# Familiar Faces? Assessing the Representation of Live, Native, Terrestrial Mammalian Wildlife in Massachusetts Museum Environments

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Abstract

Captive display presents the public's best opportunity to gain firsthand access to live animals under reasonably controlled circumstances, and the museum milieu can further enrich the experience by providing positive, pertinent, on-the-spot interpretation. A main premise of this thesis is that Massachusetts museums may not be taking full advantage of opportunities to introduce citizens to local mammalian biodiversity, what might be interesting or important to know about it, and the ramifications of our shared occupation of the environment.

The zoo profession has embraced conservation education as "the best and most viable reason for the continuing existence of zoos [that] can be found" (Hancocks, Different xviii). Traditionally, zoos have concentrated their collection energies on the accumulation of exotic animals. When only exotic animals are on display, it is easier for visitors to ignore the issues that may directly impact upon themselves and their local environment. By collecting and exhibiting native species, zoos can demonstrate that they are of value and worthy of conservation, and educate visitors on how conservation might be accomplished.

This thesis assesses: 1) the extent to which, among museums in Massachusetts with a live animal collection, native terrestrial mammalian wildlife species (NTM) are on exhibit; 2) the exhibition style and interpretive focus employed in the presentation of these animals; and 3) the factors that have informed the museums' collection strategies in this regard.

Collectively, there are 12 zoo-museums displaying 23 of Massachusetts' 56 NTMs. Presentation formats vary from small indoor terrariums to immersive enclosures which allow visitors to join an NTM in a sizeable outdoor wetlands environment. Some fact distinct to the species is the most frequently shared detail beyond species identity; details on typical or historical interactions and impacts between the NTM and humans is the subject least broached in interpretive signage. The majority of the zoos have a formal collection plan in place that makes specific calls to include native Massachusetts species and acknowledge that showcasing wildlife that live closest to home can be an effective means to inspire appreciation of the local environment. Curators in this state appear to recognize that inclusion of the local field and forest

species can make an important contribution to the practicable impact of their living collections, but exhibition practice could be updated to better accomplish conservation education objectives.

## Biographical Sketch

During a stint in New Zealand on a Fulbright scholarship, I took great pleasure in learning of that nation's native flora and fauna. It was quite easy to come by information about the local species, as the nation is rather proud of its unique ecology and openly flaunts it. It struck me that my homeland, New England, did not seem to so readily disclose its own natural heritage. This at first saddened, but ultimately inspired me, and an interest in remedying this dearth is what originally led me to enroll in Introduction to Museology, at the time engagingly co-taught by Carl Francis and Shelley Monaghan. In this culmination to my time spent involved with the Harvard Extension School's Museum Studies program, I address the issue that had initially set me upon this academic pursuit.

# Acknowledgments

I owe a debt of gratitude to numerous individuals. [To be continued…]

Table of Contents

List of Tables

List of Figures

# Chapter I

## Introduction

According to records kept from the Colonial period onwards, fifty-seven naturally occurring wild terrestrial mammalian species have inhabited Massachusetts (Cardoza, Jones, and French; see Table 1). Other than the sea mink, which went extinct in 1890 (Williams and Nowak 134), all also make homes beyond state borders. Seven, however—elk, lynx, marten, mountain lions, gray wolves, wolverines, and the Indiana bat—now do so exclusively; they are considered extirpated (extant elsewhere, but extinct at the state level). Presently, four resident species are on Massachusetts' list of species of "Special Concern" (at risk of being classified as "Threatened, " the precursor to "Endangered"), and the New England cottontail rabbit now has only "spotty distribution." The remaining forty-five species, which include a few that have re-established populations following a period of extirpation, are relatively widespread.

Nevertheless, if you ask a child growing up in Massachusetts to name his or her favorite wild animal from this state, you are as likely to hear things like "polar bear" and "giraffe" as "raccoon" or "moose," according to an anecdote shared by Massachusetts Division of Fish and Wildlife (MassWildlife) Education Coordinator, Pam Landry (5/31/08). Where would these children get the idea that an Arctic or African mammal laid equal claim to the local species' home turf? By coming face to face with the creatures on a visit to one of the state's several zoos, they say. In the immediate experience of most urban dwellers, as sociologist Bob Mullan and social anthropologist Garry Marvin have observed, this is where wild animals naturally occur; "they are born in the zoo, and they eat, sleep, breed and die there" (12).

The likelihood of spotting species such as beaver, coyote, moose, and bear is on the rise in residential areas, but apart from the omnipresent gray squirrel or the occasional opossum, raccoon, or skunk on an urban foray, the majority of Massachusetts' primarily city-dwelling populace[1] are unlikely to encounter many of their native mammals in situ. MassWildlife encourages visits to sixty-seven specific outdoor sites statewide, claiming they provide "some of the finest wildlife viewing opportunities in a variety of habitats" (Wildlife), but there is no guarantee any animal will be witnessed, and any fortunate observation may be limited to a remote or momentary glimpse. "Humans are intrusive in this environment and are at a

Table 1: Native, Terrestrial, Mammalian Wildlife Species of Massachusetts

| **Found Statewide** | | | **Regional Distribution within MA** | |
|---|---|---|---|---|
| White-Tailed Deer (Odocoileus virginianus) | Big Brown Bat (Eptesicus fuscus) | Red Squirrel (Tamiasciurus hudsonicus) | Moose (Alces alces) | Eastern Small-footed Bat[sc] (Myotis leibii) |
| Common Gray Fox (Urocyon cinereoargenteus) | Little Brown Bat (Myotis lucifugus) | Eastern Gray Squirrel (Sciurus carolinensis) | Bobcat (Lynx rufus) | New England Cottontail Rabbit (Sylvilagus transitionalis) |
| Red Fox (Vulpes vulpes) | Northern Long-eared Bat (Myotis septentrionalis) | Eastern Chipmunk (Tamias striatus) | Black Bear (Ursus americanus) | American Beaver (Castor canadensis) |
| Coyote (Canis latrans) | Hoary Bat[m] (Lasiurus cinereus) | Southern Flying Squirrel (Glaucomys volans) | Hairy-tailed Mole (Parascalops breweri) | Common Porcupine (Erethizon dorsatum) |
| Striped Skunk (Mephitis mephitis) | Eastern Pipistrelle[m] (Pipstrellus subflavus) | Woodchuck (Marmota monax) | Eastern Mole (Scalopus aquaticus) | North American Deermouse (Peromyscus maniculatus) |
| Fisher (Martes pennanti) | Eastern Red Bat[m] (Lasiurus borealis) | Masked Shrew (Sorex cinerius) | Common Water Shrew[sc] (Sorex palustris) | Southern Bog Lemming[sc] (Synaptomys cooperi) |
| Ermine (Mustela erminea) | Silver-haired Bat[m] (Lasionycteris noctivagans) | Northern Short-tailed Shrew (Blarina brevicauda) | Rock/Long-tailed Shrew[sc] (Sorex dispar) | Northern Flying Squirrel (Glaucomys sabrinus) |
| Long-tailed Weasel (Mustela frenata) | Southern Red-backed Vole (Clethrionomys gapperi) | Star-nosed Mole (Condylura cristata) | Smoky Shrew (Sorex fumeus) | Woodland Jumping Mouse (Napaeozapus insignis) |
| Northern River Otter (Lontra canadensis) | Meadow Vole (Microtus pennsylvanicus) | Meadow Jumping Mouse (Zapus hudsonius) | | |
| American Mink (Mustela vison) | Woodland Vole (Microtus pinetorum) | | | |
| Common Raccoon (Procyon lotor) | White-footed Deermouse (Peromyscus leucopus) | | | |
| Virginia Opossum (Didelphis virginiana) | Common Muskrat (Ondatra zibethicus) | | | |

| **Extirpated from MA** | | | |
|---|---|---|---|
| Canada Lynx[e] (Lynx canadensis) | American Marten (Martes americana) | Sea Mink[x] (Mustela vison macrodon) | Elk/Wapiti (Cervus elaphus) |
| Mountain Lion/Cougar[e] (Puma concolor) | Wolverine[e-P] (Gulo gulo) | Gray Wolf[e] (Canis lupus) | Indiana Bat[e] (Myotis sodalis) |

The 57 wild native terrestrial mammal species of Massachusetts are listed in the table above. Thirty-three have statewide distribution, 16 are represented only regionally, and eight are no longer expected within state borders. It is uncertain whether or not the red fox was an original inhabitant, but since it is possible, it shall be classified as such for the purposes of this thesis. Species are grouped by taxonomic order; refer to Table 2 for the taxonomic key.
(sc=Listed in Massachusetts as a species of "Special Concern"; m=Migratory species; e=Listed in the United States as "Endangered"; e-P=Conservation status is pending re-review by the federal Office of Endangered Species; x=extinct)

Table 2: Taxonomic Key for Table 1

<table>
<tr><th colspan="3">Found Statewide</th><th colspan="2">Limited Distribution</th></tr>
<tr><td>Artiodactyla/<br>Cervidae</td><td rowspan="5">Chiroptera/<br>Vespertilionidae</td><td rowspan="3">Rodentia/<br>Sciuridae</td><td>Artiodactyla/<br>Cervidae</td><td>Chiroptera/<br>Vespertilionidae</td></tr>
<tr><td rowspan="2">Carnivora/<br>Canidae</td><td>Carnivora/<br>Felidae</td><td>Lagomorpha/<br>Leporidae</td></tr>
<tr><td rowspan="2">Carnivora/<br>Ursidae</td><td>Rodentia/<br>Castoridae</td></tr>
<tr><td rowspan="2">Carnivora/<br>Mephitidae</td><td rowspan="2">Insectivora/<br>Talpidae</td><td>Rodentia/<br>Erethizontidae</td></tr>
<tr><td rowspan="2">Rodentia/<br>Muridae</td></tr>
<tr><td rowspan="3">Carnivora/<br>Mustelidae</td><td rowspan="2">Insectivora/<br>Soricidae</td><td rowspan="3">Insectivora/<br>Soricidae</td></tr>
<tr><td>Rodentia/<br>Sciuridae</td></tr>
<tr><td rowspan="3">Rodentia/<br>Muridae</td><td>Insectivora/<br>Talpidae</td><td rowspan="3">Rodentia/<br>Zapodidae</td></tr>
<tr><td>Rodentia/<br>Zapodidae</td></tr>
<tr><td colspan="3">Extirpated from MA</td></tr>
<tr><td>Carnivora/<br>Procyonidae</td><td>Carnivora/<br>Felidae</td><td colspan="2">Carnivora/<br>Mustelidae</td><td>Artiodactyla/<br>Cervidae</td></tr>
<tr><td>Didelphimorphia/<br>Didelphidae</td><td colspan="2"></td><td>Carnivora/<br>Canidae</td><td>Chiroptera/<br>Vespertilionidae</td></tr>
</table>

The organization of this table mimics Table 1, but taxonomic order and family (Order/Family) are provided in lieu of species .

disadvantage in the face of the animals' ability to observe, outwit and thus absent themselves from man's gaze" (Mullan and Marvin 76).

In the metropolitan setting, chance encounters with native wildlife are prone to be unwelcome and unlikely to provoke superlative preference; their growing presence can have negative impacts. Indeed, Ellie Horwitz, MassWildlife Chief of Information and Education, has cautioned that conflicts between humans and mounting mammal populations are inevitable and will necessitate implementation of potentially controversial control measures (6/27/07).

William Conway, former Director of the New York Zoological Society/Wildlife Conservation Society, made the observation that while urban populations have the least opportunity for ordinary acquaintance with wildlife, they are collectively the people with the greatest influence on wildlife-related policy developments ("Zoos" 48). This can be problematic if their decisions are guided by ill-informed biases; in a landmark study sponsored by the United States Fish and Wildlife Service, social ecologists Stephen Kellert and Joyce Berry concluded:

> …[Wildlife management] professionals often encounter a public with views dependent as much on bias and misunderstanding as on an adequate comprehension of an issue's complexity. Thus, it behooves managers to assess existing levels of public understanding and, in circumstances where wildlife knowledge is judged insufficient, to provide information which, hopefully, will render people more capable of forming intelligent perceptions (7).

Museums exhibitions are a valuable and engaging means of disseminating information, as respected exhibition developer and consultant Kathleen McLean has repeatedly posited; "an exhibition designed to encourage face-to-face interaction and dialogue among visitors—often strangers—is arguably one of the most vital contributions museums can make to the social dynamics of our times" (McLean, "Museum" 89). Apposite to Kellert and Berry's point, Deirdre Stam, a former Board member of the American Association of Museums (AAM), has declared that "the information to be derived by the public from the museum [and the] wisdom developed from that information—and it can be intellectual, aesthetic, sensory, spiritual or emotional—is to be used for subsequent decision-making in everyday life" (Stam 273).

In the 1970s, when establishing their Accreditation Commission, the AAM determined it was acceptable to expand the definition of museums to include zoos (Gurian 167). They are ~~very~~ unique museums in that their collections, rather than gathering dust in drawers or frozen in poses behind glass, are living, breathing, eating, occasionally reproducing organisms. "Modern zoo philosophy has it that just as

other institutions exist to preserve and present a cultural heritage so zoos exist to preserve a…natural heritage" (Mullan and Marvin 126).

Captive display presents the public's best opportunity to gain firsthand access to live animals under reasonably controlled circumstances, and the museum milieu can further enrich the experience by providing positive, pertinent, on-the-spot interpretation. According to Conway, "[Z]oo collections now provide the most important contact with living wild animals that many people will ever have" ("Zoo Conservation" 1-2). In the course of an international analysis of the socio-cultural aspects of live animal collection and exhibition, Mullan and Marvin nonetheless found, "Animals held in menageries and zoological gardens have traditionally been exotic wild animals which are thought of as coming from…wild lands not associated with the realm of human habitation, lands which conjure up notions of distance and of the wondrous" (Mullan and Marvin 2). Consequently, it can prove easier to sight an elephant within state borders than certain indigenous species.

A main premise of this thesis is that Massachusetts museums may not be taking full advantage of opportunities to introduce citizens to local mammalian biodiversity, what might be interesting or important to know about it, and the ramifications of our shared occupation of the environment. David Hancocks, a prominent zoo professional and long-time practitioner and proponent of exhibition of local species, has emphasized that regional themes are a desirable focus for live wildlife exhibition, and that the northeastern temperate hardwood forest habitat is in particular need of representation (Different 214-15; "Lions" 35). Massachusetts is "broadly representative of New England" in both culture and nature (Bernardos et al. 145), and the northeastern temperate hardwood forest is precisely the environment that the majority of its mammals inhabits.

Although another element of Hancocks' arguments for rethinking the typical content of zoo collections addresses the over-representation of mammals relative to other animals,[2] this thesis is being limited to a consideration of mammalian representation because mammals generally hold greater appeal for the public. Kellert and Berry's data showed that the American population, at least in the late 70s/early 80s, preferred mammals and birds to all other vertebrate classes (35). A 1998 study found that longer exhibit viewing times were enjoyed at zoos with greater numbers of mammal species on display (Johnston 337). Maintaining a mammalian focus in this study is not meant to imply that non-mammals are not equally

museum-worthy; it is merely meant to minimize the impact of confounding factors that may inhibit collection of other taxonomic groups by zoo curators.

Among museums in Massachusetts with a live animal collection, the extent to which live, native, terrestrial mammalian wildlife species (NTMs) are on exhibit; the factors that have informed the museums' collection strategies in this regard; and the exhibition style and interpretive focus employed in the presentation of these animals are herein assessed. Following from the results of this research, the potential for enhancing the role such displays may play in the future is explored.

# Chapter II

## Acquainting Oneself with Animals

### Indirect Access

Ann Bay, Director of the Smithsonian Center for Education and Museum Studies, has noted, "Museums… are not efficient places for learning facts. People can learn facts more efficiently by turning to, say, the Web or a book" (28). Indeed, widespread access to the internet enables many to simply point and click their way to a variety of text, photo, audio, and video presentations of information about animals. The search for information both online and in print media (e.g., field guides) can be tailored to target very specific and minute details, which in many cases would be impractical for a museum to present in its exhibitions.[3]

Television and cinema, too, have played a significant role in delivering informative and entertaining wildlife documentaries to their audiences; today's viewers may even enjoy following a reality TV series for an ongoing look at the lives of a specific group of animal individuals—as, for instance, in *Meerkat Manor*, a show produced by the Discovery Network's Animal Planet. *Microcosmos*, *Winged Migrations*, and *March of the Penguins* have all fared well on the silver screen. Their narrative style enables viewers to project themselves into the storylines, reacting to both intellectual and emotional content. There is also an almost certain guarantee that the celebrity species will be presented in frequent close-up, providing a perspective that is rarely available in reality.

Written and recorded media possess the capability to deliver great quantities of data and can also feature emotively engaging qualities. An additional advantage is their availability for repeated reference; one may revisit these resources to reinforce the internalization of their substance. They are irreplaceable tools of enlightenment for certain purposes.

### Ain't Nothing Like the Real Thing

The aforementioned media undergo a careful crafting and editing process before they reach their recipients: authors include only those details they deem relevant to their discussion; wildlife documentaries

are scripted, and what are meant to pass as natural scenes oftentimes are contrived. An information scientist warns, "Learners who are inexperienced viewers may not realize the ways in which the original differs from the reproduction and that the reproduction is not a substitute for seeing the real [thing]" (Frost 84). While a certain level of comprehension can be synthesized from others' accounts, scholarly or sensational, of interactions with and insights about wildlife, these portrayals cannot provide audiences with a comprehensive experience of their subject matter; "…the holistic collection of features for an object cannot be efficiently represented in the absence of the object" (Leinhardt and Crowley 304). Any authored depiction is an abstraction that unavoidably omits certain attributes of the original object.

