Protected)	Special Concern (Legally Protected)
Minnesota	Threatened	Threatened
Missouri	Endangered	Not Indigenous
Nebraska	Commercial Exploitation Prohibited	Not Indigenous
New Hampshire	Controlled (Legally Protected)	Controlled (Legally Protected)
New Jersey	Non-native Herpetofauna	Threatened
New York	Threatened	Protected
Ohio	Limited Protective Status ⁴	Natural Occurrence Disputed ⁵
Pennsylvania	Collection Prohibited	Commercial Exploitation Prohibited
Rhode Island	Considered Non-indigenous ⁶	Protected (Legally Protected)
South Dakota	Endangered ⁷	Not Indigenous
Vermont	Not Indigenous	No Special Protection
Virginia	Not Indigenous	Threatened
West Virginia	Not Indigenous	Commercial Exploitation Prohibited
Wisconsin	Threatened	Threatened
New Brunswick (Canada)	Not Indigenous ⁸	No Special Protection
Nova Scotia (Canada)	Threatened (Collection Prohibited)9	Vulnerable (Collection Prohibited)9
Ontario (Canada)	Collection Prohibited	Vulnerable (Collection Prohibited)9
Quebec (Canada)	Collection Prohibited	Vulnerable (Collection Prohibited)9

¹ Included in the species distribution map of Iverson, 1992. Considered non-indigenous by the Connecticut Dept. of Environmental Protection.

² Despite reported specimens (Dancik, 1974), considered non-indigenous by the Illinois Dept. of Natural Resources.

³ Personal possession limited to one specimen. Collection from the wild prohibited.

⁴ Collection from state owned or controlled waters prohibited.

⁵ Despite reported specimens, considered non-indigenous by the Ohio Dept. of Natural Resources (Rice, 1996).

⁶ Included in the species distribution map of Iverson, 1992. Considered non-indigenous by the Rhode Island Dept. of Environmental Management.

⁷ Occurrence in South Dakota based on two recorded specimens (Backlund, 1994).

⁸ Recorded specimens believed transported into New Brunswick via human activities.

⁹ Designation a status evaluation only. Collection and/or possession prohibited via other aspects of provincial wildlife law.

Table 3. Blanding's and wood turtle classified and display advertisements, United States 1983–98. Periodicals sampled with total number of issues reviewed in parentheses: Breeder's Monthly Journal (14), California Turtle and Tortoise Club (96), Captive Breeding Magazine (10)¹, Chicago Herpetological Society (202)², Greater Cincinnati Herpetological Society (84), Greater San Antonio Herpetological Society (7), Michigan Society of Herpetologists (12), Northern Ohio Association of Herpetologists (155), Reptile & Amphibian Magazine (56)¹, Reptiles Magazine (60)¹, Vivarium (52)¹.

	Number of Issues Sampled	Number of Advertisements per Species	
Year		E. blandingii	C. insculpta
1983	30		2
1984	42	1	1
1885	39		1
1986	38	1	5
1987	35	2	2
1988	39	1	2
1989	40	6	6
1990	57	5	2
1991	71	2	3
1992	59	3	4
1993	58	1	4
1994	58	3	2
1995	57		7
1996	59	2	14
1997	56		12
1998	58	4	10
Totals:	748	31	79

¹ All issues published through 1998.

² Combining 154 issues of the CHS Bulletin (1983–98) and 48 issues of the CHS Newsletter (1983–87).

specimens for sale or trade. The percentage of ads placed by private individuals was also disproportionally large, with only 5 advertisements being attributable to commercial turtle dealers (1 wanted, 4 for sale). Public institutions contributed 2 ads (wanted for display) to the total number as well. The earliest documented Blanding's turtle ad was placed in 1984 with a total of 11 of the 31 recorded advertisements appearing prior to 1990. Advertisements placed by commercial turtle dealers include one in 1996 (wanted) and 4 in 1998.

Advertisements for wood turtles, on the other hand, totaled 79, of which only 23 were seeking to obtain rather than sell specimens. With the exception of 2 advertisements contributed by public institutions (wanted for display), private individuals placed all recorded want ads. Of the 56 advertisements offering specimens of C. insculpta for sale or trade, commercial turtle traders placed 45. A private individual placed the earliest documented wood turtle advertisement (wanted) in 1983 with at least one additional ad being recorded in each subsequent year. Commercial advertisements offering C. insculpta for sale were initially recorded in 1992 and have demonstrated a steady and significant increase in number and frequency since that date. This phenomenon is certainly an artifact of biased data resources (i.e., commercial advertisements are largely non-existent prior to 1992), and cannot be viewed as indicative of any actual increase in wood turtle trading activities. One

commercial dealer located in New Hampshire, for example, has consistently offered wood turtles for sale in 15 consecutive issues (1997–98) of a popular and widely distributed reptile hobbyist magazine. This same dealer has placed similar ads in other recent herpetological publications as well.

