

We remember...

10% of what we read



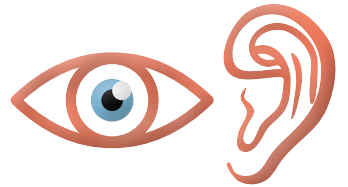
20% of what we hear



30% of what we see



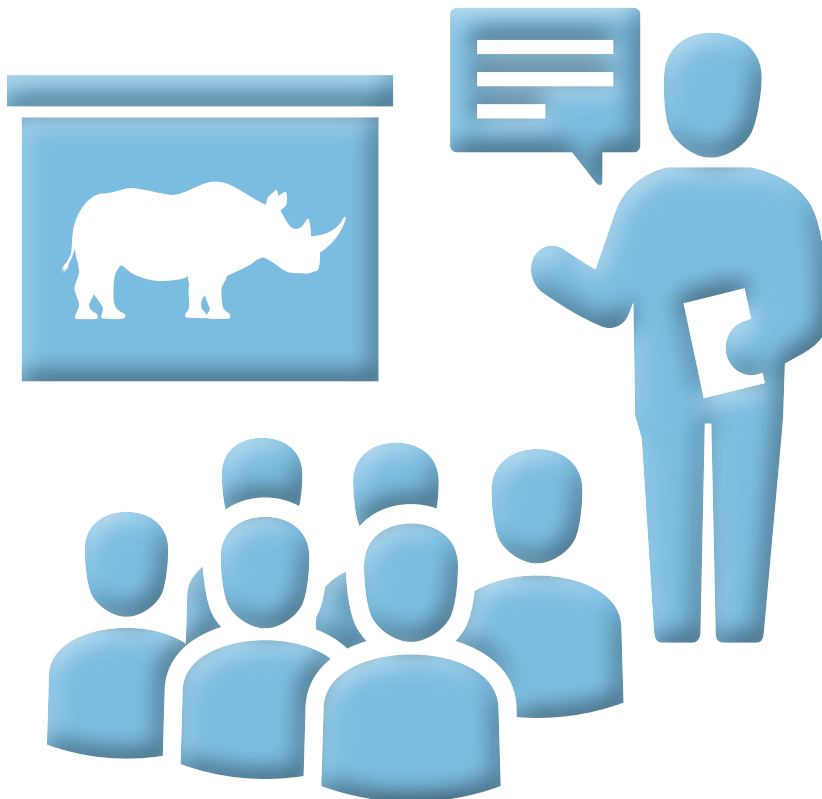
50% of what we see and hear



70% of what we discuss with others



80% of what we experience personally



*95% of
what we
teach*

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WELCOME TO THE POTTER PARK ZOO DOCENT PROGRAM! Below you will find information regarding the program's requirements, expectations, and protocols. Please be aware that this information may be subject to change based on industry best practices and the needs of Potter Park Zoo.

DOCENT REQUIREMENTS

Potter Park Zoo docents must:

- Be at least 18 years of age
- Pass a background check
- Successfully complete docent training course
- Commit to donate a minimum of 50 hours of service per year for a minimum of two years
- Be able to communicate effectively to diverse groups
- Be able to walk to conduct tours up to 1.5 hours
- Be able to stand for one hour more while doing presentations
- Be able to carry equipment/cages weighing up to 20 lbs. for short distances

To remain in good standing, docents must:

- Correctly and consistently follow all animal handling protocols
- Stay current on program content changes, new animals, or changes in protocols
- Successfully complete all mandatory continuing education including but not limited to:
 - » Animal handling refresher course
 - » Quizzes
 - » Online learning modules
- Donate a minimum of 50 hours each year
 - » At least 50 hours of "Education"
 - » "Other" hours are encouraged but will not count towards the 50 hour minimum commitment

HOURS CLARIFICATION

Education hours

- Any activity where a docent is imparting educational information to the public or other docents. Examples include: tours, outreaches, learning stations, animal encounters, and interpreting enrichment.
- In the case of encounters or outreaches, all of the time spent loading animals, getting to and from the location, presentation time, and cage cleanup count as education hours.

Continuing education hours

- These hours are for specifically designated activities that increase docents' knowledge or skills. Often these activities are mandatory and may include the animal handling refresher course, quizzes, and online learning modules, among others. Please note that while there is no set minimum continuing education requirement, the number of mandatory hours may vary from year to year.