Object-Centered Learning

Direct experience has several characteristics to recommend it. Whereas the indirect formats generally cater exclusively to sight and/or sound, being in the presence of an actual animal permits the simultaneous stimulation of multiple senses. The smells may not always be entirely pleasant, but they are powerful triggers for memories and emotional reactions (see, e.g., Herz et al.). A sense of scale is much easier to grasp by making a direct comparison against oneself than when relying on others' measurements. Furthermore, in contemplating the animal in relation to oneself, a three-fold examination is facilitated: a firsthand inspection of the animal and how it is responding to the circumstances both parties are experiencing; exposure to reciprocal inspection by the animal; and in reaction to the first two aspects, a reassessment of one's prior assumptions and expectations. The immediacy of the encounter is inimitable and non-transferable; the participant owns the encounter and it thereby becomes more personally meaningful.

Project Zero is a research branch within the Harvard Graduate School of Education that explores issues of learning, thinking, and creativity. Director Shari Tishman, acknowledging that "Many learning theorists believe that learning happens best when people construct new knowledge by actively building on their own ideas and impressions" (45), touts the following benefits of object-centered learning:

> The more you look, the more you see; the more you see, the more interesting the object becomes. Moreover, examining objects directly—either visually, tactually or aurally—is something most students can do. Regardless of background knowledge, learning style, or skill, almost all students can notice features of an object, ask questions about it, and generate ideas and connections… [P]art of the power of objects is their capacity to connect broadly to a surprisingly wide array of themes"(45-46).

There is no obvious reason her observation needs to be limited to school-goers. Whether or not an instructor (or a museum docent) plays a part, the process of investigating actual objects involves more personal involvement than does passive absorption of facts, thus has a better chance of leading to enduring learning outcomes.

## Museum Settings

High-ranking, experienced museum professionals will acknowledge that the museum cannot thoroughly elucidate all that is to be known about an object, but they also insist it be recognized as a valuable supplement to other ways of learning and knowing: "Museums are good at providing [object-enriched] environments where visitors can put the facts they know in context and perceive their significance;" when exhibits and programs are well-designed, they "allow visitors to connect what they do, see, and feel with 'what they already know, understand, and acknowledge'" (Bay 28).

Objects are fundamental to the museum enterprise. Collecting and preserving objects in accord with some singular strategy is at the core of most museums' activities. An object holds value for museums either by its one-of-a-kind qualities (e.g., a type specimen against which all other representatives can be compared, or the largest or oldest known example), or in its ability to serve as a basic representative of its general kind (Leinhardt and Crowley 303).

To render collection endeavors relevant, a museum must adopt promotion of knowledge and understanding as a basic objective, too, utilizing the collection of objects for research, education, and exhibition (CMNC 21). The museum exhibition is the means by which an object is transformed into an experience for its observer; the audience is thereby given an opportunity to appreciate objects' qualities and participate in a constructive evaluation of the messages they may bear. It is a process dependent as much upon the supplied setting as upon the attitudes and awareness a visitor arrives with—the inner "scaffolding" which simultaneously supports and constrains new insights and their ability to have a lasting impact on one's personal growth (G. Hein 34-5).

McLean identifies five factors that influence how an individual will respond to an object in the museum setting: the characteristics of the object itself, the context of the object within the exhibition, the overall exhibition environment, the apparent value the museum places on the object, and the personal

significance of the object to the person (McLean, Planning 22). Thus, though each visitor is offered an essentially identical interpretation of an object, still each visitor's experience of it is an individualized and dynamic confrontation. Extensive collocation of objects in the museum further diversifies the experience, as the visitors' self-directed physical travels leads them to make connections not just between themselves and each object, but to contemplations, even if not explicitly conscious, of what unites the objects beyond the space in which they're held. The social context further "ensures that museum visitors will interact in an almost endless variety of ways with the exhibits and with each other" (McLean, "Museum" 86).

Ideally, museums facilitate the process by which objects in their collection are brought to life for people. An accessioned entity will have been extracted from its originally appropriate environment, and the museum is responsible for creating new contexts which will both expose the significance of the object's prior circumstances as well as bring to light new meanings that may only be possible within this "place that holds objects apart and displays them for interpretive engagements by users" (Carr, Balancing 29).

## Objectives for Living Objects

Natural history museums often present mounted specimens of deceased animals, in some cases articulated in lifelike poses within the context of a diorama replicating their natural habitat, simulating scenes one might purportedly witness in the wild. The American Museum of Natural History in New York City is renowned for its dramatic exotic wildlife arrangements; Boston's Museum of Science (MoS) features examples with an emphasis on New England's native animals. Exhibits such as these can impart awareness of the variety of species, their appearances, and environments in which they might be naturally found; multisensory interactive elements at the MoS enhance the experience further by incorporating tactile and olfactory components. In a related vein, the Boston Children's Museum's urban wildlife kit[4]—designed for use in classrooms and similar settings and containing a variety of hands-on natural history specimens, a project guide, and other relevant objects—by its multi-facted approach can be a valuable means of introducing its users to the variety of animals in their immediate environment and some associated issues. However, when a living animal is effectively re-contextualized within a museum—both looked after and made comprehensible to look upon—it can have an even more powerful impact on a visitor's thoughts and feelings.

Living Objects—Vital Subjects

Mullan and Marvin posit, "The zoo cannot but fail in its attempt to give a full understanding or appreciation of natural behaviour and natural relationships for these cannot be displayed in an environment which consists of artificial segments of the whole, all within yards of each other. This is an artificiality that fools nobody" (159). Visitors may arrive informed by various media of the environments the unfamiliar animals belong in, and may be dissatisfied when these environments are not re-created (Davallon and Davallon 33). In an ideal situation, more comprehensive and realistic mixed species exhibits, where naturally co-existing species are presented together without obvious barriers, would better communicate to zoo-goers how the world actually functions (Croke 45).

Pioneering zoo biologist Heini Hediger has explained that complete authenticity in zoo exhibition will never be entirely possible:

> The best guarantee of complete naturalness is assumed to be a faithful copy of a piece of natural scenery…[but e]ven an untouched section of it [sic] natural ground, enclosed within six sides (*i.e.,* the closest possible imitation of a section of the biotope) is likely to be unnatural…[A] cross section of nature is not an equivalent part of the whole, but merely a piece which, on being completely isolated, alters its quality…
>
> The essential thing about the isolated section of nature is that it is cut off from the main cycle of life…Naturalness, in the sense of biologically correct type of space, is not the result of an attempt at imitation, but of an adequate transposition of natural conditions" (Wild 71).

Zoo professionals might further submit that zoos' value is not wholly derived from how accurately they can depict conditions as they exist in nature. While this is a desirable goal to strive for, it is a transition in display technique that will require ongoing institutional commitment and much investment of time and finances before it is complete. In the meantime, it is not just factual evidence about animals in their ecosystems that zoos intend to transmit; rather than focusing on animals merely as "objects of science", they additionally attempt to communicate that the animal is a "subject of nature" (Davallon and Davallon 31); zoos' objects, themselves alive, double as subjects.

Kellert's research shows that zoo visitors, "motivated more by generalized affection for animals than by specific intellectual curiousity [sic] or attraction to wildlife and the out-of-doors," are primed by their incoming attitudes to be engaged by emotional impulses (Activities 53). Stephen Bostock, Education Officer at the Glasgow Zoo, has echoed Conway's thoughts that zoos are the exclusive forum for wildlife encounters for some and suggests that "People are more likely to be concerned about the survival of

animals of which they have experience" (153); he further surmises that "the special effect that animals can have on us…is somehow connected with the animals' being independent of us, that they are living their own lives, and are not existing merely in order to have such an effect on us" (180).

Outcomes of Live Animal Exposure.

The majority of zoo visitors are intrinsically disinterested in educational outreach; only 25 percent demonstrate notable concern about the welfare and protection of animals (Kellert, Activities 58). In the course of a three-year study of American's attitudes, knowledge, and behaviors toward wildlife and natural habitats, Kellert found that roughly twice as many visitors to zoos are motivated by the social benefits they expect to derive than are those for whom animal admiration is the key incentive (64 and 36 percent, respectively; Kellert, Activities 51). Comparatively few consider zoos more than a pleasurable venue for a social, recreational outing, and people visit them primarily for such (Mullan and Marvin 117, 123). Regardless, the Director of Zoo Atlanta and his coauthors allege, "The general public may not come to the zoo looking for an education, but they may leave having been educated or at least strongly affected by their experience without even realizing it" (Maple, McManamon, and Stevens 231).

At least one study has shown that significant learning gains can be made when live animals are integrated into education. Mystic Marine Life Aquarium researchers Sherwood, Rallis, and Stone compared the immediate and long-term post-exposure effect of live vs. dead sea star and horseshoe crab specimens on fourth-grade students' retention of facts about these creatures. They found that both groups demonstrated greater and enduring knowledge post-exposure than prior to their encounters, but furthermore that the students that had spent time with live specimens made significantly greater cognitive gains than those involved only with the dried organisms. Additionally noteworthy is that the former were alone in obtaining and sustaining significant improvement in their attitudes toward the animals.

Such affective learning is valuable. Robert Lacy, a conservation biologist at Chicago's Brookfield Zoo, recognizes, "The attachments we form with other animals are probably as important as any economic arguments in instilling in people a sense of responsibility for preventing the destruction of the natural world…[and] to nurture feelings of compassion, stewardship, and responsibility for life" (192).

# Chapter III

## Cultivating Living Collections

"Nothing is less likely to be preserved than the disposable items that seem so prolific to those who use them and throw them away," observed the Commission on Museums for a New Century (CMNC 37); what's out of the ordinary is more easily treasured. To draw parallels between cultural and natural histories, the allure of exotic, unusual, or endangered species in the assembly of living collections is prone to surpass that of any resident species. The latter, albeit not often encountered, risk being considered commonplace because of their relative proximity. Zoos' decisions of which species to include and interpret—or not—implicitly convey messages about which species they feel are valuable; "By accessioning or displaying objects, the creators of museum exhibitions are creating or enhancing these objects' value" (Gurian 172).

## Historical Overview

### Old World Origins

The predominant impetus for forming the earliest animal assemblages was to flaunt imperial conquests, political connections, and control over other lands' peoples and animals (Robinson, Foreword vii; Mullan and Marvin 91; Croke 128). Animals held little zoological interest for most owners, so for over four millennia the primary guiding principles of accumulating them were contingent upon their being exceptionally outlandish, attractive, or rare, but most especially remote in origin, to serve as a potent symbol of one's affluence and sphere of influence (Mullan and Marvin 116-17).

Not until the nineteenth century was a formal acquisition philosophy applied to the practice of animal collection; the Zoological Society of London instituted one when continuing the cultivation of a collection that had been in existence for over 700 years before bequeathed to them in 1828 by the British monarchy (Kisling 114; Hancocks, Different 43). Concurrently, they established a taxonomically organized zoological park for the explicit purpose of progress in the biological sciences (Bostock 27; Hancocks,

Different 43, 45).[5]

The eighteenth and nineteenth centuries in Europe marked the transition from elite animal assemblages reserved for the privileged few to collections fully intended for public use and enjoyment. In this "Classical" stage (also "Golden Age") of their development, zoos transformed from a medium for expressions of dominion over others into a source of civic pride for host municipalities; they proliferated across the continent, in most cases modeled after London's example (Veltre 21; Kohlstedt 3; Mullan and Marvin 110; Hancocks, Different 43). The international and inter-municipal atmosphere was competitive; the standard collection strategy was to procure the largest number of the most exotic species (Veltre 27). One zoo professional portrays the period thusly: "Obtaining a newly discovered okapi [(the giraffe's closest living relative)] was equivalent to the national art gallery's acquiring an original da Vinci. Collecting exotic animals became analogous to collecting rare or heretofore inaccessible art" (Hoage 136). Native species remained of little interest under these conditions.

Progress in the New World

Introducing Zoos. According to Vernon Kisling, a noted historian of zoological gardens, American colonists did not much go for the diversion of animal displays in their first century or so of settlement: "The colonial period was characterized by hard work, frugality, simple pleasures, and the need to establish a new American society in what was an overwhelming and threatening wilderness" (110). Nevertheless, at some early point a few rugged individuals did supplement their incomes on travels into town by taking along for show a native creature or two they had captured while trekking the wilderness; to new settlers, these were at first as exotic as the lions and other overseas species sailors began bringing home in the 1720s (Kisling 109).

Menageries–collections of caged animals assembled without any organizing principle apart from, perhaps, a pragmatic arrangement to improve efficiency of husbandry–arose in the young nation shortly after it had won its independence, at the same time the European masses were being introduced to them (Kisling 109). Ties to Europe remained strong, and the early to mid-1800s were marked by adoption of and improvement upon techniques and notions American travelers observed on cross-Atlantic visits to the more museum-like zoos, in the style of London's (Kisling 114). Progress was interrupted by the Civil War, but

the Reconstruction era following it saw the integration of zoological gardens into the urban public park systems,[6] which were being designed and developed at the time to provide respite from the rampant industrialization and urbanization of the city landscape (Hanson 9, 12, 16-18).

Kisling has suggested that conditions such as these, plus adequate leisure time "and an acceptance of the animal exhibit as a suitable form of popular entertainment and education," were necessary for the widespread establishment of zoos (110). In her analysis of the forces shaping the early development of American zoos, Elizabeth Hanson elaborates: "looking at animals was considered a moral activity, associated with more polite standards of behavior, than, for example, going to the theater [or circus]" (22).

As was typically the case in establishment of museums in the early twentieth century, zoos were intended to elevate taste and prompt a decline in the lower- and middle-classes' undesirable behaviors (Stam 273). However, although "Many zoos professed to being more than merely entertainment, or saw their role as that of 'rational entertainment'…apart from their links with professional zoologists, they do not seem to have been perceived as cultural institutions on a par with art galleries or museums, where one entered to be edified, educated or aesthetically uplifted" (Mullan and Marvin 113)—despite the fact that the American zoos, too, strove to collect according to the "art gallery" model described above.

Species selection in early American zoos. "[M]oney and chance [often] determine what is in a particular zoo rather than geographical location, climate, vegetation, water supplies, access to supplies of food, historical considerations, etc." (Hediger, Man 46). This was evidently the case from Kisling's descriptions of the starting collections at several of America's longest-surviving zoos, when they first opened in the nineteenth century: two had benefited from castaway circus collections; three had received animal donations from other institutions; two began with a single bear; and three launched with only a pair or herd of white-tailed deer (116-119).

Since native animals were the easiest to obtain and keep, were unlikely to be confused with the collections found in circuses, and were believed to be both "practical and suitable" to furthering educational aims, community advocates and "experienced directors advised new zoos to begin by displaying these animals" (Hanson 45-47):

> An early supporter of a zoo for Boston suggested that "when we remember that not one in ten thousand, perhaps not one in fifty thousand, of our city people (not only here in Boston, but anywhere), has ever seen or is in any way familiar with the greater part of the animals and plants that are indigenous to the soil on which he was born and bred…we see

> at once that we have here an opportunity of setting an example to the world, sure to be followed to the gain of general education everywhere" (Hanson 45).

The National Zoological Park, at first an extension of the Smithsonian Museum of Natural History, planned to display and breed representatives of North America's large mammals, too, but to additionally feature foreign species in their collection (Hanson 46). Plans were delayed when "One congressman, declaring himself a patriot, objected to money being spent for a zoo that would maintain exotic species, claiming this would be contrary to the spirit of the Constitution;" when funds were finally approved in 1891, the National Zoo "was required to offer refuge so that 'native animals…threatened with extinction might live and perpetuate their species in peace'" (Hancocks, Different 92).

William T. Hornaday, first director of the New York Zoological Society, proposed displays of multiple sorts of native animals, even "those smaller animals often taken for granted" (qtd. in Hanson 46). Although such exhibits were apparently well-received at his zoo, Hornaday advised Boston's Franklin Park Zoo, before it officially opened in 1913, that the American species exhibits would certainly need to be augmented by exotic ones "in order to attract a crowd that would justify the cost of its maintenance" (qtd. in Hanson 61). A thriving international trade in animals that had begun a century prior primed the public to expect an experience that would include creatures they could never hope to come across in the wilds of their own country. Historian of science Elizabeth Hanson has theorized that "Without animal dealers, zoos would have taken a different form, if they existed at all. Displays would have been limited to local fauna, deer, and birds. But the trade in wildlife gave zoos access to a wide variety of animals" (98).

Natives Aren't Enough

By the mid-twentieth century, Hediger could confidently pronounce: "A zoo without elephants, lions, tigers, bears, zebras, camels, monkeys, etc., would not be regarded as a zoo by the public; giraffes[,] sea-lions, hippopotamus and ostrich also belong to the basic stock of large animals which are familiar to every child from its picturebooks, and which it therefore expects to see and to meet" (Man and Animal 45). He reported on the rapid decline of two Swiss zoos, Basel in 1874 and Bern in 1937, that were limiting themselves to the exhibition of endemic and successfully introduced species; these were not sufficiently popular among the public, and to survive the institutions ultimately had to adapt their missions to include exotic animals as well (Man and Animal 44). The dramatic increase in attendance prompted by the 1886

introduction of the first elephant to the Swiss Basel Zoo led them to abandon their original aims almost entirely; Hediger suggested this fate was not limited to these zoos (Man and Animal 117-8).

Moreover, a biologist at the Skansen museum and zoological collection in Stockholm, which specializes in Nordic species but represents wildlife from other locales as well, learned from a survey conducted in 1985 that although 90% of their visiting public comes primarily because of the native animals, the same proportion would not come for the Nordic/indigenous animals alone (Mullan and Marvin 74).

### Exceptional Omission of Exotics

The Arizona-Sonora Desert Museum has a different tale to tell. One of its founders, upon relocation from New York to Tucson, "immediately fell in love with the desert and was disappointed to discover that his enthusiasm was not often shared by fellow Tucsonans. He reasoned that their attitudes and destructive habits might change if they could have meaningful and intimate experiences with the land and its plants and animals" (Hancocks, Different 202). Established in 1952 and focusing almost exclusively on the botany, geology, archaeology, anthropology, and zoology of the Sonora desert region, it has enjoyed great success (Hancocks, Different 96). Its accomplishments are well-admired among the zoo community, but its strategy has nevertheless not been adopted by many other zoos; Hancocks cites only nine similarly structured zoos worldwide (Different 214).[7]

## Collection Management

### Obtaining Live Animals

Unlike the inanimate objects museums typically seek to preserve in perpetuity, a live specimen has a predictably limited tenure within the collection. Daily, well-delivered care may prolong an animal's presence, but death of the individual is inevitable. Yet the nature of living things is to procreate; in appropriate circumstances, a live specimen is able to reproduce and "replace" itself. Offspring are unlikely to be an exact duplicate of the original individual, but a living animal's worth in a museum collection context is usually as representative of a kind, rather than as a particular individual; it stands in for its entire species, as environmental philosopher Eugene Hargrove has observed (15). Ensuring permanence of an

object in a living collection is thus dependent not upon limiting handling, use, exposure, and erosion of a specific body over time, but upon providing proper husbandry and arranging continual supersession by taxonomically synonymous progeny.