Reptile Swaps, Expos, and Pet Stores. — By far the most difficult aspect of the North American live animal trade to quantify are those activities occurring at reptile expositions, swap-meets, and pet stores. While undoubtedly proliferating rapidly, these expanding U.S. markets are virtually impossible to adequately survey and relatively little statistical information exists regarding their role in the ongoing reptile trade. Some anecdotal comments based upon my personal observations of both the "neo-traditional" breeder's expo/swap-meet marketplace and more typical retail outlets, as well as a few previously published statistics, may possibly still prove of some value.

Generating an estimated gross annual income of as much as \$65 million (Anonymous, 1993), the sale of amphibians, reptiles, and related supplies is an increasingly lucrative component of the domestic retail pet trade. This revenue, however, is produced for the most part via the sale of large numbers of a few comparatively inexpensive species and a corresponding amount of much more costly equipment. Average expenditures on caging, heaters, lighting, and other assorted accessories, may conceivably generate as much as 3 to 5 times the amount of income produced by the sale of livestock alone. Nonnative species also contribute significantly to the total number of live animals sold, with a minimum of about 1.5 million exotic reptiles including an unknown number of chelonians legally imported into the U.S. annually (Levell, 1996).

Unfortunately, it is currently impossible to estimate what percentage of the U.S. pet industry's gross annual income is directly attributable to the sale of live turtles and tortoises on the basis of existing statistical data. Survey results provided in the report of the Pet Trade Master's Project (Deal et al., 1997), for example, suggest that somewhere between 2.9 and 7.4 million "turtle-owning households" exist within the U.S. at the present time. These figures are difficult to reconcile with other published statistics, however, which provide an estimated total of only 3.2 million U.S. households owning a reptile of any type (Ramus, 1995). Of course, there is a distinct possibility that a disproportionally large percentage of U.S. turtle owners obtain their animals from sources other than typical retail pet stores. In any case, reliable information on which chelonian species are most heavily exploited or the actual numbers of specimens traded has yet to be discovered.

Inexpensive turtles and tortoises, nevertheless, do predominate in traditional retail outlets, where surprisingly few chelonians priced at over \$50 to \$60 are normally offered for sale. Commonly available species with a current retail price of \$60 or less include red-eared sliders (*Trachemys scripta* elegans), painted turtles (Chrysemys picta), box turtles (Terrapene sp.), false maps (Graptemys pseudogeographica ssp.), and assorted North American kinosternids (mainly Sternotherus odoratus and Kinosternon baurii). Various similarly priced non-native species, including African sidenecks (mainly Pelomedusa subrufa), hingeback tortoises (Kinixys sp.), and a diverse array of Southeast Asian batagurines (some apparently "salvaged" from Oriental food markets), are often readily available as well. Due to federal legislation restricting the large-scale commercialization of live chelonians under 4 inches in carapace length — certainly cause for concern from a conservation standpoint — adult and subadult specimens account for the vast majority of all chelonians traded by U.S. pet retailers.

Blanding's and wood turtles, however, appear to be subjected to little if any exploitation by mainstream U.S. pet trade activities at present. Repeated inquires directed at numerous retail outlets, as well as larger wholesale livestock distributors, consistently failed to reveal specimens, although it is possible that scattered "strays" (i.e., animals brought in by neighborhood youths, customers, etc.) do still enter the market on rare occasions. The nearly range-wide protective status of both species will hopefully continue to help minimize such occurrences in the future. While a number of factors may be at least partially responsible for the current lack of exploitation, wood and Blanding's turtles quite likely simply exceed a naturally imposed "supply and demand" threshold of how much average U.S. consumers will actually pay for a turtle. Based on the standard industry-wide practice of multiplying livestock costs by a factor of 3 and the prevailing 1998 dealer's prices for Blanding's and wood turtles, legally sized 4-inch specimens of either species would be expected to retail for as much as \$300 or more. With the exception of large Psittacine birds and purebred dogs, this is far more costly than virtually any animal normally offered for sale in most U.S. retail pet stores.