- Optional continuing education hours are encouraged and should be recorded. These can include sitting in on the new docent class, study/discussion sessions, additional learning modules beyond the assigned ones, raptor orientation, or attending relevant lectures or programs in the community.

Other (non-education) hours

- These hours refer to any time given to the zoo that does not qualify as education or continuing education hours. Any activity that supports the zoo is considered as "other" hours. Examples include after hours birth/cub watches, any special event activity (except those that can be considered education such as animal handling), gardening, attending docent/volunteer association meetings, millage campaign activities

WAIVERS

Docents who do not feel they will be able to get their required hours in for a given year but still wish to remain docents can request an hours waiver.

- Waiver requests must be submitted in writing (email is acceptable) to the education curator or assistant education curator and will be considered on a case by case basis.
- Acceptable justifications for a waiver request include but are not limited to medical conditions, caring for an ailing loved one, temporary increase in job duties or temporary transfer, military deployment, or new child.
- Docents with less than two years experience who are granted a waiver may be required to undergo additional continuing education such as attending portions of the docent class in order to be reinstated.
- Waivers are for hours only. All other requirements, including continuing education, must be satisfied in order for a docent to remain in good standing.

DRESS CODE

Docents should present a neat, well groomed appearance at all times while representing the zoo.

General guidelines

The docent uniform consists of the blue docent vest and nametags worn over appropriate attire. The vest and nametags are to worn every time a docent is representing the zoo, unless given specific directions otherwise by zoo staff. Appropriate attire is as follows:

- Closed toe shoes must be worn at all times
- Shirts should not be low cut or bare the midriff. Logo t-shirts (except Potter Park Zoo) are discouraged
- Jeans are acceptable as long as they are clean and free of holes or "strategic" tears, and fit well (no droopy drawers!)
- Shorts may be worn as long as they are no shorter than three inches above the knee

WELCOME!

Nametags

The nametag should be placed on the left side of the vest above the logo and the docent patch placed on the right side. AZADV patches and pins should also be placed on the right. Longevity or milestone pins should be placed near the nametag. Only PPZ or AZADV pins should be worn.

- Photo IDs will be issued to all docents and shall be worn on a lanyard. They should be displayed at all times except when handling animals.

Additional guidelines when handling animals

- Avoid strong smelling lotions, potions, cologne, etc as the scent may stress the animals.
- Avoid wearing insect repellent as the scent and chemicals may cause stress or be injurious to the animals
- Be sure to wash hands (and arms if necessary) thoroughly prior to handling animals to remove any residue
- Avoid the following to reduce the risk of animal entanglement:
 - » Loose fitting clothing
 - » Loosely woven clothing
 - » Jewelry such as long necklaces, bracelets, watches, or large rings
 - » Long hair should be pulled back
 - » Lanyards should be tucked inside docent vest when handling animals

CODE OF CONDUCT

Docents will conduct themselves in a professional and respectful manner at all times to all stakeholders. This includes:

- General zoo visitors
- School children, parents, and chaperones
- All zoo staff
- Fellow docents and volunteers
- Zoo animals and artifacts

In addition, docents will follow all rules of the zoo including but not limited to:

- Smoking is prohibited on zoo grounds.
- Alcohol is prohibited on zoo grounds
- Respect exhibit barriers, fences, etc.
- No pets (except service animals) allowed on zoo grounds
- Do not drive on the pedestrian walkway from the parking lot to the main entrance.

DOCENT/VOLUNTEER SPECIFIC RULES

- No unauthorized access to off exhibit areas, or granting access to unauthorized persons.
- Foul language, obscene gestures, horse play, etc will not be tolerated
- No excessive/inappropriate cell phone use
- Being under the influence of drugs or alcohol is cause for immediate dismissal.
- Suggestions, comments, concerns or complaints should be brought to the attention of the assistant education curator

INFRACTIONS

Infractions of rules or protocols are subject to disciplinary action, determined on a case by case basis. Disciplinary action may include:

- Verbal warning
- Written warning
- One-on-one retraining
- Retake the docent class
- Probation
- Dismissal

Docents are encouraged to report suspected infractions anonymously or in person to the assistant education curator or education curator.