Ninety-three percent of mammals held in today's zoos were born in captivity (Conway, "Zoo" 3); agreements between institutions result in the transfer of offspring between them. Baby animals are a big draw at zoos, but there aren't always adequate resources or institutional demand to support the generation of surplus adult individuals, so breeding needs to be carefully controlled. The American Zoo and Aquarium Association (AZA) will plan, stipulate, and/or coordinate breeding and transfers for both accredited and non-accredited members.

The remaining seven percent of mammals must be obtained from the wild. Fred Koontz, Wildlife Trust's Deputy Director for North American Conservation, has argued that capture of wild animals for collection purposes is only warranted when it aims to establish or revitalize a current captive breeding population, or when circumstantially jeopardized individuals will benefit by their removal from natural surroundings (133).[8] Even then, there are ethical considerations which must be met, which include taking long-range conservation outcomes for both the *in situ* and *ex situ* populations into account (Koontz 134-141); the species is of greater consequence in this decision-making process than are the affected animal individuals. In Massachusetts, MassWildlife must review all requests and issue permits to authorize mammal field collection activities for zoos.

Some wild-born animals enter into zoo collections via wildlife rehabilitators, who would initially have come into possession of them because they were found orphaned or injured. A rehabilitator's intention is always to recover the animal to a condition that will enable reintroduction to its natural habitat, but if it imprints (becomes unnaturally attached to or unafraid of humans) or has permanent physical deficits that would interfere with its survival, it is not acceptable to release it. In these circumstances, suitable quarters for long-term care would be sought.[9]

In the experience of the New England Wildlife Center (Weymouth, MA), rehabilitated birds are far more frequently eligible for zoo placement, at least in southeastern Massachusetts, than are mammals; the majority of mammals that they process are either successfully treated and returned to the wild or have injuries so extensive they require humane euthanasia (Patel and Predigar). It is also extremely rare for

certain native mammal species to ever cross a rehabilitator's threshold. Small, injured prey animals, such as moles or shrews, will often succumb to predation before anyone knows they are in need of rescue (Rifai). The sorts of injuries commonly sustained by Massachusetts' largest species, the moose, usually involve vehicular collisions, which rarely present favorable treatment outcomes (Arini).

Species Selection

Availability of specifically desired species can obviously be variable; but unanticipated collection options may also be presented. Decisions on appropriate species to obtain should be guided by the extent to which their presence and potential for interpretation can support a museum's mission. From a practical perspective, decisions must also be based upon what holds popular appeal.

Satisfy the Visitor. At the zoo, it is a live animal's activity that draws the most interest (Hediger, Wild 176; Mullan and Marvin 134). In an analysis of exhibit characteristics that influenced zoo visitors, Robert Johnston found that animal activity had the most significant effect on viewing time over any other variable measured (338). Animals that operate on a diurnal schedule are therefore most likely to satisfy visitor curiosity; nocturnal species can be convinced to be active during daylight hours, too, by cleverly manipulating their internal clocks via special lighting arrangements. There are inherent variations in lively behavior between species (contrast the sloth with the squirrel) and also between conspecific individuals; but no animal will be active at all times, which makes it important for interpretive technique and content to fill the gap.

Johnston also found that, of the six northeastern zoos he studied, longer viewing times were associated with those having a greater number of mammal species on display (337). One presumed aspect of mammalian popularity is their phylogenetic similarity to humans; despite our obvious, even fascinating differences, our closely shared evolutionary lineage—compared to other classes of animal—can facilitate a satisfying sense of reciprocity to the moment of acquaintance. Separate mammal species are also more distinguishable to most people. Supporting these assumptions, Mullan and Marvin found that the attractive capacity of birds and fish was apparently negatively impacted by the difficulty people seemed to have both with differentiating one species within each class from another and with detecting any sense of mutual

recognition during an encounter (73-74); they emphasized that humans want obvious confirmation they are being noticed by the animals (134).

In a study conducted at the Zürich Zoo, researchers found that the size of an animal had a significant influence on their popularity among all observed age groups. Visitors were more likely to spend greater than ten seconds at larger animals' enclosures, and more likely to rank animals of larger sizes as a preferred species in a six-option questionnaire (Ward et al.). Details on the species targeted and their concomitant range in size were not included in the study. Massachusetts NTMs span in size from just over an inch in length (small-footed bat) to up to half a ton in weight (adult moose); presumably the larger species would more easily support visitor interest.

Hediger noted that animals uncommon to one's everyday experience are usually preferred; he proposed hummingbirds as an example of an animal one group might appreciate seeing in a zoo while another group might be bewildered by their inclusion:

> To Europeans, just as to east coast Americans, these small colourful, nectar-sipping birds have a particularly exotic appeal and a correspondingly high value as exhibits…[On the west coast of North America, we] find a change in values, namely a devaluation of these fascinating birds. In this region hummingbirds can be seen flying freely around the flowers in the open and their exhibition value is scarcely greater than that of a chaffinch or a blackbird in Europe. It would never occur to anyone in that part of the world to exhibit endemic hummingbirds in cages (118).

This observation would seem to work against the premise of this thesis, yet this would only be in reference to the Massachusetts mammals observed on a regular basis by an abundance of people; these, however, are very few in number.

Save the Species. Some see the inclusion of non-endangered animal species in zoos as antithetical to their purpose:

> The primary contribution of zoos to conservation is in providing a temporary refuge for species whose survival in the natural state is imperiled, and in using their presence in this displaced milieu to elicit preservationist concern for wild habitat. Yet, many of the resources of zoos are today consumed by species not at risk" (Lindburg and Lindburg 203).

Such arguments would bar the inclusion of the majority of Massachusetts' native mammals, since fewer than 10% are designated for any conservation priority. Hancocks, however, has deftly deflated this line of reasoning:

> If one wanted to develop a facility concentrating on the breeding of endangered species, one would not design the place to be a public zoo. Zoos are essentially places for exhibition, and in a zoo operation the resources of space, energy, time, and money for fully fledged breeding programs face too many other competing programs"("Lions" 35).

Zoos' missions are rightly broader than operating as an ark, even though contribution to species conservation is an undeniably important role they may serve.

## Conservation Practice

### For Both the Object and Its Kind

There is a duality to conservation practice for living collections. On the one hand, it comprises care for the captive individual. It furthermore consists in conducting research on ways to improve conditions for both the captive animal and its free-living counterparts, educating with an aim to foster community interest and action, and sponsoring the preservation or rehabilitation of wild habitats (Bostock 153). The presence of a species within the collection can be used to enhance its chances of continued existence in the wild.

For some, "enjoyment of seeing a tiger in the flesh [is] marred by the thought that other tigers have different lives elsewhere and that the life of this particular specimen has been reduced to that of an exhibit simply for their benefit" (Mullan and Marvin 12). Bostock suggests, "we [zoos] must justify keeping animals by showing the degree to which our keeping of them is in their interests" (169). The zoo profession has embraced conservation education as "the best and most viable reason for the continuing existence of zoos [that] can be found" (Hancocks, Different xviii); "Of the many narratives of human/animal relations which can be told through the enclosure of wild animals this is now the only one considered justifiable by international zoo administrators" (Mullan and Marvin xii). Conservation of endangered species and ecosystems was first consciously adopted by a majority of animal-holding museums in the 1960s (WAZA 5). The International Union for the Conservation of Nature and Natural Resources, the United Nations Environment Programme, and the World-Wide Fund for Nature in the early 1990s exhorted zoos again to play an active part in conservation.

Conservation comprises actions that operate to save an object, a species, or an environment for potential future benefit, and its aims are defined by social and scientific standards in combination. Successful *in situ* conservation of species is very much dependent on a scientific understanding of ecological dynamics—an awareness that encompasses habitat requirements of various species, the availability of different habitats, what changes in habitat availability might be expected, and compatibility

of human and animal interests. Because it is also based on which outcomes may or may not be most welcome to the human community, an understanding of social dynamics must also be employed; science cannot be the only standard applied.

Conservation in some cases requires human behaviors and actions to be limited in order to protect species populations, as when a development project is prohibited because it would disrupt important habitat; at other times, it is animal populations that require imposition of restrictive measures—as when deer overpopulate, causing extensive damage to vegetation through concentrated overuse, and special hunting periods are opened. The wants and needs of numerous stakeholders need to be taken into consideration, and one of the primary *ex situ* conservation services of zoo-museums should therefore be to foster understanding of competing social factors and potential consequences of different wildlife management decisions—even though this may put them in an uncomfortable philosophical situation: "A message emanating from zoos that advocates both the saving and the taking of animal lives is likely to be, at best, a confused one, perhaps analogous to the claim by military authorities during the Vietnam War that villages like My Lai had to be destroyed in order to save them" (Lindburg and Lindburg 203).

Recognizing one's own role in negative conservation impacts can sometimes be a challenge; Hancocks would remind all that "our polluting and consumptive lifestyles, not just the hunters' and poachers' guns, [can] cause such damage to wildlife" (Hancocks, Different 166). When only exotic animals are on display, it is easier for visitors to ignore the issues that may directly impact upon themselves and their local environment. In an article in the 2004 issue of *Conservation Biology*, Americans' expectations that other societies should infringe upon their consumptive activities in order to preserve species beloved to us—e.g., pandas, gorillas, baby harp seals—are deemed both arrogant and hypocritical. Despite the American legacy of a national parks system, the Wilderness Act, and the Endangered Species Act, we have done little in the way of setting aside complex and interconnected ecosystems; most top predators have been eliminated; and we impose little self-restraint on the development of unprotected, as-yet wild areas. "Yet we continue to hold other—generally much poorer—nations to a higher standard of wildlife and wilderness protection…We should not be surprised if those in other, wilder nations cast increasingly envious looks at our more peaceable ark—with its segregated predators and expansive human

footprint—and seek to rid their nation-arks of big and dangerous troublemakers, while making more room for human passengers" (Weber 2).

## The Massachusetts Context

When presented with hypothetical land-use scenarios that would impact American wildlife populations, nearly two thirds of the respondents representing the northeastern United States disagreed with the statement, "If oil were discovered in Yellowstone Park it would have to be developed even if it meant harm to the park's wildlife" (Kellert, Public 99); the majority were in favor of wildlife conservation in this circumstance. However, when it seemed the site of resource extraction might be closer to home and more relevant to their immediate economic circumstances, fewer than 50% concurred that "Natural resources must [not] be developed even if the loss of wilderness results in much smaller wildlife populations" (Kellert, Public 98). This difference in opinion could be reflective of beliefs about the sanctity of National Park lands; it could also have something to do with confidence that northeastern wildlife species populations are adequately robust to withstand reductions.

Species conservation measures are not commonly considered relevant to native Massachusetts mammal species. James Williams and Ronald Nowak, of the United States Fish and Wildlife Service, Office of Endangered Species, suggested it would be reasonable to hypothesize that "because the temperate 'backyard' has a greater number of individuals within a species and because they are spread over an extensive range, temperate wildlife should be less vulnerable to the forces of extinction" (130). But they counter that "The true picture has proved otherwise—there simply is not any evidence that the temperate world is particularly more secure in its wildlife diversity than any other corner of the planet. The stuffed specimen of the last passenger pigeon, which once flocked by the billions in the forests of North America, stands as stark witness to temperate vulnerability" (130).

Notably, Massachusetts ceased to be hospitable to at least seven species of mammals during the post-colonial period; three of these species now appear on the federal list of endangered species, and one's listing is pending further review (Table 1). Harvard Forest researchers have named some of the factors which drastically affected the local environment through the centuries subsequent to Europeans' arrival: "In a remarkably short period, much of the region was transformed from extensively forested to open and

agrarian, with interspersed and cut-over woodlands. Equally rapidly, this pattern was substantially reversed as the land reforested naturally following widespread abandonment of farmland beginning in the mid-nineteenth century" (Foster et al. 72). Return of the forest does not necessarily equate to return of original biodiversity. Other land uses have altered landscapes: land conversion, hydrologic changes, introduction of exotic pests, species, and chemicals. "Many natural areas have been converted to permanent or semipermanent human uses...result[ing] in a long-term loss of particular habitats" (Foster et al. 91).

The landscape continues to change today, as do the composition, abundance and distribution of native species. The number of extirpated species in Massachusetts would be higher had certain mammalian species not recently made a comeback, due to changes in the patterns of Massachusetts land use favorable to their survival here. Return of beaver in the 1920s, and recent reappearances of moose, fisher, and bear throughout much of New England reveal "sizable and important lags that are inherent in ecological response; they also alert us to anticipate future changes, even if additional human activity were to cease. Forests, once established, take decades or centuries to mature; similarly, animals, even when highly mobile, require time to migrate and expand their populations when the landscape, environment, or cultural setting changes" (Bernardos et al. 165).

Conservation scientist Debra Bernardos, in partnership with Harvard Forest researchers, has made the following observations and recommendations:

> [T]he trend toward a more forested and wild landscape with large forest animals along with an expanding suburban human population will lead to increasing conflicts between human safety and appreciation for wild nature… (167). [R]ecognition of the strong element of direct and indirect cultural control over our modern landscape is critical for successful conservation and ecological understanding. Conveying the scale of recent dynamics and their linkage to human and landscape history is also a critical element in public education and ongoing policy development (165). [W]e need to educate people about wildlife, nature, and its history and modify some of our behaviors…" (167).

MassWildlife has partially addressed these matters by online publication of one general purpose and 16 species-specific pamphlets providing guidance for potential conflict situations in wildlife encounters; all but two reference native mammals (Living with Wildlife). The pages provide information on the animals' appearances, habits, life histories, diets, and cultural significance; negative outcomes of interaction and how to mitigate them are also discussed. The scenarios for the latter are diverse and include both harms to humans (e.g., exterior and interior property damage; threats to pets, livestock, and crops; vehicular collision risks) and animals (e.g., habitat destruction and problems of species habituation) (Living with Wildlife in

Your Neighborhood). While an excellent resource for those seeking advice in these matters, the "Living with Wildlife" materials are most pertinent to those prone to direct animal interaction impacts, and do not address the resolution of social conflicts that might arise over decisions made regarding land-use decisions or human-animal conflict control measures.

With Weber's and Bernardos' admonitions in mind, Hancocks' proposal to reframe zoos' roles for conservation education is pertinent:

> People no longer need to visit a zoo to see what a camel or a leopard looks like so much as to gain a better understanding of…how to help conserve biological diversity on the planet… It must come to be seen as something worth making sacrifices for, something sufficiently valid to warrant changes in our lifestyle" (Hancocks, Different 177).

By collecting and exhibiting native species, zoos can demonstrate that they are of value and worthy of conservation.

## Live Animal Exhibition

Shelly Monaghan, an exhibition consultant and Harvard University Museum Studies instructor, insists that it is important to understand the exhibition process because it is the most conspicuous museum activity (1/31/03). Yet even though displaying animals is one of the definitive roles of zoos, Conway notes, "It was not until recently that any major zoo had a department of exhibition comparable to those of most museums" ("Zoos" 48).

The collection animal has been removed from its natural context as an interactor with the environment, other species, and conspecifics, and is thereby "museified" (Davallon and Davallon 25). Unlike inanimate objects, contexts in which zoo animals are placed will significantly impact their quality of life, so their requirements must be balanced with those of the audience. Recontextualization within the museum should therefore accommodate captive animals' biological and psychological needs, as outlined by Hediger, such that they thrive, behave as they might in the wild, and, if permitted, successfully reproduce to perpetuate their pedigree (Wild Animals; Man and Animal); the animal must be made to feel at home in its museum setting.[10]

### Evolution of Enclosures

Most nineteenth century zoos organized exhibits taxonomically: primates, reptiles, carnivores, birds,

ungulates, etc., each in their own exotically-styled house (Hoage, Roskell, and Mansour 16); this arrangement best demonstrated the breadth of a collection, where quantity and diversity of species were the dominant emphases. Enclosure aesthetics were primarily architectural in nature, conjuring up impressions of captive animals' assorted countries of origin. It was not unusual for caging to be barren of anything besides the animal.

As turn of the century industrialization and urbanization altered the landscape, it became more imperative to distance the image of the zoo from built civilization and make it more of a nature refuge; this was done more so for the human visitors than for the animals. The Davallons, a couple composed of a political historian and a painter, observe that zoo enclosures were less natural when the world was less developed and nature viewed as abundant and limitless; as nature's magnitude has been diminished, so the zoo has become more and more a re-creation of the natural habitat to enable people to access what they cannot in daily life (31).

The "father of the modern zoo," Carl Hagenbeck, who started out as a procurer and merchant of wild animals, founded his own zoo in 1907 and pioneered a style of exhibition that has since been emulated worldwide: moats and other camouflaged barriers virtually invisible to humans are employed to retain animals in what appear to be entirely natural environments, simulating mixed species assemblages that could possibly be encountered in the wild (Hanson 140-42). Hagenbeck's modifications were motivated primarily by appearances.

Half a century later, Hediger introduced the notion that enclosures could be designed to take the occupant's own perceptions into account (Wild Animals, Man and Animal). His goal was not necessarily to recreate a naturalistic environment, but instead to provide for all the basic biological needs of an animal, such that it would claim its enclosure as its own personal territory and be comfortable enough to engage in its natural behaviors. The definitive indicator of the designer's success would be productive mating attempts by the animals.