The potential impacts of captive breeder's expositions and reptile swap-meets, on the other hand, may be a different matter entirely. A comparatively recent phenomenon, these alternative live animal markets have grown from a total of only 2 annual showcase events held in Orlando, Florida, and San Diego, California, during the early 1990s into the multitude of monthly (or even more frequent) exhibitions now occurring throughout the United States. Depending upon the promoters, such events range in quality from legitimate, well-organized, and relatively effectively policed "captive-bred only" expositions, all the way down through free-for-all, almost black market debacles of little or no merit whatsoever. Included among the former category are the aforementioned Orlando and San Diego Professional Reptile Breeder's Expositions, the Mid-Atlantic Reptile Show in Baltimore, Maryland, and several other captivebred reptile swaps sponsored by regional herpetological societies. The promoters of these typically annual events (biannual in the case of San Diego) have established relatively clear-cut written guidelines regarding both the

quality and legality of all exhibited animals and strive hard to enforce these policies throughout all procedural stages. Vendor displays are vigorously inspected visually, with any animals of questionable origin being removed, forcibly if necessary, from the showcase floor. The participation of state and federal wildlife agencies is not only welcomed but actively encouraged as well. Exhibition space is provided (usually gratis), with Conservation Officers and other law enforcement personnel having open access to any and all vendor's displays throughout the duration of these events. This readily allows for official inspection of vendor licenses, permits, and livestock by authorized government agents, further reducing potential illegal trading activities. Unfortunately, the exact number of reptile swaps, legitimate or otherwise, now occurring within the U.S. on an annual basis is currently unknown.

The diversity of species offered for sale at reptile swaps may also be exceptional, and typically includes prodigious quantities of all commonly available species as well as a variety of animals almost certainly unobtainable via traditional U.S. pet industry sources. Chelonians encompassed within this latter group of animals include rare and threatened species such as the radiated tortoise (Geochelone radiata), Galápagos tortoise (G. nigra), Aldabran giant tortoise (Aldabrachelys elephantina), spotted pond turtle (Geoclemys hamiltonii), Fly River or pig-nosed turtle (Carettochelys insculpta), and the bog turtle (Clemmys muhlenbergii). Livestock prices, while obviously subject to some variation, generally closely approximate prevailing wholesale cost and probably most accurately reflect the open market values of all traded species. Hatchling-sized specimens of abundant North American turtles, for example, are routinely priced at \$10 or less with individuals of the most common species (i.e., T. scripta, C. picta, S. odoratus) often selling for as little as \$1 to \$2 apiece. At the opposite end of the scale, prices of at least \$1000 up to as much as \$10,000 or more may be regularly associated with individual specimens of the three previously mentioned tortoises.

Although currently unsupported by relevant statistical data, it is clear that Clemmys insculpta has been offered for sale (where legal to do so) at reptile swaps since the inception of these events. My personal observations have confirmed the presence of substantial numbers of hatchling-sized wood turtles, for instance, at the annual Orlando Reptile Breeder's Exposition in each of the previous 6 years with as many as a dozen of the approximately 250 attending vendors displaying specimens of this age-class during 1998. It is important to note, however, that each of these 1998 vendors was also included among those commercial wood turtle dealers whose price lists were reviewed elsewhere in this report. While adult and subadult wood turtles have been in evidence on 3 to 4 occasions during this time period as well, the absolute maximum number of individuals in these ageclasses available for purchase has certainly never exceeded 10 (generally no more than 5-6) in any given year. Wood turtle prices at the Orlando show average between \$50 to \$75 per hatchling and \$125 to \$150 per subadult or adult.

Conversely, Blanding's turtles were not recorded at the Orlando Breeder's Expo in any year prior to 1997, when one well-known dealer offered a half-dozen or so hatchlingsized specimens for sale. This same individual and two additional vendors displayed Emydoidea during 1998, with each dealer exhibiting hatchling age-class specimens in typical single clutch-size quantities (8-10 specimens per vendor) or less. As is the case with C. insculpta, these three vendors were included among the commercial Blanding's turtle suppliers whose price lists were reviewed elsewhere in this report. Also noteworthy, and possibly indicative of overall interest in the species among more "sophisticated" turtle collectors, all three vendors exhibiting Emydoidea still had multiple specimens priced at \$100 to \$125 each available for purchase at the end of the 1998 show. As one of the oldest and largest of these events in the country, Orlando Expo trade activities may be considered fairly representative of those occurring at similar markets elsewhere within the United States.