BENEFITS

Volunteering as a docent at Potter Park Zoo comes with many tangible and intangible benefits for docents in good standing. Tangible benefits include:

- Discount in the zoo gift shop, concession stand, and restaurant
 - » Docents may get a discount at the concession stand or restaurant before or after their scheduled shift or program. Docents will need to present their photo ID or be in uniform.
- Discounts to select special events
- Potter Park Zoo family membership after one year of service
- Invitation to annual docent/volunteer dinner after first year
- Access to San Diego Zoo Global Academy's Potter Park Zoo Volunteer Connection
- Eligibility to join Potter Park Zoo Docent and Volunteer Association (PPZDVA) and Association of Zoo and Aquarium Docents and Volunteers (AZADV)

DOCENT RESOURCES

DOCENT MANUAL

Contains general ecology/conservation background information, program specific write-ups, and data sheets for all exhibit and program animals.

MEMBERSHIP HANDBOOK

Contains contact information for all docents and those volunteers in the docent/volunteer association. Updated yearly.

ZOO WEBSITE

The Potter Park Zoo website, www.potterparkzoo.org, contains blog posts, news, information regarding special events, education programs, membership, ADOPTS, and other zoo endeavors. There is a “hidden” site within the zoo site for docents and volunteers. It can only be accessed by directly entering the URL www.potterparkzoo.org/falcon-nest into the browser. It is recommended that docents bookmark the site to easily get to it later. The “Falcon Nest” site, www.potterparkzoo.org/falcon-nest, contains PPZ Docent/Volunteer Association meeting minutes, the program schedule, special event sign-up sheets, program write-ups, and selected animal data sheets.

SAN DIEGO ZOO GLOBAL ACADEMY/POTTER PARK ZOO VOLUNTEER CONNECTION

This special site combines aspects of a social site, online learning, and a resource bank. Docents will be able to create profiles, connect with other docents, join interest groups, and complete assigned online continuing education courses. Docents are also able to take any other course that interests them, and most are free of charge. There will also be a resources section with copies of program write ups, recorded power point lectures, and more. See the separate instructions for accessing the site.

PPZ DOCENTS FACEBOOK GROUP

A lot of interesting articles and posts are shared between the docents in this group. Search for “Potter Park Zoo Docents” and request to join the group. An administrator will need to accept your request as this is a closed group for docents and volunteers.

POTTER PARK ZOO DOCENT/VOLUNTEER ASSOCIATION

This is a group created and run by the docents and volunteers. They have monthly informational meetings, generally held on the fourth Wednesday at 7 p.m. They also hold fundraisers for zoo projects and have social gatherings.

ASSOCIATION OF ZOO AND AQUARIUM DOCENTS AND VOLUNTEERS (AZADV)

A national organization comprised of volunteers and docents from AZA institutions from across the country. They produce a newsletter several times a year and host annual conferences. Applications for membership can be found in the docent lounge or online at the AZADV website.