Ted Finlay, Lawrence James, and Terry Maple, Zoo Atlanta and Georgia Institute of Technology collaborators, have corroborated previous research that demonstrated an animal's environment influences people's perceptions, as do differences between the animals themselves. In general, animals constrained within visible barriers are viewed less favorably than those housed in naturalistic enclosures or not

restrained at all (519, 520). Their findings also suggest that "zoo animals are seen as restricted, tame, passive, and often friendly and harmless" when any barrier is visible (either between the animal and viewer or behind an animal) (525, 526). As is often the case, there can be discrepancies between intentions and achievements; decisions that zoos make about how they physically present their animals can thus have a great impact on meaning making—especially if exhibition technique and messages they mean to convey are at odds.

Interpretive Efforts

Hediger advised mid-twentieth century that the minimum details to include on enclosure labels consisted of animal identity, geographic origin, select factoids, and an unusual image of the species (Wild Animals 177). Factoids could include details on diet, life habits, gender/age/seasonal variations, utility to humanity, etc. Beverley Serrell, an expert in museum labels, has noted that at zoos, "Each exhibit has its own set of variables and uniqueness that its own label should take into account" (58); in a study she conducted in 1979, she demonstrated that changing generic label content to include exhibit-specific information (e.g., how an enclosure was enhanced to encourage an animal to express its natural behaviors) could significantly increase readership (57, 58).

Current interpretation philosophy teaches us to shy away from a litany of information; ways to engage a visitor in participative construction of meaning are encouraged. The Managing Director of the Copenhagen Zoo suggests:

> In some respects modern zoo design may be compared with a theatre where the animals are the actors, the exhibit design is the scenery, the theme or the story being interpreted is the play, the visitor area is the auditorium and the visitors are the audience…In this model, the interpretation, in whatever format, becomes the playwright or producer, responsible for organizing and enhancing the overall experience for the visitors (Andersen 2003).

The Director of the National Zoo promotes an even more direct role for visitors; his institution attempts to stimulate activity in both the humans and the animals at its exhibits (Robinson, Multimedia 42).

# Chapter IV

# Live Animal Collections in Massachusetts Museum Environments

## Museums Defined

### Basic requirements

Barry and Gail Dexter Lord, experts in museum planning and management, have presented a sound and suitable appraisal of what a museum's core attributes should include: "Museums are complex cultural institutions uniquely concerned both with collecting and preserving the material cultural [or natural] heritage, and at the same time *communicating its meaning*;" these activities are united and guided by the museum's purpose as reflected in its mission, mandate, goals, and objectives (3). A museum's mission statement affirms its role and relevance to its community, and its mandate delimits its collection focus relative to the mission. Stated goals dictate the intended direction of institutional growth over time, whereas objectives are the more immediate means by which the goals may be gradually attained (Lord and Lord 3-4).

It is correspondingly important that the purpose is not profit-driven nor purely of recreational intent, as pointed out by at least one museum philosopher: a theme park, similarly to a museum, lures leisure-seekers with the offer of a stimulating situation; the difference is that "the commercial amusement center['s] interest stops short of what you may come to think or believe as a result of your experience" (H. Hein 3). Deirdre Stam, a former Board member of the AAM, refines the point: "The visitors' experience becomes, paradoxically, the more tangible entity, to wit, the product of the museum. This view implies that the primary product of the museum is then not the preservation and display of the artifact but rather the information to be derived by the public from the museum" (273).

### Accreditation

Accreditation is a prestigious professional designation signifying the recipient is perceived by its peers to uphold the field's highest standards of performance, demonstrating coherence between mission and

methods, diligent care and development of collections, investment in educational programming, involvement in conservation and research activities, rigorous fiscal responsibility, dedicated management and governance—i.e., all the elements integral to an ideal museum.

The American Association of Museums administers a national museum accreditation program. Fewer than 2% of the 774 AAM-accredited museums are aquariums or zoos. Only two among the 49 USDA-licensed exhibitors of warm-blooded animals in Massachusetts are AAM-accredited (United States; List). Five, inclusive of the aforementioned, are likewise accredited by the Association of Zoos and Aquariums (AZA), which is "America's leading accrediting organization for zoos and aquariums and accredits only those institutions that have achieved rigorous standards for animal care, education, wildlife conservation and science" (Association, FindZoo). Achieving accreditation can be an overwhelmingly expensive and labor-intensive process for a small institution, so this study shall not be limited to exhibitors that have qualified for this credential. However, only those sites that adhere to commonly accepted standards of museum operation will be considered.

## Qualifying Live Mammal Exhibitors in Massachusetts

### Twelve Qualifying Institutions

All but 12 of the entities licensed by the USDA to display warm-blooded vertebrates in Massachusetts have been eliminated from this study because it was learned they display only domestic animals or only a single wildlife species, function primarily as a wildlife rehabilitation center or recreational facility, or are itinerant "zoomobiles." One qualifying institution, Dr. Spooky's Little Zoo and Museum, is being withdrawn from the study because it ceased to operate mid-2009, under the pressures of the recession. Two of the remaining 11 entities operate dual animal exhibition campuses; Zoo New England operates the Franklin Park and Stone Zoos in a centralized manner, so these shall be counted as a single institution for the purposes of this thesis, whereas the two Mass Audubon facilities curate their locations separately and will thus be analyzed separately. The 12 institutions involved in this study are listed in Table 3.

There is at least one zoo-museum based in each of the state's major regional tourism sectors designated by the Massachusetts Office of Travel and Tourism, except the Northeast (Where to Go), though

one could easily argue that this latter zone is adequately and conveniently served by the Boston Metropolitan Area. The broad distribution of zoos ensures general accessibility of encounters with wildlife in museum environments across the state. The data herein presented shall elucidate the extent to which encounters with NTMs are likewise facilitated.

Table 3: Massachusetts Live-Mammal-Exhibiting Zoo-Museums[1]

| Name of Institution | Location | Region |
|---|---|---|
| Blue Hills Trailside Museum (Mass Audubon) | Milton | Boston Metropolitan Area |
| Buttonwood Park Zoo[b] | New Bedford | Southeastern MA |
| Capron Park Zoo[b] | Attleboro | Southeastern MA |
| Drumlin Farm (Mass Audubon) | Lincoln | Boston Metropolitan Area |
| EcoTarium | Worcester | Central MA |
| Zoo New England[b] (Franklin Park Zoo, Stone Zoo) | Boston/Stoneham | Boston Metropolitan Area |
| Lupa Zoo | Ludlow | Western MA |
| Museum of Science[a, b] | Boston | Boston Metropolitan Area |
| New England Aquarium[a, b] | Boston | Boston Metropolitan Area |
| Southwick's Zoo | Mendon | Central MA |
| The Zoo in Forest Park | Springfield | Western MA |
| ZooQuarium | Yarmouth | Cape Cod/Islands |

Twelve of the sites in Massachusetts that are licensed by the USDA to exhibit warm-blooded animals qualify as museums (a=AAM-accredited zoo-museums; b=AZA-accredited zoo-museums).

Mission Statements

A museum's mission statement affirms the institution's role and relevance to its community. Mission statements published by the zoo-museums listed in Table 3 were assessed to determine their potential compatibility with the collection and display of live native terrestrial mammalian wildlife. Only four of the 12 institutions directly incorporate references to native species in their missions, yet none of the mission statements would prohibit the inclusion of NTMs.

Blue Hills Trailside Museum. The mission of Mass Audubon, the entity responsible for the Blue Hills Trailside Museum (BHTM), is "To protect the nature of Massachusetts for people and for wildlife" (Mass Audubon). The BHTM does not publish a mission statement of its own, per se, but does indicate on its website that "Indoor exhibits feature wildlife you may see while exploring the reservation's 150 miles of trails. Outside the museum, stroll through [more] exhibits featuring native wildlife…" (Blue Hills). It is

clear that their collections should consist exclusively of species found in Massachusetts, and that native mammals would therefore be appropriate to include among them. The mission statement implies support for both direct and interpretive efforts in conservation and human-animal conflict resolution.

Buttonwood Park Zoo. The AZA-accredited Buttonwood Park Zoo (BPZ)'s primary exhibition theme at present is "From the Berkshires to the Sea;" only two mammal species in the collection diverge from this focus that otherwise exclusively spans the state of Massachusetts (Mammals). The BPZ has a very ambitious mission statement that asserts its active dedication to conservation efforts both local and global:

> [We] will be a significant contributor to the conservation of nature both at home and throughout the world. We will:
> •provide a safe and exciting experience that connects people of all ages to the natural world
> •be known for the excellence of our collection, animal care, and exhibits
> •be recognized for the excellence of educational programming that is not only informative but inspirational, with a strong conservation focus
> •serve as a showcase for the City of New Bedford's environmental efforts, acting as a community resource and example of sustainable green living.
> •conduct scientific research that supports conservation, at the Buttonwood Park Zoo, locally, and throughout the world
> •link the City of New Bedford to the global conservation community.
> Through these efforts we aspire to be the most talked about and respected small zoo in North America" (Zoo Mission).

This mission statement is flexible and extensive enough to accommodate inclusion of any species, and indicates that local species are indeed among their priorities.

Capron Park Zoo. "It is the mission of [the AZA-accredited] Capron Park Zoo to excite an interest in the natural world through education, conservation and recreation" (About the Capron). There is no reason that NTMs need be excluded by this mission, as they can be used to reinforce communication about conservation, ecology, evolution, basic biology, etc.

Drumlin Farm. Like the BHTM, Drumlin Farm would similarly be bound by the Mass Audubon mission statement quoted above, with an exclusive focus on Massachusetts species. Their website invites, "Visit our Bird Hill and Drumlin Underground exhibits for the rare chance to see New England's most popular wild animals up close, including our skunk, rabbit, owls, hawks, deer, and fox. These animals make Drumlin Farm their home because they have been injured or disabled and cannot survive in the wild" (Daily Activities). The reasons the animals have reached their collections can possibly enhance visitors' affective responses to the held species.

EcoTarium. The Worcester EcoTarium's mission is "To contribute to a better world by inspiring a passion for science and nature through discovery" (About the Ecotarium). Native mammal species are part of the natural world, so can safely be included in the collection towards fulfillment of this mission.

Lupazoo. "Lupazoo is a conservation and education institution demonstrating the value, beauty and interdependence of all living things" (Lupazoo). NTMs are arguably valuable and beautiful living things, and the work by the researchers at the Harvard Forest make it clear that there are stories to share about our interdependence (Bernardos et al.; Foster et al.).

Museum of Science. The MoS mission "is to stimulate interest in and further understanding of science and technology and their importance for individuals and for society" (About the Museum). Biology, ecology, and conservation are sciences, and NTMs may be used as springboards to exploration about these disciplines and the role of technology in their study, at this AAM- and AZA-accredited institution.

New England Aquarium. An aquatic focus is emphasized in the AAM- and AZA-accredited New England Aquarium (NEAq)'s mission, "to present, promote and protect the world of water through hands-on programs, live animal and interactive exhibits, public lectures and forums, and research and conservation projects" (Mission and Vision). Aquatic species would best fit the NEAq mission; the river otter and beaver are very much aquatic creatures so could contribute to the mission, but the other NTMs do not fit the mission as easily—although all living creatures, of course, are dependent upon the availability of water.

Southwick's Zoo. Southwick's Zoo's mission scope is broad enough to include any animal species: "The Southwick team's mission: to provide an extensive zoological collection and educational facility for our visitors. We strive to promote an exciting environment for a positive family experience" (The Southwick Story).

The Zoo in Forest Park. "The mission of the Forest Park Zoological Society is to promote public awareness and appreciation for indigenous and exotic animals, and to provide educational programming for all ages that encourages understanding and respect for the natural environment. The animal collections and gardens enhance our perception of the natural world, and emphasize the importance of bio-diversity"

(Welcome). The inclusion of indigenous species in this mission statement would justify the inclusion of NTMs in the collections.

Zoo New England. Although no specific mention is made of native wildlife species, "Zoo New England's mission…to inspire people to protect and sustain the natural world for future generations by creating fun and engaging experiences that integrate wildlife and conservation programs, research, and education" (Our Mission) would be well served by their inclusion. Both campuses operated by Zoo New England (ZNE) are AZA-accredited. The Franklin Park Zoo site concentrates predominantly on African and Australian species; the Stone Zoo, with its emphasis on Asian and North American species, would be the logical location for this entity to concentrate any NTMs in their collection.

ZooQuarium. The ZooQuarium mission statement specifies that native or naturalized wildlife would be more suitable in their collection than exotic species.: "Since 1969 ZooQuarium has provided a fun-filled family adventure to explore and discover the marvelous creatures that live just steps away from the busy roadways of Cape Cod" (Schedule/Rates).

# Chapter V

# Research Methods and Results

## On-site Research

Each of the properties listed in Chapter IV was visited once in order to determine which NTMs were on display and their enclosure and interpretation characteristics.

### Native Terrestrial Mammal Representation

All zoos listed in Table 3, except for the New England Aquarium, had at least one living NTM in their collection;[11] the maximum number of living NTMs observed during a single on-site research visit was eight, at the Buttonwood Park Zoo. Representative species at the Museum of Science Live Animal Center are not visible to the public except during live animal demonstrations, and were not observed on the on-site research visit; NTM representation at this institution was determined by review of MoS website materials and published/broadcast interviews with Live Animal Center curators (six NTMs were apparent in their collection from these sources ("A Closer Look"; Inside; Keene; Live; Science)). The average number of NTMs observed at a single institution was 4.4±2.4; with MoS and NEAq data excluded, the average increases by approximately a single species, to 5.3±1.7. Fifty-three separate NTM exhibits were observed statewide.

Although the quantity of NTMs at any one institution does not exceed 14% of the total possible, at least 23 species are distributed across the state's zoo-museums, reflecting overall representation of 41% of the extant NTMs. The extent to which individual species are represented is indicated in Figure 1 (MoS data are included). The common porcupine and the striped skunk are most prevalent, each being held at six separate facilities. Thirty-three NTM species do not appear to be represented in the collective collections; four of these are extirpated species that no longer naturally reside in Massachusetts, four are listed as Special Concern conservation status in Massachusetts, two appear on the federal list of Endangered species, and one's listing as such is pending review.

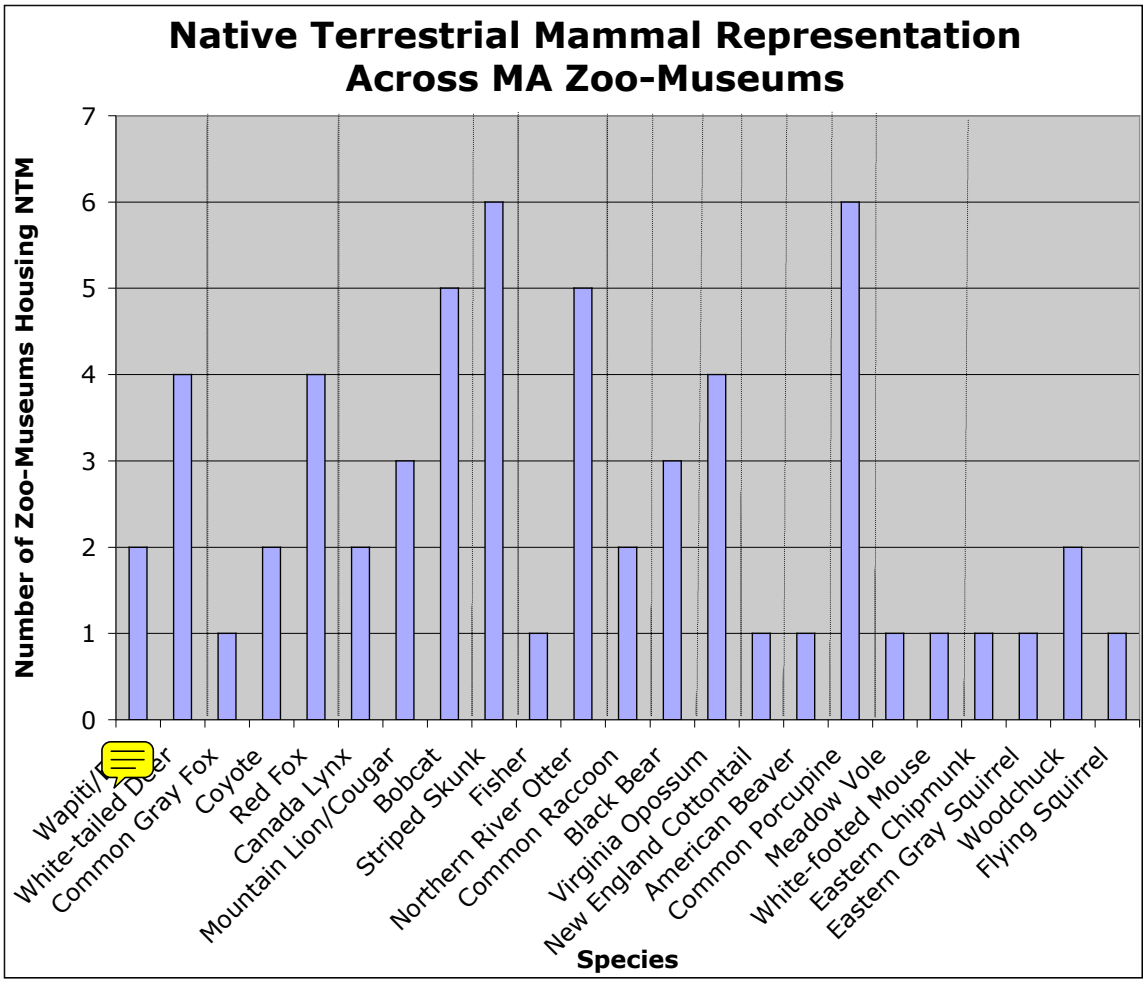


Figure 1: Twenty-three of the 56 extant NTMs are featured at zoo-museums throughout the state. Species grouped within a pair of vertical lines belong to the same taxonomic family.