Price Lists and Periodicals from Other Countries. — In an attempt to evaluate the level of interest in wood and Blanding's turtles among foreign chelonian enthusiasts, preliminary data were gathered from a variety of countries including Canada, France, Germany, Netherlands, Spain, Sweden, United Kingdom, and Japan. All of these countries are notable for active herpetocultural communities that, theoretically at least, help sustain apparently thriving live reptile markets. At least two of the preceding countries, Germany and Japan, are often implicated as probable destinations for a wide variety of illegally obtained animal species as well. Data resources analyzed included recent price lists (1997 or 1998) from at least one commercial turtle dealer in each of the previously mentioned countries (2 in both Germany and Japan), as well as the classified/display advertisements contained within the pages of about 60 assorted issues of foreign herpetological periodicals. Foreign periodicals contributing sampled issues include Bible of Reptiles and Amphibians (Japan), Ophidiophile/Reptile Life (Canada), Reptilia (Spain), Reptilian (United Kingdom), Sauria (Germany), Schildkröte Fachmagazin (Germany), Tortoise Trust Newsletter (United Kingdom), and Vivarium Guide (Japan).

With the exception of a single, phone directory type classified advertisement (i.e., no actual specimens advertised) in *Schildkröte Fachmagazin*, a newly established (1998) chelonian hobbyist periodical, Blanding's turtle was conspicuously absent from all foreign data resources surveyed. The species was not recorded from the price lists of any sampled European or Japanese dealer and no specimens of any age-class were actually offered for sale and/or trade in the display or classified advertisements of reviewed foreign periodicals. Colleagues in Japan, Germany, Sweden, and United Kingdom provided further evidence of an overall scarcity of *Emydoidea* in overseas animal mar-

kets as well, as these individuals consistently reported an almost total lack of available specimens, at least over the past several years, within each of their respective countries. The apparent absence of *Emydoidea* in foreign markets at present is interesting, particularly in the case of Japan where a wide assortment of relatively rare chelonians including several "protected" North American species are routinely and openly advertised for sale. While a general similarity in appearance to the widespread European pond turtle (*Emys orbicularis*) is probably largely responsible for the current low level of Blanding's turtle exploitation occurring among foreign chelonian traders, any number of additional known and unknown factors may also contribute significantly.

The wood turtle, in contrast, has been recorded multiple times among the foreign price lists and periodicals sampled thus far. Countries contributing at least one recorded C. insculpta advertisement include United Kingdom, Germany, and Japan. Recorded occurrences of wood turtles in these overseas reptile markets include an alphabetical directory style listing in Schildkröte Fachmagazin and a few wanted/ for sale classifieds, as well as a number of relatively sophisticated, high quality commercial display advertisements. Wood turtle exploitation was far and away most evident in Japan, where the species was recorded from the display advertisements of at least five different commercial turtle suppliers. With one notable exception, color or b/w photographs of C. insculpta were prominently featured in each of these Japanese display advertisements. Unfortunately, the wood turtles depicted in these photos have invariably been specimens of adult age-class. All occurrences of wood turtles in British and German markets recorded to date have been strictly confined to more typical classified advertisements, but it is highly probable that commercial dealers in one or both countries at least occasionally include C. insculpta in their price lists. It is also reasonable to assume that traded specimens will eventually be recorded in other European live reptile markets as well.

Discussion

The data generated by this study, while still far from comprehensive, provide no indication of any large-scale exploitation of *Emydoidea* in domestic or foreign live reptile markets. The species has been recorded from the price lists of comparatively few commercial dealers (all located within the U.S.), although such occurrences have demonstrated a slight increase over the past 2 to 3 years. Total number of Blanding's turtles offered for sale on an annual basis remains extremely low, however, with only specimens of hatchlingsized age-classes thus far recorded from all surveyed commercial resources. Per-dealer quantities of available specimens have also invariably remained within typical average single clutch size parameters (8–10 animals). The small number of hatchlings offered for sale, as well as additional factors including the very real possibility that at least some commercially traded Blanding's turtles have been legitimately produced in captivity, suggests that current commercial trade activities warrant only relatively minor conservation concern for the species. Historically, pet trade exploitation of *Emydoidea* has probably always been negligible as well, with the vast majority of all individuals formerly harvested from wild populations either utilized as commercially traded preserved biological specimens or as human food (Harding, 1990a, 1997).