STAFF

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Assistant education curator

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Public safety

	cell 517.230.3970
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Dispatch

	517.244.8002
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ZOO MAP



POTTER PARK ZOO THROUGH THE YEARS

- **1915** J.W. and Sarah Potter offer the City of Lansing a 58-acre parcel of property, later named Potter Park.
- **1915** The official dedication of Potter Park takes place during the Independence Day celebration in 1915.
- **1917** Public acceptance and use of Potter Park is so enthusiastic that Mr. and Mrs. Potter deed an additional 27 acres, increasing the size to 85 acres
- **1918** Mr. Potter, concerned with southeastern Lansing's development, encourages the city to spend \$20,000 to extend the street car line to Mr. Hope Cemetery, making the park and additional land accessible.
- **1920** Elk, which had been located at Moore's Park, are transferred to Potter Park, and a bear, a pair of raccoons, and some deer are gifted by one Charles Davis and became the first residents of the new Potter Park Zoo. The year 1920 is noted as the "official" birth of the zoo.
- **1927** Sophie Turner, a nearby resident, donates 17 acres to the city for Potter Park. The total acreage is now 102. From this modest beginning, the zoo grows rapidly in its animal collection and its popularity.
- **1930** The Works Progress Administration (WPA) builds a large animal house, later called the Lion House.
- **1936** The Depression brings tough times for all, but the zoo manages to obtain federal funds to build Monkey Island.
- **1939** Potter Park Zoo is visited by more than 120,000 people annually and has an annual operation budget of \$7,500.
- **1940–1950s** The first aviary is introduced in 1941 and the barnyard in 1949. The 1950s sees growth in the animal collection with the addition of tigers, baboons, kangaroos and otters.
- **1960** Once again, Potter Park Zoo experiences financial hardships. Animals become increasingly expensive and outdated exhibits are in need of renovation. Some people think the zoo should be closed.
- **1969** Jim Hough, "Onlooker" columnist for the *Lansing State Journal*, and his zoo friend Herman, a Mexican burro, call a meeting of local residents to offer support to the zoo. The resulting group forms the Friends of the Zoo Society.
- **1971** Herman the donkey, Potter Park Zoo mascot and spokes-donkey, dies.
- **1972** Money is raised to purchase Bingo the elephant for a total cost of \$4,453.
- **1974** The zoo railroad begins offering rides for 25¢ each.
- **1975** Dr. Jim Sikarskie begins as zoo veterinarian and cares for Potter Park Zoo animals for the next 27 years.
- **1976** Plans build a new aviary begin
- **1977** Twin lion cubs are born.
- **1979** Bingo the elephant swallows a rock and dies. Sadness at the loss of the elephant encompasses area residents. Later in the year, Tombi the elephant was purchased for \$15,400.
- **1980** In an attempt to halt the tide of vandalism and unruly behavior, a parking fee is put into place.
- **1982** Aviary opens to the public after six years of planning.
- **1985** Groundbreaking for the penguin exhibit that will house nine pairs of South American penguins is held. The penguins cost \$1,800 each, plus transportation.
- **1986** The Friends of the Zoo becomes the Potter Park Zoological Society to continue the standard of excellence at Potter Park Zoo. The first docent class graduates.
- **1987** Spider Monkeys are placed on exhibit in a new building funded by the Association of Women Builders. With a \$100,000 donation from Harold Gross, renovation work begins on the old lion house into the Feline/Primate Building.
- **1989** The Feline/Primate Building opens to rave reviews. Glass eliminates much of the odor from the building so visitors stay longer!
- **1990** The residents of the city of Lansing and Ingham and Eaton counties overwhelmingly approve a one-mill parks levy for five years. The popularity of Potter Park Zoo brings support and sponsorship of special events by very special friends: A&W restaurant's first Crusin' for the Zoo classic car show; the first McDonald's/Toys R Us Kids Olympics; and the first 5K Rhino Walk to raise money for the rhino exhibit.
- **1991** "Ask Dr. Jim" becomes a regular column in the Potter Park Zoological Society newsletter, featuring Dr. James Sikarskie, professor of veterinary medicine at MSU, Potter Park Zoo's consulting veterinarian. With donations from many local zoo friends, the society purchases a six-seater golf cart to provide tours for less mobile visitors.
- **1992** One of the millage projects, the farmyard renovation project, is completed and opens to the public in September. Potter Park pony path replaces the old ring ride. Goff Food Stores sponsors the first Goff Zoo Days at the zoo. The event, now known simply as Zoo Days, becomes Potter Park Zoo's biggest summer happening.
- **1993** The new restaurant/restroom concession building opens for business. Concession proceeds benefit the zoo's educational programs and capital improvements. The Potter

POTTER PARK ZOO THROUGH THE YEARS

Park Zoological Society presents the first Wonderland of Lights. Docents and volunteers build, install and maintain the lighted animal sculptures and exhibits throughout the zoo. Over 40,000 visit the zoo to enjoy this new holiday tradition.