Of the 17 taxonomic families of native terrestrial mammalian wildlife recorded in post-colonial Massachusetts, 13 are represented in Massachusetts zoo-museums by at least one species. Eight of the 13 families are fully represented, though seven of these consist of but a single native species; the Felidae (the cat family) is the only multi-species family with each of its species appearing in at least one of the state's zoo-museums. Five families have 25 to 75% of their species represented. There are no native bats, shrews, moles, or jumping mice on display at any of the zoo-museums involved in this study; combined, members of these non-represented families make up one third of the NTM species total. Taxonomic family representation at the state's zoo-museums is graphically indicated in Figure 2.

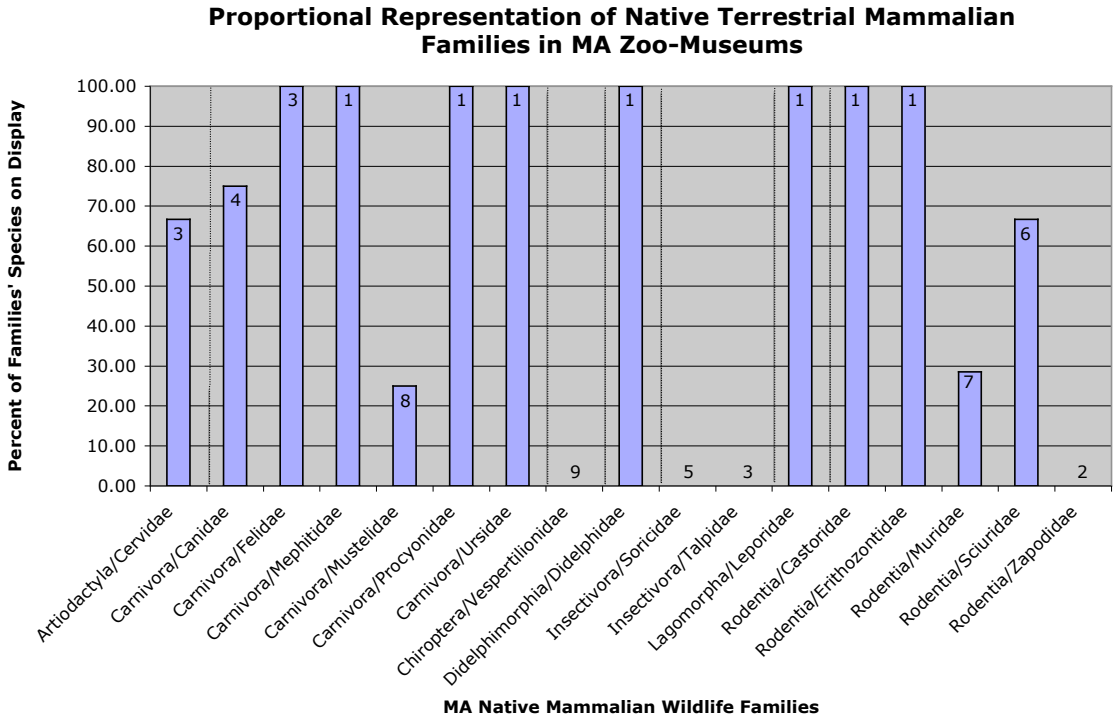


Figure 2: Thirteen of 18 families (in five of seven mammalian orders, which are divided by vertical lines) are represented in Massachusetts zoo-museums. Numerical inserts indicate total number of species within a family that are native to Massachusetts (i.e., there are three species of Cervidae in Massachusetts, 67% of which (two) are represented in Massachusetts zoo-museums; four species total of Canidae, 75% of which (three) are represented; etc.).

Display Characteristics

As Johnston noted in his six-zoo study, exhibit and zoo characteristics (e.g., exhibit naturalism, exhibit size, size of zoo) "may act in concert to exert a powerful influence on exhibit viewing time" (335); viewing time itself may be taken as an indirect measure of exhibit success, though its measure was not an element of the current project. A more robust measure of exhibit success would be demonstrable, favorable change in visitor attitudes toward the presented species and preservation of their habitat; though collection of this data was also not within the scope of this study, Maple, McManamon, and Stevens have claimed display of "active animals in a naturalistic habitat behaving much the same as their wild counterparts" is the most effective such motivator. Settings in which NTMs were presented were therefore noted.

Proximity. Enclosures were coded for proximity range, which indicates approximately how close visitors could conceivably get to the animal (a reasonable indicator for physical access to the museum

object, which may increase the salience of its effect) as well as how far away the animal can get from the visitor (suggestive of the space made available to the animal; this latter figure is a reasonable indicator for the degree of independence the animal is afforded, which as it increases may presumably minimize the perception of human control over the animal). Similarly, because placement of animals in exhibits below eye level can "convey a sense of human dominance and reinforc[e] the psychological relationship between humans as captors and animals as captive" (Bierlein 1355), which can interfere with the formation of positive affective responses, notations were made on this characteristic, too.

Four proximity scores were used, based on whether an animal could be within arm's length (<1m; unless an enclosure had a glass barrier, an animal within arm's length could possibly be touched by a visitor), beyond arm's length but within the space of a small studio apartment (~1-5m), from "across the room" to "within the house" (~5-15m), and beyond ~15 meters. The distances were determined subjectively.

The preponderate minimum possible proximity was within the one to five meter range; 57% of the animal enclosures were in this category. Thirty percent of enclosure barriers began even closer to visitors. The only NTM that did not seem to have at least one representative displayed within five meters of the visitor was the common gray fox. Visitors to Massachusetts zoo-museums thus have generally favorable opportunities to observe the held NTMs in close proximity (see Table 4).

Forty-nine percent of the animal enclosures spanned no further than five meters from visitors, thus restricting their inhabitants to obviously unnaturally small ranges; ten species were displayed at no greater distance. However, although animals' natural ranges are typically larger than what is observed in zoos, as long as their needs for shelter, diet, and exercise (both physical and mental) are being met, it is not negligent for zoos to restrict their available space (Hediger, Wild). This may not be obvious to most visitors, though, who may find it difficult to reconcile the cognitive dissonance between zoos' messages of respect for wildlife and their habitats with the limitations placed on animals' freedom within their facilities. A slight majority of displayed NTMs (51%; 12 species) were presented in fairly extensive enclosures (though only seven exclusively so), which may enable visitors to overcome concerns about their potential captive discomforts (see Table 4).

Table 4: Ranges of Potential Visitor Proximity to NTMs

| | <1m | | ~1-5m | | ~5-15m | | >15m | |
|---|---|---|---|---|---|---|---|---|
| Nearest Possible | Wapiti/Elk | 1 | Wapiti/Elk | 1 | Common Gray Fox | 1 | White-tailed Deer | 1 |
| | White-tailed Deer | 2 | White-tailed Deer | 2 | Red Fox | 1 | | |
| | Mountain Lion/Cougar | 1 | Coyote | 2 | Canada Lynx | 1 | | |
| | Bobcat | 1 | Red Fox | 3 | Northern River Otter | 2 | | |
| | Striped Skunk | 3 | Canada Lynx | 1 | Common Porcupine | 1 | | |
| | Fisher | 1 | Mountain Lion/Cougar | 2 | | | | |
| | Northern River Otter | 2 | Bobcat | 3 | | | | |
| | Black Bear | 1 | Striped Skunk | 2 | | | | |
| | Virginia Opossum | 2 | Northern River Otter | 1 | | | | |
| | Meadow Vole | 1 | Common Raccoon | 2 | | | | |
| | White-footed Mouse | 1 | Black Bear | 2 | | | | |
| | Eastern Chipmunk | 1 | Virginia Opossum | 1 | | | | |
| | | | New England Cottontail | 1 | | | | |
| | | | American Beaver | 1 | | | | |
| | | | Common Porcupine | 4 | | | | |
| | | | Eastern Gray Squirrel | 1 | | | | |
| | | | Woodchuck | 1 | | | | |
| | | 30% | | 57% | | 11% | | 2% |
| Furthest Possible | Meadow Vole | 1 | Red Fox | 1 | Wapiti/Elk | 1 | Wapiti/Elk | 1 |
| | White-footed Mouse | 1 | Mountain Lion/Cougar | 1 | White-tailed Deer | 2 | White-tailed Deer | 3 |
| | Eastern Chipmunk | 1 | Bobcat | 2 | Common Gray Fox | 1 | Canada Lynx | 1 |
| | | | Striped Skunk | 5 | Coyote | 2 | Northern River Otter | 1 |
| | | | Fisher | 1 | Red Fox | 3 | American Beaver | 1 |
| | | | Northern River Otter | 1 | Canada Lynx | 1 | | |
| | | | Common Raccoon | 2 | Mountain Lion/Cougar | 2 | | |
| | | | Virginia Opossum | 3 | Bobcat | 2 | | |
| | | | New England Cottontail | 1 | Northern River Otter | 3 | | |
| | | | Common Porcupine | 4 | Black Bear | 3 | | |
| | | | Eastern Gray Squirrel | 1 | Common Porcupine | 1 | | |
| | | | Woodchuck | 1 | | | | |
| | | 6% | | 43% | | 40% | | 11% |

Potential visitor proximity to animal enclosures ranged from zero to over 15 meters; the nearest and furthest possible proximities for each NTM display appears above. Integers indicate quantity of displays of a species within a particular proximity range. Species highlighted within a column represent either their nearest possible proximity range among all presentations (top half of table) or furthest possible proximity range among all presentations (bottom half of table). The flying squirrel does not appear in this table because, although at least one is known to be held at the Museum of Science, it was not observed.

The design of over 90% of the NTM displays may thwart the sense of human dominance that can be derived from elevated observation; only five NTM displays were presented below visitor eye-level. These included one each of the five displays of striped skunks and of northern river otters, one of the three Virginia opossum displays observed, and each of the American beaver and eastern chipmunk displays. Other design aspects of these five displays, such as barrier attributes or naturalism, may nevertheless serve to mitigate—or reinforce—the dominance effect.

Barrier Attributes. Finlay, James, and Maple convincingly demonstrated that visibility of barriers influenced attitudes about animals; less obtrusive caging can mitigate the perception of captive wildlife as "aberrant pets," to borrow a phrase from Hancocks (85). Massachusetts' zoo displays of NTMs were scored for the degree to which enclosure materials impeded the visitor-animal interface. Finlay and his fellow authors had found that any visual evidence of barriers, even if only observed behind an animal, could impact viewer perceptions; however, since background barriers were evident at all observed enclosures but one, only foreground barrier characteristics were scored.

Three barrier attribute options were noted: fenced (the most obtrusive; a lattice-like barrier fully intervened between visitor and animal), glass (intermediately obtrusive; a transparent physical barrier intervened), or open (least obtrusive; a partial or inconspicuous barrier intervened, e.g., an "open" rating was possible if an enclosing fence was present but not high enough to thoroughly obstruct clear views of an animal); see Figure 3. If a combination of barrier types was present at a single enclosure, the barrier of least intervention quality was noted.

Figure 4 depicts, for each NTM, the proportion of their exhibits possessing fenced, glass, or open barrier ranking. Fenced enclosures were predominant, at 31 (58%) of the 53 NTM displays. Glass barriers intervened in slightly more than a quarter (15) of the NTM displays; only seven (13%) of the displays presented an open interface. Large, predatory species (canines, felines, and bears) were most likely to be physically shielded from visitors by fencing; none of their displays featured an open barrier, though some were separated from the public by glass. Petite species were typically kept in small, glass-walled terrariums; all opossums were also kept within glass enclosures. The American beaver and northern river otter displays most reliably allowed for unobstructed appreciation of their occupants; glass barriers, in the

case of the otters, could actually be seen as improving the visitor-animal interface, as it allowed for improved observation and interaction with an animal while it was underwater.


Figure 3: Enclosure Barriers. A: An "open" barrier is one that allows an unobstructed view of the animal. B: A glass barrier visually simulates an open barrier to some extent, but its physicality is usually apparent in person. C: Fencing can obstruct clear views of the enclosed animals. D: This style of fencing allows for ranking it as an "open" view, as it is possible to obtain clear views of the enclosed animals. All photos by author.

Open displays may be of dichotomous effect, depending on how they are deployed. One open elk display was corral-like, and visitors could hand-feed the animals zoo-sanctioned fodder and pet them, as one might at a farm animal display. The other open-rated elk exhibit was immersive; visitors entered the animals' forested enclosure, bordered by wetland on one side, in a facility-operated vehicle. The former exhibit occupants may be perceived as more pet-like, given the nature of the available interaction; the latter are presented in a manner more faithful to their status as wildlife.

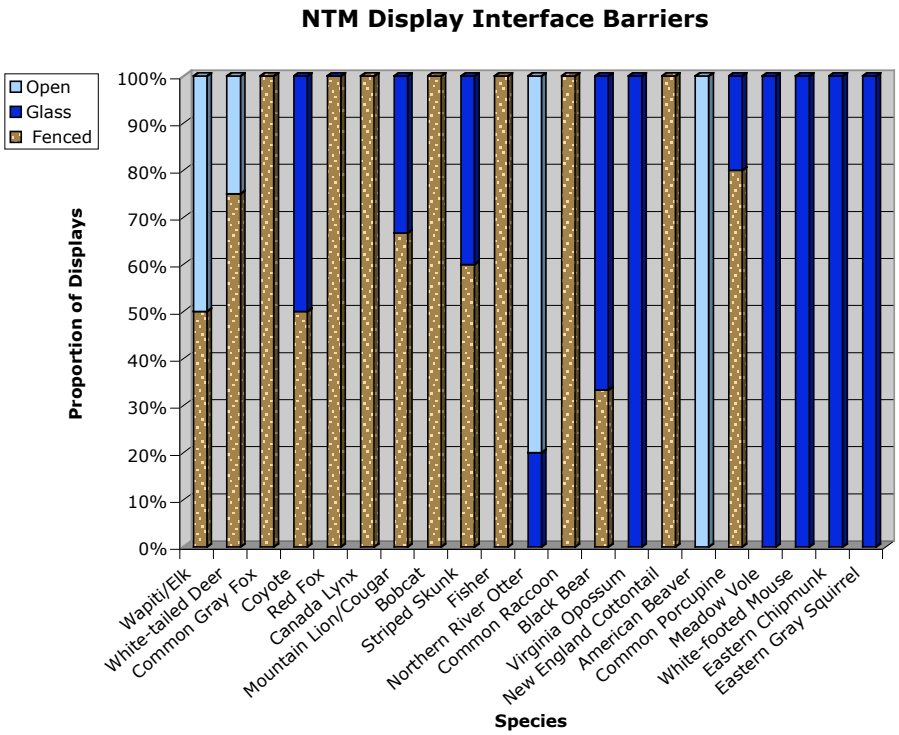


Figure 4: This graph depicts the proportion of enclosures for each NTM offering the three different qualities of interface defined in this thesis (open, glass, or fenced; see Figure 3 for examples).

Naturalism: Décor. Measures of naturalism were based on whether or not an animal enclosure featured an outdoor area and whether the exhibit utilized natural substrate and plant growth or relied wholly on props (e.g., harvested branches or leaf litter, potted plants) to provide a nuance of nature. Authentic habitat elements are surmised to generate more realistic perceptions of the species' belongingness in the wild environment. An indoor exhibit can be dressed up to resemble a more natural environment (consider the interior walk-through rainforest exhibits at some zoos), whereas an outdoor exhibit can lack natural décor and seem ecologically estranged (imagine a terrain made entirely of molded concrete).

Six species are housed exclusively indoors, at an obvious remove from the natural world; 17 NTMs have at least a portion of their exhibit area outdoors, 11 exclusively so (although members of the MoS collection were included in this count, they can not be included in a further assessment of exhibit naturalism, as their enclosures were not observed). Neither the Virginia opossums nor the eastern chipmunk, gray squirrel, meadow vole, and white-footed deer mouse appeared outdoors on captive

display.[12] Eighty-three percent of the 53 observed displays provided an outdoor viewing opportunity; 82% of these made at least partial use of the natural landscape, and the remainder—as well as all nine of the observed indoors-only displays—incorporated some amount of natural prop elements into their displays (Figure 5). No exhibit was without at least some prop materials derived from nature.

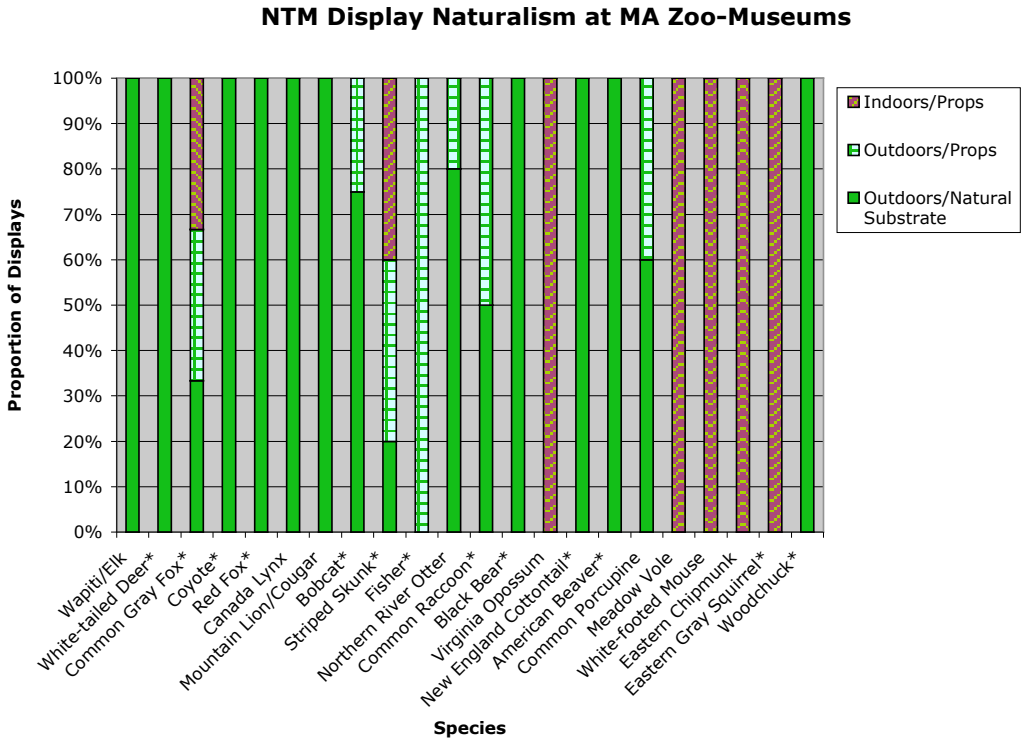


Figure 5: The majority of NTM enclosures at Massachusetts zoo-museums were outdoors and incorporated the natural terrain to some extent. Only five of the observed NTMs did not have a single outdoor display. All observed exhibits featured at least some natural elements.