Accurately assessing the extent and potential impacts of wood turtle exploitation is a much more complex proposition, and is a topic certainly well beyond the intended scope of this report. It may be important to note, however, that pet trade exploitation of the species is by no means a recent phenomenon, as wood turtles have long been popular captives among chelonian enthusiasts everywhere. At the same time, the collection and sale of wild-caught specimens of C. insculpta has probably exhibited little significant increase in overall intensity, particularly within the U.S., over the past 2 or 3 decades. If anything, the American marketplace has demonstrated a decided shift away from the sale of adult and subadult wood turtles with hatchling and young juvenile age-classes now accounting for the majority of all traded specimens. Most such currently traded C. insculpta hatchlings may very well be legitimately captive-produced as well. Determining the legality of traded adults and older juveniles is more problematic, as illicitly obtained specimens of these age-classes are undoubtedly sold on occasion (Rosenberg, 1996; Bartlett, 1997). As a long-lived species that is readily reared in captivity, however, and contrary to previously published opinion (Rosenberg, 1996), all adult and subadult wood turtles currently offered for sale cannot be automatically assumed to be illegal.

Previously published statements such as "the most serious recent threat to wood turtles is commercial collecting for the pet trade" (Harding 1990b; Ernst et. al., 1994) were based on prevailing trends during the decades preceding the 1990s. Harvesting activities were indeed more widespread in the past, with far greater numbers of wood turtles removed from wild populations and subsequently sold, prior to the more recent enactment of nearly range-wide protective legislation. In contrast, *Chrysemys picta* and other similarly exploited "common" North American chelonians are currently being harvested in larger quantities each year. The ramifications of increased collecting pressure on the conservation status of these currently abundant species, although almost certainly of concern, are issues that remain largely unexplored.

Regardless of cause, the potential consequences to the overall survivability of wild populations inherent in any continued, methodical loss of older age-class turtles cannot be overestimated. This is particularly true of late-maturing, cold temperate zone species like *Emydoidea*, in which average annual adult and larger juvenile survivorship must approach nearly 100% if populations are to be maintained as viable, self-sustaining ecological components (Congdon et. al., 1993). While little confirmatory research has been published thus far, a similar high rate of average adult survivorship appears to be equally critical to the long-term persistence of functional wild populations in all *Clemmys* species. Survivorship requirements notwithstanding, populations of these turtles are clearly losing animals in numbers far exceeding any realistic sustainable limit. Obviously, the live reptile trade has contributed significantly to such losses. Eliminating or at least minimizing the impacts of future trade activities may require the unmistakable permanent marking, conceivably via Passive Integrated Transponder (PIT tag) technology, of as many captive and free-ranging specimens as possible.

It is equally obvious, however, that an assortment of additional factors adversely impacting U.S. turtle populations are still far from adequately resolved. Included among these factors are such issues as habitat loss, introduced exotic species, pollution, road mortality and increased predation, as well as outright vandalism (i.e., firearms target practice) and simple opportunistic collection by canoeists and fishermen (Klemens, 1989; Harding, 1990b). Incidental disturbances, especially near areas of high communal nesting or hibernation activity, attributable to the waterways management programs and recreational land-use policies of government agencies, have also been implicated in the decline or extirpation of some regional sub-populations (Garber and Burger, 1995; Buech and Nelson, 1997; Buech et al., 1997). Until detrimental aspects of these human activities - particularly when associated with accelerating levels of habitat fragmentation, degradation, and destruction - are legitimately confronted and finally eliminated or at least dramatically reduced, these factors will continue to be the most dangerous threats to the survival of most chelonian species.

Unfortunately, effectively addressing such issues may be beyond the capabilities of existing environmental and wildlife conservation policies. Certainly, Clemmys and Emydoidea populations have continued to disappear throughout the U.S. despite, in many cases, several consecutive decades of protective legislation. Such disappearances far too often appear to be symptomatic of an overall inability or unwillingness of state level government agencies to preserve sufficiently large areas of habitat, as well as a widespread lack of reasonable, commonsense effort directed toward enforcing currently existing regulations. More simply put, listing a species as protected and actually protecting that species are two very different things indeed. Regardless of how difficult or politically unpopular, the successful conservation of these turtles will undoubtedly require the preservation of all habitats important to all stages of their life history. Protected wetlands with unprotected nesting areas, or protected wetlands and nesting sites without safe migration corridors, can ultimately only result in further demise. Similarly, eliminating the systematic collection of animals from protected populations will only be possible when individuals engaged in illegal poaching and trading activities are finally captured, prosecuted, and punished.