- **1994** Wolf Woods and the Trappers Cabin are officially opened after extensive renovation of the old wolf exhibit. The Lansing Parks and Recreation millage of 1970 made this exhibit possible.
- **1995** This year celebrates the 75th birthday of the zoo. Cakes are lined up together on long tables to make one huge cake for visitors. A new master plan is developed, including a new entrance plaza.
- **1996** A fundraiser is launched for the Discovery Center. The first annual Golf Safari is created to raise money for the center.
- **1997** Potter Park Zoo partners with Impression 5 Science Museum to bring the dinosaur display to the Meridian Mall.
- **1998** First attempt to seek regionalization funding for the zoo. Admission prices are \$2.50 for adults and \$1 for children.
- **1999** Admission prices are raised to \$5 for adult non-residents and \$3 for adult residents, with children remaining at \$1.
- **2000** The new entry plaza, including the Discovery Center, is opened!
- **2001** Toys for Tots is on board for the first time at Wonderland of Lights. A new vet clinic opens with a \$50,000 donation from the Rotary Club of Lansing.
- **2002** West Nile Virus claims the zoo's snowy owls.
- **2003** Ivan, the zoo's mascot tiger and the oldest living Siberian/Amur in North America, succumbs to old age at age 20 years.
- **2004** The first Big Zoo Party is held.
- **2005** Ground is broken on the new river otter and arctic fox exhibit. The corals, conservation and clownfish exhibit opens, housed in the Discovery Center
- **2006** The the new river otter and arctic fox exhibit opens to rave reviews from several experts that we have the best otter exhibit in North America and that keepers at other zoos would love to have our facility.
- **2007** In July, Ingham County takes the reins as the managing and supporting entity of the zoo. The zoo also receives re-accreditation from the Association of Zoos and Aquariums, which is mandatory for the zoo to house and/or breed endangered species.

- **2008** A new bald eagle exhibit opens and the zoo creates an updated version of the master plan, complete with time line and development strategy.
- **2009** Wings From Down Under opens.
- **2010** Potter Park Zoo celebrates its 90th anniversary; opens a new eagle owl exhibit; breaks ground for the black rhino exhibit; and the first Wine & Stein event takes place.
- **2011** Black rhino exhibit opens; the Big Zoo Party returns; three Amur tiger cubs are born in September.
- **2012** Gerry Brady, long-time zoo director, retires; Sherrie Graham, PPZ Society executive director, becomes interim director as the zoo moves to a public/private partnership (position is later made permanent); PPZ successfully undergoes re-accreditation (again) by the AZA; the Big Zoo Lesson is awarded high honors at the AZA national conference.
- **2013** Planning is underway for the proposed moose and bison exhibits; the coral reef exhibit closes after 8.5 years and the space is reclaimed as a classroom for the high school zoo and aquarium sciences class; for the first time, a male river otter is born at PPZ. Cindy Wagner is announced as general curator.
- **2014** Two of the tiger cubs born in 2011 are sent to another zoo and their mother goes to John Ball Zoo. The father and one cub remain at PPZ; two new wolves arrive; work gets underway on the raven exhibit; plans are made to refurbish the spider monkey exhibit to make it suitable for red pandas; Dr. Tara Harrison leaves the zoo for another position, and Dr. Sally Nofs is appointed in her place.
- **2015** Construction begins on the moose exhibit. Beloved black rhino, Jello, passes away due to complications from his medical condition. Zookambi summer camp experiences record attendance. The King vulture gets a new exhibit courtesy of an Eagle Scout project.
- **2016** The beautiful over-three-acre moose exhibit opens. The newly remodeled spider monkey exhibit becomes home to our red pandas and two cubs are born in the summer. Work begins to create a nature play space in the Backyard Gardens. Sherrie Graham steps down as director. Cindy Wagner is appointed interim and then permanent director of the zoo and Amy Morris is appointed zoo society director. The county millage passes by a record margin.

IN CASE OF EMERGENCY

Emergency situations can't be predicted but with knowledge and preparation, we can work together to professionally bring the situation to a positive conclusion.

In the event an emergency occurs on site, volunteers are expected to act in the following manner:

- Remain calm
- Reassure the public

INJURY

Contact a staff member. All county, zoo and zoo society employees are trained in emergency first aid. If you have your cell phone, call zoo public safety at 517.230.3790. If you don't have a cell phone and you are near the front of the zoo, go immediately to admissions or the zoovenir shop and ask the employee to phone for help. If you are in the back of the zoo go to the restaurant and ask an employee to call for help. If you see a zoo keeper you can ask them for help as they are trained and have a radio with them at all times.

Sometimes a person has minor injuries and would like a bandage. We have small first-aid kits on our golf cart, in the labeled lower cabinet in the docent lounge, and in the Welcome Center. **We never apply bandages or first aid** but the visitor may use the supplies themselves.

Smaller injuries that may require further medical treatment (i.e., twisted ankle) need to be reported to the Welcome Center.