Naturalism: Co-Inhabitants. In the wild, species rarely occur in isolation from one another; they are members of a mixed community of species—inhabitants of an ecosystem. In zoos, species usually occur in isolation from one another, extracted from their normal interrelations. The extent to which NTMs were presented in mixed-species assemblages was noted, and only occurred in three displays, if limiting the discussion to accessioned animals.

In two of the displays, it was a merger of convenience rather than a simulation of authentic species interactions (two white-tailed deer enclosures held an additional hooved species, but in neither case was it one with which they would naturally co-occur). One beaver display co-housed waterfowl which they

conceivably could be found together with in the wild. The immersive elk enclosure could also be considered a mixed-species exhibition, yet no accessioned NTMs shared it with them; wild coyote, fisher, and otters, for example, were welcome to insinuate themselves at their will.

Interpretation. The scope of the interpretive materials provided at each native mammal exhibit was catalogued concomitantly with the display features. Incorporation of the following elements into the exhibit labeling was noted: individual identification (i.e., recognition of the particular animal on display as having a unique life story apart from it ambassadorial role representing the species as a whole), scientific nomenclature, habitat needs, geographic range, diet, unique attributes/abilities, conservation status, and details of the human/animal relationship. It was also noted whether any interpretive elements encouraged interactive tactile or kinetic participation.

A former public relations director of the AZA has argued against publicizing individual animal personalities, as the public may be distressed by their eventual removal from display (Allen 293); anonymity is generally embraced by the zoo community, apparently to facilitate the interpretive focus on the species overall:

> The thrust of educational programmes seems to be an attempt to neutralize particular cultural perceptions of animals and to take the visitor beyond the primary idiosyncratic experience of the individual animal in the cage in order to explain that the animal is a representative of a particular species with particular zoological and behavioural characteristics which are normally revealed in a particular ecological setting" (Mullan and Marvin 128).

In contrast, Hancocks has asked "Where is the line that separates concern for an ecosystem from concern for individual animals?" (Different 173). Twelve out of the 53 NTM displays at Massachusetts zoo-museums acknowledged the individuality of at least one of the enclosure occupants. This was generally done by reference to an animal's personal history of injury and rehabilitative care, though on a couple of occasions was simply a notification of the name bestowed upon a charismatic individual.

At a minimum, a zoo animal should be identified at its enclosure by its common name.[13] It is standard to also include details on scientific nomenclature, diet, range, and habitat on zoo enclosure labels; it is recommended to share a unique detail about the displayed species as well (Hediger, Wild Animals 177). The extent to which the different categories were incorporated into the interpretive materials is indicated in Figure 6.

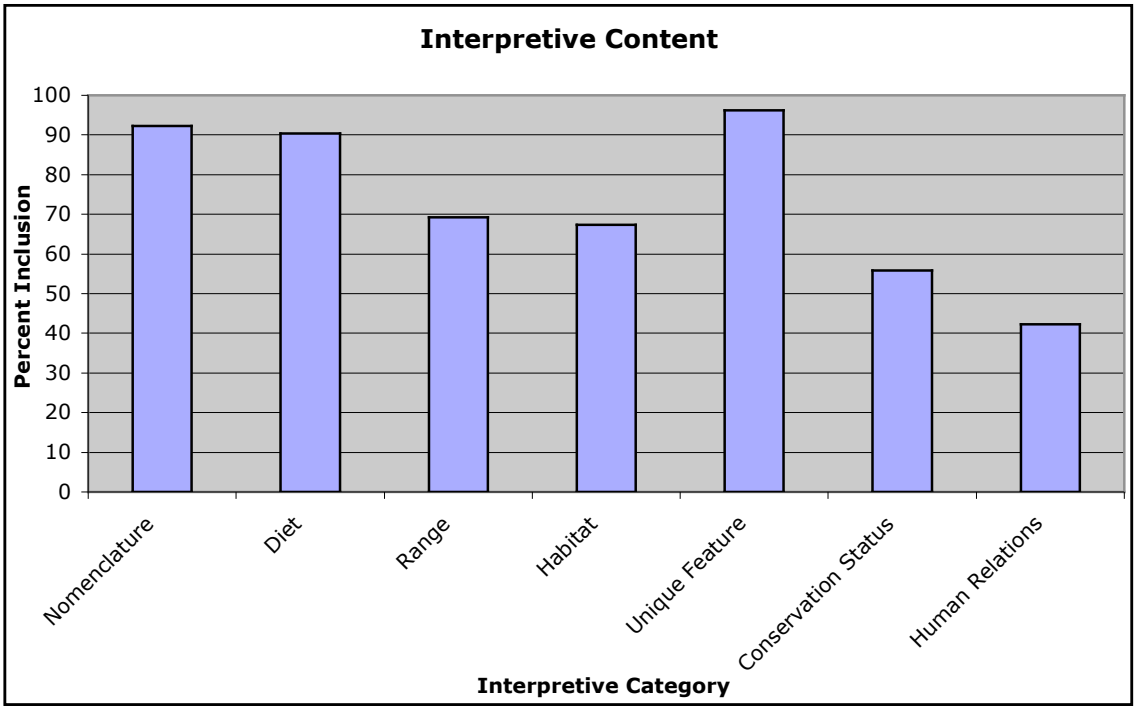


Figure 6: This graph depicts the proportional representation of each of seven interpretation categories at the 52 interpreted displays of NTMs observed at Massachusetts zoo-museums.

At Massachusetts zoo-museums, the unique detail was the most popular datum to include on interpretive labeling, missing at only two displays. Scientific nomenclature and diet were not far behind in frequency of appearance, at 92.3% and 90.4% of the 52 included exhibits, respectively. Roughly two thirds of the displays described their inhabitants' preferred habitats and geographical range; this suggests that for another third of the exhibits, it was not made obvious that a species is either currently or previously native to Massachusetts.

Conservation status of displayed NTMs was evident in only a slight majority of instances (Figure 6). This is not especially surprising, since only two of the displayed NTMs, the lynx and the cougar, are formally listed as endangered; however, even for these species, not every exhibit included conservation interpretation (it was absent from one of each species' displays). "Not Threatened" is the interpretive statement which would have appeared in conjunction with the other species featuring conservation interpretation.

The ways in which humans and Massachusetts' native terrestrial mammalian species are interconnected were referenced at fewer than half of the exhibits (Figure 6), despite the fact that human activity can often be identified as the culprit behind changes in species distribution or abundance, and that numerous potential human-wildlife conflict situations have been deemed likely enough that MassWildlife has drawn up advisory documents to prepare the public on proper ways to respond to them (Living with Wildlife). Nevertheless, 73% of held NTMs had such interpretation available at at least one display. Figure 7 depicts the extent to which the human/animal relationship is addressed at the 52 NTM displays statewide.

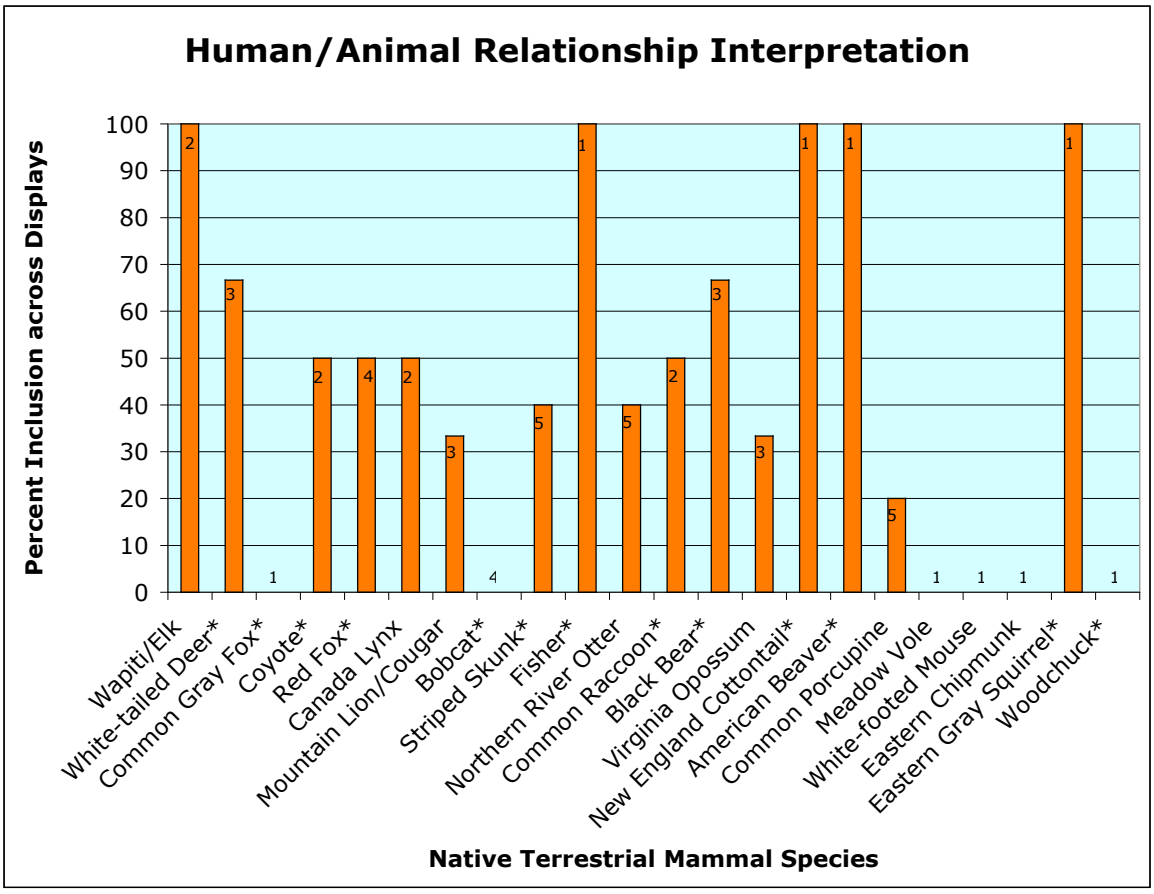


Figure 7: The prevalence of human/animal relationship interpretation among the various species displays varied, and did not appear more frequently for species determined by MassWildlife to require advisory publications (species marked by asterisk (*)). Total number of displays observed per NTM is indicated by the integers.

Interactive exhibit elements, apart from what the animals themselves can provide, were infrequently available at the NTM enclosures, appearing at only ten displays. In three instances, this involved an opportunity to feed grain to the animals (elk and white-tailed deer), which provides the visitor with a direct experience of caring for them. In the other cases, there were opportunities to compare one's own anatomy against casts or illustrations of an animal's, or to contrast a personal attempt at a physical feat against the exemplified ability of an NTM; this is an additional means of obtaining understanding about an animal.

## Collection Strategies

### Questionnaire Administration

Representatives at the twelve institutions listed in Table 3 were asked to complete an online questionnaire soliciting details on their collection practices and the factors that have influenced their decisions regarding representation of native mammal species in their live holdings (see instrument, administered via SurveyMonkey.com, in Appendix).[14] Questions one and two solicit basic details about institutional identity and whether the institution is self-perceived to fulfill a museum-like role. Question three captures data on representation of native Massachusetts mammal species in relation to all others in the zoos. Questions four through seven target collection plans—whether there is one in place, to what extent native Massachusetts species are incorporated—and general procurement practices. Questions eight through ten explore the factors that inhibit or foster inclusion of native Massachusetts mammal species in the respondents' collections.

Select zoo officials were contacted on 19 August 2009 via email; the body of the email introduced the purpose of the research and provided a URL link to the questionnaire. Respondents were assured that the data in the questionnaire would be analyzed for general trends and would not be reported in a way that linked responses to specific institutions. If a response had not been received by 26 August, an attempt was made to contact the official by phone; if this was unsuccessful, the original email was resubmitted with a request to respond or decline to respond by 28 August. Representatives from nine of the institutions participated in the questionnaire; three of these requested that the questionnaire be administered by phone.

Only seven respondents answered all ten questions. One institution formally declined to participate; the remaining two did not formally decline, but did not participate all the same.

Questionnaire Results

Institutional Identity and Purpose. Seven of nine respondents identified their institutions as museums when asked to consider that "Museums collect and preserve heritage objects and utilize their collections for research, education, and exhibition. Rather than providing a purely recreational experience, a museum seeks to communicate the meaning of its collection." For the two that did not identify themselves as museums, it is not because their mission is purely recreational; each of these identified education as their primary focus. Each of these also collected natural heritage objects, and each exhibited them, so presumably it is because they are not conducting research with their collections that they distanced themselves from a museum identity. This did not seem an adequate criterion to eliminate these two institutions from the study.

Any institution identifying entertainment as their primary focus could not reasonably be considered a museum; no respondents were eliminated by this criterion. The majority of respondents considered education to be their institution's primary focus; six felt this purpose outweighed all others. A single respondent identified conservation as their institution's primary focus. Two declined to limit themselves to a single most important dimension and emphasized their zoos must merge their efforts equally in entertainment, education, conservation, and research.

NTM Representation. Total species holdings at the nine responding zoo-museums varied from eight to 600 per institution. Representation of NTMs at these same zoo-museums varied from zero to nine species, comprising from 0 to 100% of their holdings.[15] The proportional representation of NTMs as against all mammal species, and all species overall, is indicated per responding institution in Figure 8A. When averaged across respondents, NTMs represented 4.7% of each collection Surprisingly, given Hancocks admonitions about disproportionately numerous mammal holdings in zoos, the Massachusetts collections were reported to contain only 15.0% mammal species on average; see Figure 8B.

Collection Plans. A collection plan "leads the [museum] staff in a coordinated and uniform direction over a period of years to refine and expand the value of the [museum's] collections in a predetermined

way…[It] defines the purpose of the collection and sets agreed upon limits such as subject, geographical location, and time period to which each collection must relate. The statement also may consider the uses of a collection and state the types of objects that will be acquired to fulfill the purposes of that collection" (Gardner & Merritt 32). Seven out of eight respondents (87.5%) indicated that they have, or are in the process of drawing up, a formal document to outline their institution's collection plan. The one responding institution lacking such a document or its draft indicated that there are informal mechanisms in place to guide the growth of their living collection. Interestingly, the self-reported "non-museum" has a formal collection plan in place; it is one of the institutions self-identifying as a museum that lacks one.

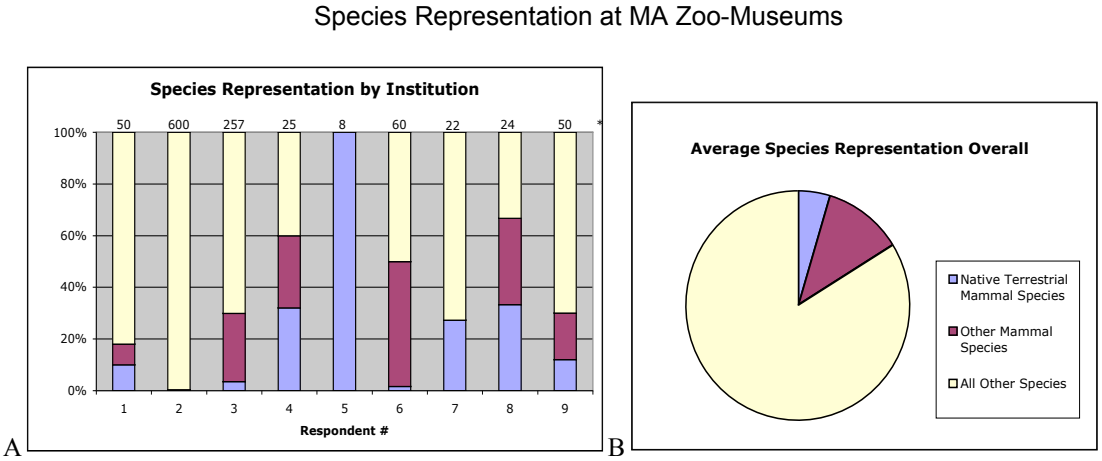


Figure 8: Representation of NTM species in relation to other mammal species as well as non-mammal species are depicted by institution (A; *values at the top indicate total number of species at responding institution) and when averaged across institutions (B).

Native Massachusetts mammals are specifically planned for in 87.5% of the eight collection plans (inclusive of the informal version). Seventy-five percent state intentions to include other native Massachusetts taxa as well. A single institution lacks any reference to local wildlife in their collection plan, but nevertheless has not excluded them from their holdings.

An "active" collection strategy involves making efforts to obtain particular animal species for the collection; a "passive" collection strategy bases acquisition decisions upon which species are made available to an institution by chance. All eight respondents actively seek and accumulate species native to Massachusetts, though five of them also rely upon random receipts of such species. Two respondents

collect Massachusetts species exclusively. At least half of the respondents receive non-releasable NTMs from wildlife rehabilitators; half again receive their NTMs as purchases or gifts of captive-born individuals from other institutions. None described purposeful removal of animals from the wild as a source for their collections.

NTM Selection Constraints. Respondents were asked to evaluate the extent to which a variety of factors might impinge on increasing the representation of NTMs in their collection. On average, visitor interest and relevance to mission were equally ranked as the most influential factors, with space constraints and species availability coming in a close second. Bureaucratic impediments were barely influential, and pathogen risks and husbandry costs were only slightly more so. Figure 9 summarizes the responses. One respondent indicated that expertise of staff would be an additional important factor to consider when introducing certain new species to a collection, but did not feel this was an influential factor with regard to expanding NTM representation at their institution.