The U.S. Endangered Species Act (ESA), although certainly a valuable conservation tool, is often plagued by similar problems and may carry a variety of largely unrecognized additional "costs" uniquely associated with federal wildlife legislation. Most prominent and disturbing of these costs is a redirection or "focusing" of unwanted attention on the very species being protected, often with a concurrent and clearly artificially induced inflation of the commercial value of that species on the open market. The bog turtle, Clemmys muhlenbergii, serves as an excellent example of just this scenario. In 1996, prior to ESA listing, bog turtle prices typically averaged approximately \$250 per hatchling and somewhere between \$500 to \$600 each for animals of older juvenile and adult age-classes. Following the announcement of impending federal protection in 1997, average asking price for specimens of C. muhlenbergii easily doubled, with adults and subadults currently selling on the open market for as much as \$1200 to \$1500 or more apiece. The possible reaction of individuals unscrupulous enough to still collect and/or sell wild bog turtles to such rapidly escalating commercial values obviously requires no additional discussion. Insuring that appropriate measures are taken to negate any possible adverse repercussions of ESA listing, however, remains of paramount importance. For commercially valuable and comparatively rare species like C. muhlenbergii, such actions clearly must include some method of efficiently monitoring virtually all known populations.

It is also unrealistic to view the commercial value of many chelonians as anything other than a simple and unpleasant "fact of life," which will not readily go away without considerable prodding. Conservation biologists working with turtles must therefore clearly recognize this value and react accordingly when formulating management plans for all such species. Perhaps, well-known dinosaur expert Peter Dodson expressed this attitude best in the following statement. "The value of certain fossils, however inconvenient it may be for us paleontologists, is as fundamental a reality as the roundness of the earth or the force of gravity. It behooves us to be in contact with all reality, not just selected facets of it." (Dodson, 1996). By substitution of the word "chelonians" in place of "fossils," as well as "herpetologists" in place of "paleontologists," Dodson's comments are equally applicable to commercially valuable turtles as well.

Unlike paleontologists who contend with disappearing fossils of organisms that no longer exist, herpetologists must be primarily concerned with preventing the extinction of not just some of the planet's turtles and tortoises, but possibly all of them. Species like Australia's western swamp turtle (*Pseudemydura umbrina*), Madagascar's angonoka or plowshare tortoise (*Geochelone yniphora*), and Kemp's ridley sea turtle (*Lepidochelys kempii*) are already precariously close to extinction. With threats to their survival now far exceeding anything ever experienced, many other chelonians are likewise clearly hurtling onwards into oblivion. It has become increasingly apparent, however, that preventing the extinction of each and every species will require the adoption of potentially controversial and certainly radically different solutions to a host of difficult problems.

Perhaps it is time to make chelonian hobbyist activities benefit turtle conservation instead of continuing a battle which currently simply cannot be won. To do so, the propagation of those animals already held in captivity must be encouraged. Regulated commercial trade in legitimate, captive-produced specimens should be permitted instead of prohibited, and restrictions on the sale of turtles under 4 inches in carapace length relaxed or repealed altogether. If managed properly, is it not possible for successful captive propagation to significantly reduce or possibly even eliminate the compulsion to remove additional turtles from wild populations?

Such is already proving to be true in the case of the African spurred tortoise (Geochelone sulcata) with absolutely no management at all. As recently as the late 1980s and very early 1990s imported wild-caught specimens accounted for virtually every G. sulcata available in U.S. markets, with fully mature individuals of both sexes typically selling at prices of \$1000 or more. An extremely hardy species that readily breeds in captivity, captive-produced hatchlings began appearing on the price lists of U.S. turtle dealers with increasing regularity during the mid 1990s. By 1997 and 1998 the species was easily the most common chelonian offered for sale at the Orlando Reptile Expo, where several hundred hatchlings priced at as little as \$30 to \$35 apiece were available for purchase in each respective year. Hatchlings are now available through a myriad of additional outlets as well, and G. sulcata is currently the second most frequently advertised chelonian among U.S. reptile dealers (JPL, unpubl. data). In fact, this amazingly prolific species will most likely quickly become a nuisance, as the large size attained by even comparatively young specimens (10 to 25 kg at 5 to 6 years of age) will almost certainly make these animals unwelcome in the homes of all but the most dedicated tortoise enthusiasts.

Serious chelonian hobbyists have also demonstrated an ability to breed many other species in captivity, including Blanding's, wood, and bog turtles. Perhaps now more than ever they should be granted the opportunity to do so. Such efforts may ultimately help preserve these turtles into an increasingly uncertain future.

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