LOST CHILD

If you notice a lost child, calm them if possible and have them look around the immediate area where they are standing. If a guardian isn't located, remain with the child until public safety arrives. An announcement will be made over the PA system, directing the guardian (using the adult's name if possible) to come to the Welcome Center. Someone in the Welcome Center will wait with the child until their guardian shows up. When parents are found, they will be directed/escorted to the child.

FIRE

In the event of a fire on zoo grounds, volunteers are expected to remain calm, notify a staff member immediately or call zoo public safety at 517.230.3790 and stay away from the fire area. You may need to calmly direct visitors away from the fire so that emergency personnel can get through quickly.

EMERGENCY WEATHER

In the event of severe weather, there will either be an emergency siren or a notice over PA system. Escort all of the visitors near you to the interiors of a building and basements. The Bird/Reptile building has a basement with an outside entrance; the Feline/Primate building has an interior hallway.

COUNTY PROCEDURE: INJURY

"Code Blue" is used when medical attention is needed for an employee, visitor, docent or volunteer. Announce a "Code Blue" over the radio and provide information regarding locations, medical attention needed and type of incident.

If an ambulance is needed, make the request over the radio along with which gate the ambulance should enter. Provide appropriate first aid and document incident information on the appropriate injury forms. Dispatch will call 911.

If no ranger or other zoo staff are available, parking booth attendants should be prepared to direct the ambulance to the appropriate gate for entrance into the zoo. Also, a staff person shall go to the appropriate gate and open the gate for the ambulance to enter the zoo and lead them to the exact location.

Do not go into the animal holding areas! There is a basement under the keeper's lounge with an outside entrance. In the Education building, go into the classrooms. There will be an announcement over the PA system when the weather has improved.

ANIMAL ESCAPES

Remember the three priorities:

1. Safety of the zoo visitor
2. Your own personal safety and that of the rest of the staff
3. Safety of the animal

Calmly assist animal staff in moving visitors into buildings or escorting them from the zoo. Do not speculate on what is occurring; simply tell the visitors we need them to move inside a building or go outside the zoo.

Once you have escorted visitors inside a building, stay at the door to reassure visitors, allow others to come into a building or try to prevent visitors from exiting a building until the emergency is over.

We cannot legally prevent a visitor from exiting a building, but explain the danger involved and suggest firmly that they remain inside.

Zoo staff will let you know when it is safe to leave the building.

IN CASE OF EMERGENCY

COUNTY PROCEDURE: ANIMAL ESCAPES

“Code Green” is used in the event of an animal escape. Follow these procedures:

Do not use the radio unless absolutely necessary, you are called or the situation has been resolved.

Admission booth staff

Close all the entrance gates at the admissions booths and secure the turn stile with the chain and lock provided in the admission booth. Staff will direct visitors, docents, volunteers, and worker that are inside the zoo, to go to the gift shop, Discovery Building or the Welcome Center. All zoo visitors that are on the outside of the admissions area must return to their vehicle until drill or emergency is over. Admissions employees must stay inside of the admissions booth until the “all clear” has been issued.

Parking booth staff

If the emergency is a drill, collect money from the visitors and tell them to go park, and stay in vehicle until an “all clear” has been issued. If the emergency is not a drill then do not allow additional vehicles into the park. Monitor the radio in case the police or fire department has been requested. If they respond, direct them to the appropriate gate for entrance into the zoo. Once the “all clear” has been issued, you may allow visitors into the park.

Contact area staff

Alert all visitors and advise them to get indoors as quickly as possible. Suitable locations for the visitors are: inside the Feline/Primate building, and hallway of big barn. Contact area employees must stay inside big barn with visitors until the “all clear” has been issued.

Ranger staff

Depending upon your locations when the “Code Green” is issued, report to one of the three entrance gates: north gate by railroad tracks, south gate by river, education gate behind education center.

Stay inside of a truck or utility vehicle. Do not allow anyone in or out of the gates except for emergency vehicles. Monitor the radio in case the police or fire departments have been requested to respond to the zoo.

COUNTY PROCEDURE: ANIMAL DEATH

“Code Red” will be used only when an animal in the zoo has died. Issue a “broadcast” message: “Code Red” at the _____ exhibit.

Do not say anything about a dead animal over the radio! Zookeepers will respond and deal with the issue. Seasonal staff may be requested to assist in closing off the area and/or moving the animal as necessary as determined by the zookeepers.