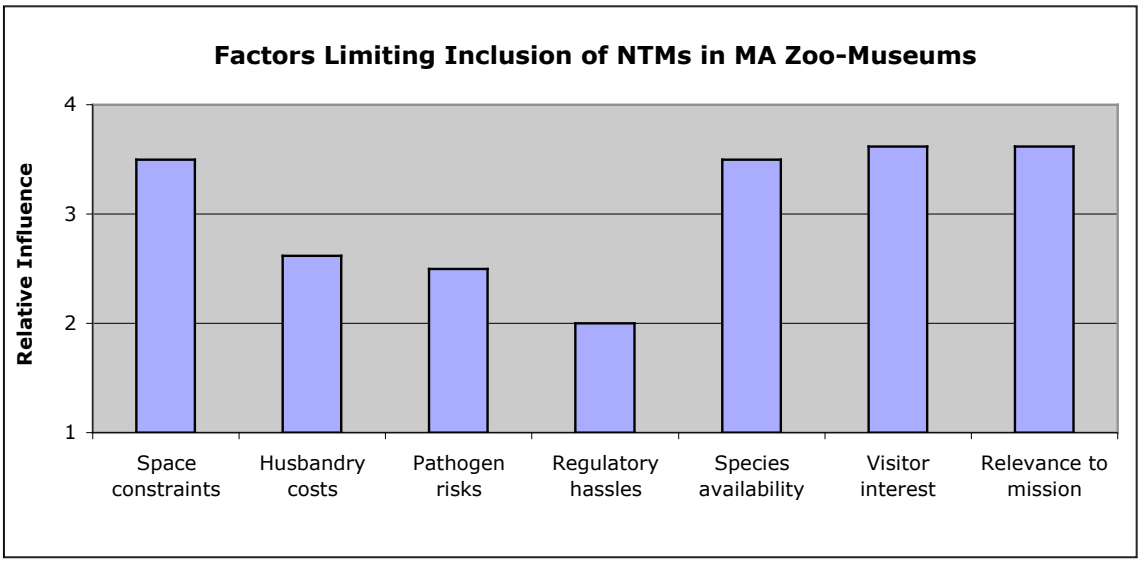


Figure 9: Respondents ranked various factors for the extent to which they influence decisions to limit inclusion of NTMs in their institution's collections (1=Not an influential factor; 2=Barely influential factor; 3=Somewhat influential factor; 4=Very influential factor).

Of the seven respondents that indicated whether their institution's acquisition decisions were at all guided by the content of other zoos in Massachusetts, 71.4% denied any such dependence. Those that did

plan around what other zoos hold did so under the AZA's direction as voluntary participants in regional, ex situ population management programs, which "are designed to maintain a healthy, genetically diverse and demographically stable population" (Population).

Thirty-three native mammalian species were notably absent from any of the twelve zoo-museums included in this study. A selection of seven, representing the largest species (moose), one species from each of three unrepresented families (star-nosed mole, masked shrew, and big brown bat), one extirpated species (wolverine), one species of special concern (southern bog lemming), and one common species (red squirrel), were presented to respondents to rank in order of which would be most to least welcome for inclusion at their institution (Figure 10). Three agreed that the big brown bat was most desirable for their collection—as one respondent pointed out, they would enable messaging on the numerous ecological services bat species provide overall; concerns over required magnitude and costs of care currently inhibit their inclusion. Two respondents cited the wolverine as their first choice, being not only charismatic and reasonably easy to care for but also relatively unknown due to its early extirpation and in need of conservation efforts in the remnants of its range; they did not indicate why this species was not yet in their care. One institution each chose the moose and the southern bog lemming as their preferred species, but the latter are not especially easy to come by, and the former require considerable investment in space and, if this is not a constraint, finances for converting it to an appropriate enclosure.

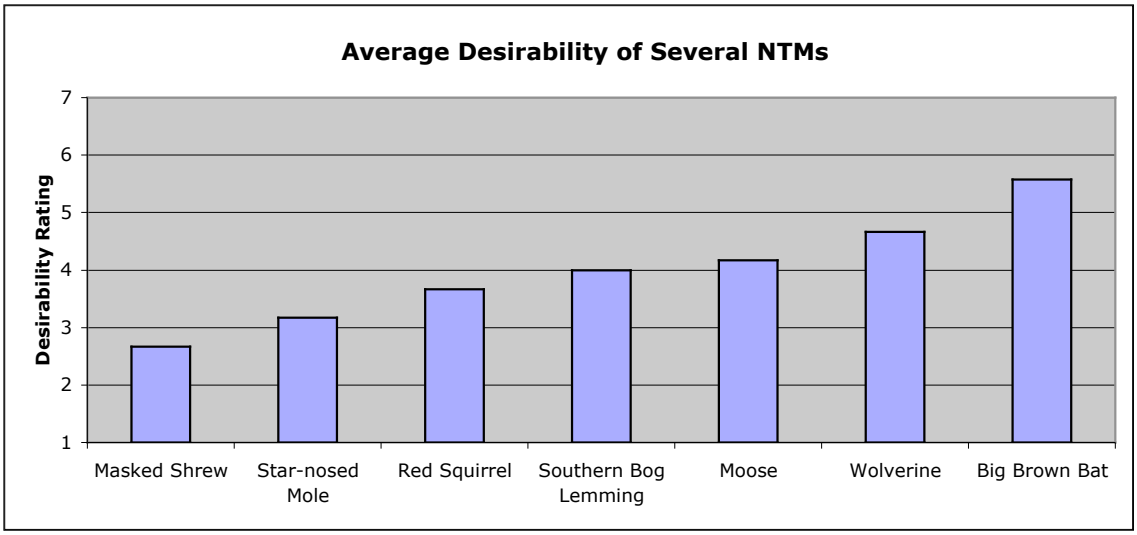


Figure 10: Respondents were asked to rank the desirability of including each of seven NTMs that did not appear to be included in any Massachusetts zoo museum (1=Least desirable; 7=Most desirable).

Benefits of NTM Display. All eight respondents to the final questionnaire question, soliciting their opinion on the primary benefit of including native Massachusetts mammals in their institutions' collections, acknowledged the importance of enabling people to make connections to their local ecosystem by fostering an awareness and appreciation of the diverse species living within it. Half tied conservation education into their cause, noting that knowing about an animal is the first step along the path to caring about its continued existence.

# Chapter VI

# Conclusions

## Preliminary Overview

The point of this study was to gain an understanding of the potential for human community members to gain physical, cognitive, and affective access to native terrestrial mammals—species which, by their geographic proximity, should have a superior claim to recognition than species whose natural habitats are situated continents away. This view is shared by Hancocks: "It seems perverse that children routinely assemble more facts about dolphins or tigers for a homework project than their grandparents ever accumulated in a lifetime, but that their knowledge of local wildlife is minimal" (Different 170).

Wildlife in its natural environment may be too elusive for the average citizen to easily encounter; conversely, as human populations sprawl across the state and convert more landscape to their own ends, increased contacts and conflicts with assorted animal species may arise. Zoos, a type of museum specializing in living collections, are the main domain in which most members of the public may gain pleasurable and personal acquaintance with wildlife.

Hancocks has repeatedly made the suggestion that "A move toward more attention on local habitats would encourage zoo visitors to value more highly the wildlife and wilderness in their own part of the country" ("Lions" 35); alluding to the risks of significant environmental degradation, he has urged, "Zoos must do all they can, with energy, imagination, and enthusiasm to show people that the region in which they live is precious and in need of intelligent stewardship" (Different 172).

The time is ripe to do so in Massachusetts. The Massachusetts landscape currently ranges from a patchwork of reasonably intact forests in the west to highly fragmented and strained environments in the east and is under ongoing development pressures (Bernardos et al. 150). A scholar of forest change has noted that:

> Unlike the farmlands and pastures of the 1800s, developed lands are unlikely to be abandoned under anything short of a cataclysmic change in the social structure and are unlikely to revert to forests within any kind of reasonable planning horizon. The U.S. Census Bureau predicts that population in the six New England states will increase from 13.6 million in 2000 to 15.3 million in 2025, an increase of nearly 13 percent (Aber 399).

He has also presciently noted:

> A major disruption in the global distribution of petroleum (another "oil crisis," as in the 1970s) could result in greater demand for wood-fired power plants and domestic wood burning for heat. It would not take very long, nor a very large increase in the fraction of energy consumed as wood in the region, to completely change the age structure, biomass, species composition, and appearance of the New England forest. In this way, the congruence of a high population density, high energy usage, and large tracts of mature forests could prove a volatile mixture (Aber 399),

It is evident that local wildlife populations will be impacted by human population growth and choices made about landscape use.

Earlier in this document, it was noted that conservation education is being cited as the paramount purpose for holding wild animals in captivity in zoos. Given that "the rescue of sufficient habitat to support any large, far-ranging species will simultaneously save countless species that exist in smaller-scaled habitats ranged across by these larger animals" (Norton et al. 314), and also that MassWildlife notes that although "mammals have traditionally received comparatively scant attention in Massachusetts…a growing environmental awareness has awakened a new realization of the diversity, abundance, and values of the state's mammalian fauna" (Wildlife), Massachusetts' zoo-museums can conceivably contribute to local conservation efforts by presenting live, native, terrestrial mammals in a context that informs citizens of the biodiversity of their "backyard" and engages them as advocates for equitable co-occupation of the state.

## Discussion of Results

"Even in the earliest temples of the muses, someone set forth some object for others to experience, and who selected what for whom is the question at the heart of all conversation about exhibitions" (McLean, "Museum" 83). The research conducted for this thesis identified the zoo-museums of Massachusetts and established which native, terrestrial, mammalian wildlife species they had on exhibit and in what fashion they were being displayed and interpreted. Details on collection decisions were also collected. These collective data reveal to some extent the richness of the relationship that these museums are attempting to cultivate between the community and these particular animals.

### Native Terrestrial Mammal Representation

Species Omissions. It was found that fewer than 50% of the NTMs, as defined in this study, were on display in the twelve zoos deemed to be operating according to museum-like principles. In truth, a large

number of these species do not meet the standard charismatic qualifications for zoo display; visitors prefer larger species, and nearly half the NTMs are smaller than a chipmunk. However, their diminutive qualities shouldn't strictly preclude their inclusion—particularly since all four species identified as of Special Concern in Massachusetts are contained within this category. Their presence in a collection could be used to explain what this designation means, and to generally educate about the diversity of the state's smaller species and the ecological roles they play (it could also be of interest to some segment of society to learn that there is a species of lemming in their midst; there are certainly misconceptions to be debunked about such creatures).

The largest NTM, which by the demonstrated rubric for visitor tastes should be quite appealing, was only witnessed in two-dimensional silhouette on highway signs when traveling between institutions—the moose was excluded from all zoos. This is unfortunate, since apart from their impressive size, they also could be used to support an interesting tale of successful return to the state following a three-century absence. This animal could serve as a potent example of the consequences of human action on a species' abundance and distribution, linking historic patterns of land use, and exploitation of moose as a resource, to their varied presence and absence in Massachusetts.

The wolverine is another notably absent species that could have both held appeal for visitors and been used to explore issues of conservation. Present in the state until the early- to mid-1800s, it's range has suffered further and further reduction throughout the nation, to the point where it has been proposed for listing as a federally endangered species. The United States Fish and Wildlife Service initially denied this species protection under the Endangered Species Act, claiming there was insufficient evidence to support its addition to the list; several non-governmental environmental agencies joined in formally protesting this decision, so the wolverine's status is presently under re-review (Gallagher). What a conservation education opportunity the presence of this animal would have offered, to explore both the civic and scientific processes of determining when a species is eligibly endanger

Species Inclusion. Moose and wolverine may not be species that immediately come to mind when considering the state's fauna, as the moose has only just returned after a long absence, and the wolverine departed long ago and presently looks unlikely to make a comeback. Many of the species that are commonly associated with the northeastern temperate forest—e.g., deer, porcupine, bobcat, beaver,

skunk—do indeed make an appearance in at least one of the state's zoo-museums.

Of the nine institutions that indicated by questionnaire their proportional holdings of NTMs, the holdings at five had equal or greater representation of NTMs than of other mammals. This was an encouraging and unexpected result. It was also heartening to learn that seven respondents actually had active collection of NTMs specified in their institutional collection plans. Even though, as discussed previously, the living objects have an impermanent presence in the collection, it seems that upon their loss they have a good chance of being intentionally succeeded by other NTMs, which will ensure visitors continued access to personal experience of local species.

Zoo-museums identified relevance to mission, visitor interest, species availability, and space constraints as the greatest impediments to inclusion of NTMs, but an analysis of mission statements demonstrated that none should outright exclude their inclusion in any of the twelve institutions' collections. Visitor interest in a species—in any object—can very much be manipulated by its presentation; Hediger noted that the public arrives vastly ignorant of what could be found exciting about certain species, and it's thus imperative that a zoo use resourcefulness in display and interpretation to alleviate that circumstance (Hediger, Wild 178).

It then falls to species availability, which is difficult to control if one relies upon wildlife rehabilitation patients to fill one's collection; if relying on inter-facility transfer, it may involve political petitioning and an ability to demonstrate adequate resources to care for any new charge. The instrument deployed was not sensitive enough to detect the degree to which zoo-museums were actively attempting to bring in an additional NTMs but were having difficulty obtaining them, though one respondent indicated the smaller species were difficult to come by.

Sometimes a species may be available, but can't be accepted for lack of space. This summer Alaska Fish and Game took 10 orphaned moose under their control, and have since sought suitable placements for them (Christiansen). Two have been claimed by the Milwaukee Zoo, and two have died in captivity; six remained unclaimed as of late June 2009 (~2.5 months ago at time of writing), but although the moose was ranked by questionnaire respondents as the third most desirable NTM to obtain, it would doubtless take significant investment of space, and time and finances preparing that space, in order for any of the local zoos to accept one (or more) of these creatures. With such an investment, it would also make sense to

ensure in advance that the exhibit could be easily repopulated so it does not languish unusable when the inaugural resident(s) depart in death. In the current economic climate, it might not make sense to deplete a good proportion of resources to enrich collections by a single species of indeterminate tenure.

In summation, a healthy proportion of native terrestrial mammal species are on display in Massachusetts zoo-museums; statewide, there is opportunity for citizens to come into the physical presence of various NTMs and benefit from the in-person experience that object-centered learning can provide. Because the contexts that have been crafted for the held animals can exert an influence on visitors' attitudes about them (see Finlay, James, and Maple, e.g.), their presentation to the public shall be analyzed next.

Display Characteristics

Hancocks has observed that in enclosure design, meeting needs of the animal is primary, "but seamlessly attached to that come the important needs of the human visitors and the justification for displaying animals at all…A refuge built principally for animals would be quite a different place, with far more space and quiet " (Different 144). Zoos do not operate primarily as refuges for the species they hold; they are in the business of facilitating wildlife acquaintance opportunities for their visitors, and according to the mission statements of the 12 zoo-museums analyzed herein, focus on delivery of an engaging and educative experience more frequently than on specific conservation outcomes.

The environmental milieu in which an animal appears bears a tacit message, one that is comprehended viscerally and in advance of digesting any interpretive signage. Modern zoo philosophy encourages creation of an experience for the visitor that enables him or her to make connections between the observed individual and the terrain they would naturally inhabit, the better to comprehend the local ecology. Conway has suggested that "the real value of the zoo's role in this context is to act as a partial substitute for visits to natural areas and to fulfill certain functions of parks in the field of environmental education and conservation" ("Zoos" 49). Nevertheless, the wildlife encounters within a zoo are necessarily contrived, as paying visitors expect a reasonable guarantee of interactions with numerous species that simply is not possible spontaneously. Zoo visitors have also been known to complain about attempts at ultra-authenticity of animal enclosures, as they impede obtaining close proximity and full views (Hancocks, Different 127).

Proximity. In the twelve zoo-museums, visitors generally have the opportunity to quite closely approach the displayed NTMs, a situation which many of these species would seldom permit in the wild. Proximity not only facilitates observation, it also improves the chances for a visitor to confirm that an animal is aware of his or her presence, which Mullan and Marvin deduced is of great importance to the encounter.

Nearly half the NTMs in the visited institutions are restricted to a display space not much larger than a studio apartment. This may not bother the occupants, if they are suitably enriched, and may suit visitors' interests, but some may be distracted by the animals' perceived plight if it seems the close quarters are against an animal's will and it has no option to retreat to a further distance. The subconscious message conveyed may be that it is acceptable for the interests of the visitor to supplant those of the animal. If an underlying goal is to lead visitors to recognize that NTMs are worthy of adoration, and personal or societal sacrifice is warranted in order to conserve the habitats they need to survive, severely curtailing their range in captivity may frustrate the delivery of this message by demonstrating suboptimal settings are suitable when it is convenient to human purposes. Yet open displays, while enabling the clearest and in some cases most natural views of animals, in the latter instances did so at the expense of proximity.

Appearance. The location of an enclosure, what it contains beyond the animal itself, and the barriers employed to keep animals contained and separate from visitors certainly impact the quality of a visitor's animal observations, both sensuous and analytical.

Interior displays are most practical for small and/or sensitive creatures, and also require inclusion of suitable décor in order to call the world of the outdoors to mind. All indoor displays (17% of observed enclosures) were glass-fronted terrariums, ranging in size from 10 gallon tanks to a walled-off section of a small room. The smaller rodent enclosures, even with their sprinkling of leaf litter, strongly resembled pet store displays, effective only in showcasing the existence and appearance of their inhabitants, but not how they might behave in the wild. The larger indoor displays tended to incorporate a greater measure of natural elements, such as logs, branches, and stones, which gave a truer depiction of the scenes one might expect to observe in nature. These latter arguably allow visitors to more clearly envision what the inhabitants' conspecifics might be up to on their own in the wild, and to thereby comprehend the value of undeveloped land to their survival. This is merely speculative, as this study did not directly assess visitor

responses.

Merely appearing outdoors did not automatically ensure an exhibit was reminiscent of nature. Eight enclosures were primarily architectural constructions, effectively caging the animal, as opposed to containing it in a fragment of the landscape. Though natural enrichment materials were included in each of these, distinguishing them from the barren spaces of zoos' yesteryear, they did not clearly allow for observations characteristic of what one might witness in a non-captive creature. Incorporating natural elements into the décor does however demonstrate that zoos are making an effort to lead the visitor to associate their enclosed animals with the world beyond their barriers.

The majority of outdoor enclosures did enable their inhabitants to trod on actual earth and lay among the grasses and bushes growing there, and/or to swim in specially-constructed ponds. At least two enclosures, one for white-tailed deer and another for elk, occupying sizeable, forested acreage, accurately represented natural conditions for their occupants. The extent to which other enclosure environments mimicked those in which the animals would be most likely to be observed in nature, however, was not assessed in this study. It's possible visitors can be concocting misconceptions about normal habitats based on inaccuracies in habitat reproduction, and this could be a valuable subject for further review.

Materials employed in construction of enclosures can obstruct some modes of sensory appreciation of a creature; affected senses vary by barrier. Certain enclosure materials also carry connotations of a creature's individual character (Finlay et al.). On 58% of the occasions one can observe an animal on display at Massachusetts zoo-museums, one is peering through a lattice of wires, bars, or wood. Although this can impact a visitor's willingness to believe that the occupant is a wild animal, such assessments appear to be limited to the individual on display (Finlay et al.); for the visitor, the creature observed has lost its truly natural status, but this does not necessarily detract from the status of its wild, unobserved conspecifics, which may yet be called to mind.

Nevertheless, the visitor is most immediately occupied by the specific animal before them (Mullan and Marvin 128), and fencing is typically unattractive and a vivid reminder one is not on an actual nature walk. It is also a hindrance for the wildlife photography enthusiasts among a zoos' visitors. Glass barriers, presumably, mitigate this effect since one is not viewing the animal with an impeding cross-hatch overlaid. Logistical matters of expense and security aside, lattice fencing does better permit sound and scent

exchange than do glass barriers, and these are important elements of a multi-sensory experience; in some cases, tactile contact may also (even if it should not) be made.[16] Yet glass allows one to come within an inch from cooperative animals it would otherwise be dangerous to be so close to; a bear behind glass may bring its face or paws to the visitor's, a sure and satisfactory sign that one has been recognized by the animal other. Twenty-eight percent of observed enclosures make this sort of experience possible.

An obvious way to alert someone to the ecological interconnectedness of NTMs within the forest habit would be to recapitulate them in microcosm. Several NTMs can compatibly share the same turf, yet there was only one display that physically demonstrated this, and incompletely so; despite referencing the potential presence of other NTMs within the enclosure, only one species was formally in the collection and consistently present on the territory (the other named species were free to come and go, and were not observed on the research visit). Should any zoo-museums have exhibit re-design on their strategic agenda, construction of mixed-species assemblages— even if this had to be limited to a façade of such, with inconspicuous divisions between occupied segments of the enclosure—should be attempted.

Interpretation. In the museum setting, interpretation implies that beyond provision of information, a suggestion of its significance is shared. It is appropriate for interpretation to relate the object it addresses to the museum's mission. The interpretive emphasis for the twelve zoo-museums discussed herein can be reduced to familiarizing visitors with biodiversity and/or inspiring their interest in providing for its perpetuation.

Of the 53 observed displays, all but one—an exhibit new enough that interpretive materials had not yet been drawn up—at a minimum identified the relevant creature by its common moniker. Fifty included details about the NTM on display that distinguished it from all other creatures at the zoo-museum; difference is an important element of diversity, so dedication to including such details is laudable. In the context of promoting conservation, it seems reasonable to suppose that an animal's conservation status and how the species and human populations impact upon one another would be highlighted more frequently than is in actuality done. In fact, this sort of detail was least likely to be included on enclosure labeling.

The bulk of the institutions could do more to encourage visitors to actively relate to the animals on display. Presenting information primarily in factoid format is not particularly engaging. Asking visitors questions about themselves (their own bodies or opinions) in relationship to an NTM would actively

involve them and put them in the role of expert; this is especially effective if exhibit developers successfully anticipate questions visitors would naturally think to ask themselves (Gillian and Coulton 118). Regrettably, only seven displays incorporated this level of interactivity. Three other displays facilitated an opportunity for people to make a food offering to an NTM, and for the NTM in turn to accept it. Though promoting an unnatural sort of relationship, one which would be dissuaded in a natural setting, it does generate a very immediate experience of interdependence.

This research neglected to establish the extent to which human facilitators (e.g., docents) directly interpret NTMs for visitors to the zoo-museums; "One way of ensuring that subtle points of interpretation do not languish in unnoticed arrangements of objects or unread text panels is to present ideas through the mouths of real people—lecturers, guides and actors" (Arnold 69). It is certain the MoS deploys one or two of their NTM species, at minimum, to the demonstration area in company of its Live Animal Center staff or volunteers; but one needs to plan to be present at the appropriate time in order to benefit from this technique. Generally, though, keepers and technicians have daily animal care duties to attend to and are thus frequently in the vicinity of the objects in their collections; whether sizeable or small, a visitor to a zoo-museum should usually be able to locate someone of whom to ask any questions they haven't otherwise found answers to.

Such actions fulfill one of the basic roles that have been attributed to museum objects; the encounter leads the learner to direct their own inquiry, and to invite others to stroll on their path to discovery; "For it is the story told, the message given, and the ability of social groups to experience it together that provide the essential ingredients of making a museum important" (Gurian 182).

## Concluding Remarks

"The zoo is not a window on nature but rather a prism that bends the light according to the culture it is set in," observes Croke (253). Zoos were mere menageries when set within the ancient culture of conquest; the concern of collectors had little to nothing to do with proper care of their uprooted inmates, but instead was concentrated in the quantities and varieties of exotic animals they could amass. It was not their business to convey anything of importance about the animals themselves; their collections existed merely to reflect the extent of their owners' international reach.

In their 1998 publication, *Excellence and Equity*, the AAM asserts that "Decisions about collecting, exhibitions, programs, and other activities carry a powerful, value-laden educational message" (18). Although referring to ethnic and minority museums in particular, the CMNC's musing that "Changing times and changing perceptions result in new museums" (18) is similarly apt when considering zoos.

Massachusetts is no stranger to celebration of the rich heritage of the region, but there has been a strong tendency to emphasize the cultural aspects over the natural.[17] As zoos have evolved over time, redefining themselves as custodians of our natural heritage, a greater role has been recognized for inclusion of indigenous species in their animal assemblages (Davallon and Davallon 26). Curators in this state appear to recognize that inclusion of the local field and forest species can make an important contribution to the practicable impact of their living collections.

Exhibition of NTMs is supportive of the mission of each identified zoo-museum, is relevant to visitors, is an appropriate presentation format to allow them to make an impression on people, and is entertaining and accessible to a variety of audiences; NTMs additionally have ample interpretive scope, and together these qualities satisfy McLean's assertions of what an exhibition must be made certain to consist (Planning 53-54). Yet when critiquing a museum exhibition, the probable effect on visitors has been deemed the most important aspect to examine (Chambers 65). This is a logical direction in which to proceed when building upon the foundations of this study, which is a snapshot of the status of native, terrestrial, mammalian wildlife species in Massachusetts zoo-museums and factors that have shaped decisions on their inclusion in living collections.

Endnotes

[1] More than 92% of Massachusetts residents live in urban areas; see HIV/AIDS in Massachusetts: An Epidemiological Profile. (March 2004. MA DPH, HIV/AIDS Bureau, and HIV/AIDS Surveillance Program. 22 June 2008. <http://www.mass.gov/Eeohhs2/docs/dph/aids/2004_profiles/chapt1.pdf>).

[2] Hancocks has calculated the ratios of species represented in zoos against natural abundance for several taxonomic groups:

- Mammals = 1:31
- Birds = 1:98
- Reptiles = 1:104
- Amphibians = 1:2000
- Invertebrates = 1:several million

He laments this imbalance and urges his professional community to incorporate greater vertebrate—and invertebrate—diversity in their collections and displays (David Hancocks. A Different Nature: The Paradoxical World of Zoos and Their Uncertain Future. Berkeley, CA: University of California Press, 2001: 165).

[3] Undeniably, numerous such sources were of use in the preparation of this thesis.

[4] Designed by one of the earliest Harvard University Extension School's Museum Studies graduates, Anna Holden, under the supervision of Juli Brownrigg, Director of the BCM Kits Department; see Anna R. Holden, "Bridging the Gap Between Nature-Deficient City Youth and Urban Wildlife: An Example of a Museum's Unique Ability to Address a Local Need." (Diss. Harvard University, 2006).

[5] The London Zoological Society's animal collection is in many circles considered to be the first worthy of the title "zoo," by virtue of its deliberate plan for collection growth plus an exhibit organization intended to abet observation and study (Vicki Croke. The Modern Ark: The Story of Zoos: Past, Present and Future. New York: Avon Books, 1997:141; Hancocks, Different 43, 45). Prior to the introduction of these elements, when animal collections were just a haphazard variety of caged species—living "cabinets of curiosity"—the term "menagerie" was more appropriate to apply.

[6] Had funds been available, construction of the Franklin Park Zoo in Boston may have started as early as 1887 (Elizabeth Hanson. Animal Attractions: Nature on Display in American Zoos. New Jersey: Princeton University Press, 2002: 61).

[7] Earth boasts well over 1000 zoos (Zoos & Aquariums of the World. World Association of Zoos and Aquariums. 27 August 2009. <http://www.waza.org/network/index.php?main=zoos>.

[8] Zoo professionals make it clear that planned wildlife removal "must never be undertaken to facilitate the exploitation of a habitat (e.g., the spotted owl should not be taken into captivity so that we can cut down the old-growth forest and get on with our business)" (Bryan G. Norton, Michael Hutchins, Elizabeth F. Stevens, and Terry L. Maple, eds. Appendix. Ethics on the Ark: Zoos, Animal Welfare, and Wildlife Conservation. Proc. of a conference on Animal Welfare and Conservation: Ethical Paradoxes in Modern Zoos and Aquariums. 19 Mar. 1992. Washington, DC: Smithsonian Institution Press: 317).

[9] Not all such specimens would be acceptable for display collections in zoos; some have suffered serious disfigurement (e.g., amputations).

[10] Some liken the lodgings more so to a prison; there is extensive animal rights/welfare literature that strongly argues against the keeping of animals in zoos. Several such viewpoints are succinctly presented in assorted chapters of *Ethics on the Ark: Zoos, Animal Welfare, and Wildlife Conservation*. While

concurring with John Wuichet and Bryan Norton that "there is inherent value in the state of wildness itself" (239), for the purposes of this thesis it is presumed that live animals are an acceptable collection object (John Wuichet and Bryan Norton. "Differing Conceptions Of Animal Welfare." Ethics on the Ark: Zoos, Animal Welfare, and Wildlife Conservation. Ed. Bryan G. Norton, Michael Hutchins, Elizabeth F. Stevens, and Terry L. Maple. Washington, DC: Smithsonian Institution Press, 1995. 235-250).

[11] The New England Aquarium did have a native *marine* mammal species on display, the harbor seal.

[12] Non-captive eastern chipmunks and gray squirrels were on occasion seen on zoo grounds, however.

[13] Only one observed enclosure lacked this nicety, or any other interpretation, as its occupants had only very recently been acquired; this enclosure is omitted from the subsequent analyses.

[14] Since the information being collected pertained to institutions rather than individuals, the project was exempt from the requirement for approval by Harvard University's Institutional Review Board (Human Subject).

[15] Eight NTMs were the maximum observed at any on-site visit; since questionnaire-reported holding quantities were in some cases greater than those observed, this suggests that not all held species were available on exhibit, or were not yet obtained, at the time of the on-site visits.

[16] I confess—I pet a porcupine! S/he did not seem to mind.

[17] Of the 103 museums mentioned or advertised in the *2008*2009 Massachusetts Getaway Guide* distributed by the Massachusetts Office of Travel and Tourism, over 80 deal in arts and local historical heritage; fewer than 20 specialize in science or nature (Massachusetts Office of Travel and Tourism. 2008*2009 Massachusetts Getaway Guide. Boston: MOTT, 2008).

Appendix

Native Massachusetts Mammal Collection Strategy Questionnaire

## Native Massachusetts Mammals Collection Strategy Questionnaire

**Exit this survey**

20%

Thank you very much for making time in your busy schedule to assist me by answering this brief questionnaire!

For my thesis towards a Master of Liberal Arts degree in Museum Studies from the Harvard Extension School, I am investigating the factors that influence inclusion of native mammals in Massachusetts museum live animal collections. Responses to this questionnaire will be analyzed for general trends and will not be linked to specific institutions when I compile the data (I ask you to identify your institution below only to enable me to track respondents, so I will know with whom to follow up if I need any clarification).

Please email me at ccheney@fas.harvard.edu or call 617.623.2773 if any concerns or confusion arise while participating. Thanks again for your cooperation!

**1. Museums collect and preserve heritage objects and utilize their collections for research, education, and exhibition. Rather than providing a purely recreational experience, a museum seeks to communicate the meaning of its collection. With this in mind, do you consider your institution a museum?**

- Yes
- No
- Not sure

Please indicate in the space below which institution you are affiliated with (NOTE: Your answer is used only to ascertain receipt of institutional response and enable subsequent clarifications if necessary).

**2. What do you feel is your institution's primary focus? Please select the most appropriate response.**

- Entertainment
- Education
- Conservation
- Research
- Other (please specify)

Native Massachusetts Mammals Collection Strategy Questionnaire

**Exit this survey**

40%

I am interested in the proportional representation of live native Massachusetts mammals in the state's museums.
For the purposes of my thesis, the 56 following species shall be considered native mammals (cetaceans and pinnipeds are excluded; extirpated and migratory species are included):

RODENTS----------INSECTIVORES/BATS--------CARNIVORES/UNGULATES/OTHER:

Beaver.....Eastern Mole.....Black Bear.....Northern River Otter
American Porcupine...Hairy-tailed mole.....Raccoon.....American Mink
Muskrat.....Star-nosed Mole.....Striped Skunk.....Ermine
Woodchuck.....Common Water Shrew..Bobcat.....Long-tailed Weasel
Chipmunk.....Masked Shrew.....Canada Lynx.....American Marten
Gray Squirrel.....Northern Short-tailed Shrew...Mountain Lion/Cougar...Fisher
Red Squirrel.....Rock/Long-tailed Shrew.....Red Fox.....Wolverine
Northern Flying Squirrel.....Smoky Shrew.....Gray Fox.....Moose
Southern Flying Squirrel.....Big Brown Bat.....Coyote.....Wapiti/Elk
Southern Bog Lemming.....Eastern Pipistrelle.....Gray Wolf.....White-tailed Deer
Southern Red-backed Vole...Eastern Red Bat.....Virginia Opossum
Woodland Vole.....Eastern Small-footed Bat....New England Cottontail Rabbit
Meadow Vole.....Hoary Bat
Woodland Jumping Mouse...Indiana Bat
Meadow Jumping Mouse.....Little Brown Bat
Deer Mouse.....Northern Long-eared Bat
White-footed Mouse.....Silver-haired Bat

**3. Please indicate the total number of species (as opposed to number of individuals) represented in your collections:**

| | |
|---|---|
| All species combined | |
| Mammalian species | |
| Native mammal species (see list above) | |

**4. Is there a collection plan in place at your institution to define the purpose and guide the growth of the living collection?**

| |
|---|
| We have a formal document to outline our collection plan |
| We have an informal, undocumented plan |
| No plan is in place; the direction of collection growth is not predetermined |

**5. If there is a collection plan, please indicate whether inclusion of native Massachusetts animals is specified for any of the following taxa (select all that apply):**

| |
|---|
| Invertebrates |
| Amphibians |
| Reptiles |
| Fish |
| Birds |
| Mammals |
| N/A (no MA taxa referenced in collection plan) |
| N/A (no collection plan) |

**6. An Active collection strategy involves making efforts to obtain particular animal species. A Passive collection strategy bases acquisition decisions upon which species are offered by chance.**
**Which collection strategy does your institution employ for the following species categories ?**

| | Primarily Active Collection | Primarily Passive Collection | An even mix of Passive and Active Collection | N/A (There is no collection activity in this category) |
|---|---|---|---|---|
| MA species | | | | |
| Other USA species | | | | |
| Exotic species | | | | |

Please elaborate on the source(s) of native Massachusetts mammals presently in your collection.

**7. Are acquisition decisions at all guided by the content of other Massachusetts institutions' live collections?**

| |
|---|
| Yes |
| No |

Please elaborate, if you wish:

**8. In your opinion, how strongly do the following factors impact decisions to limit native Massachusetts mammal species representation in your institution's collection?**

| | Very influential factor | Somewhat influential factor | Barely influential factor | Not an influential factor |
|---|---|---|---|---|
| Space constraints | | | | |
| Husbandry costs | | | | |
| Pathogen risks | | | | |
| Regulatory hassles | | | | |
| Species availability | | | | |
| Level of visitor interest | | | | |
| Relevance to mission | | | | |
| Other | | | | |

(please specify)

**9. In my visits to Massachusetts live animal collections, I did not encounter any of the species below. Please rank these species according to their desirability for inclusion in your institution's collection, with 1 being most desirable and 7 being least desirable.**

| | 1 (Most Desirable) | 2 | 3 | 4 | 5 | 6 | 7 (Least Desirable) |
|---|---|---|---|---|---|---|---|
| Big Brown Bat | | | | | | | |
| Wolverine | | | | | | | |
| Red Squirrel | | | | | | | |
| Southern Bog Lemming | | | | | | | |
| Moose | | | | | | | |
| Star-nosed Mole | | | | | | | |
| Masked Shrew | | | | | | | |

Please indicate your reasons for ranking a given species as most desirable. Why isn't it in your collection already?

**10. What do you consider to be the primary benefit of including native Massachusetts mammals in your institution's collection?**

THANK YOU!!!

It was so kind of you to share your information and insights with me. Your responses will enable me to better depict the overall level and reliability of live native terrestrial animal display in this state.

I look forward to visiting your institution--and your animals--again some day soon. Of course, I'd be excited to see even more Massachusetts species represented the next time I go ;o)

Best wishes for continuing to grow in these crazy times.

Cheers,
Cheryl

Prev Done

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