You may be asked to direct visitors away from this area. You need to remain calm and pleasantly ask visitors to leave the area. **Do not mention the animal death!** You can say something like “the keepers are temporarily closing this exhibit but you are welcome to see the other exhibits nearby.”

ANIMAL COLLECTION

The zoo has over 500 animals in the collection. If you notice anything unusual about a zoo animal, contact a zoo employee or call public safety. They will contact Dr. Sally Nofs, veterinarian, or Cindy Wagner, director. They will assume responsibility immediately. Do not discuss the animal details over the radio.

ISSUES/CONCERNS ABOUT VISITORS

Any zoo visitor that exhibits any unusual or threatening behavior, uses offense language, disturbs the animals, throws items into an exhibit, climbs over public barrier or climbs into an exhibit, portrays vandalism, or shows any disruptive behavior shall be brought to the attention of your immediate supervisor or the park police (Portable 16).

BOMB THREATS

In the event of a bomb threat to Potter Park Zoo, visitors will be directed to leave the facility. Do not permit additional visitors to enter the zoo. Staff shall leave the area indented by the threat. The zoo director shall direct operations and staff will follow directions given. Emergency personnel will be permitted to enter at specific gate locations.

SOME OF OUR ANIMALS

SPECIES; NAME	SEX	DISTINGUISHING CHARACTERISTICS	BORN	LIFE SPAN IN CAPTIVITY; ENRICHMENT NOTES
MANDRILLS				45 years
Loko	M	Large adult; father to young male	1992	Fed/enrichment: 12:30 p.m.-1 p.m., 3 p.m.-4 p.m.
Susanna	F	Much smaller than adult male; unrelated to others	1996	
COLUMBIAN BLACK SPIDER MONKEYS				30-40 years
Gumbelina	F	Larger, some gray on face; pendulous clitoris (often mistaken for a penis)	1981	Fed/enrichment: 12:30 p.m.-1 p.m., 3 p.m.-4 p.m.
Sonny	M	Larger, some gray on face	1983	
Jasper	M		1997	
Leon	M		1998	
Marcel	M		1999	
RING-TAILED LEMURS				24-27 years
Lulu	F	Missing thumb	1988	Housed with red-ruffed lemurs; Fed/enrichment: 3 p.m.-3:30 p.m.
Miss Piggy	F	White/pink beads on necklace	1992	
Sheila	F	Metal necklace, metal chain; skinny	1993	
Miranda	F	No necklace; "fang" teeth	1995	
RED-RUFFED LEMURS				19 years
Joplin	F	Buffier color	1991	Housed with ring-tailed lemurs. No visible feeding; fed off exhibit
Sambi	M	Darker orange, white ring around base of tail	2007	
GOLDEN LION TAMARINS				24 years
Colby	F	Lighter color	2006	Brother/sister; one fixed. Fed/enrichment: 3:30 p.m.-4 p.m.
Cheddar	M	Darker color	2006	
COTTON TOP TAMARINS				7-16 years
Mom	F	Short tail	1996	Housed with several birds. No visible feeding/enrichment other than bugs after cleaning (no set time)
Daughter	F	Crooked tail	2006	
RIVER OTTERS				21 years
Miles	M	Smaller than Clyde; missing part of two legs and tail	02/19/13	
Nkeke	F		2015	
GRAY WOLVES				10-12 years
Tala	F	Light gray	2009	All three are siblings. No public feeding or enrichment at this time.
Kamots	M	Very dark, larger	2014	
Tikanni	M	Very dark, white spot of fur on chest	2014	
SNOW LEOPARD				15-20 years
Little Girl	F	Almost always outside. Often found at the top of the tallest rock in the back.	1998	Fed 3 p.m.-4 p.m. Enrichment may occur before 10 a.m. or at feeding time.
AMUR TIGERS				16-20 years
Sivaki	M	Father of female; Larger head/body; visible male genitalia under tail	2005	Never together; usually alternate outside/inside daily. Fed 3 p.m.-4 p.m. Enrichment may occur before 10 a.m. or at feeding time.
Ameliya	F	Smaller	09/13/11	
AFRICAN LIONS				25-30 years
Kota	M	Mane	2005	Females are sisters; often all together. Fed 3 p.m.-4 p.m. Enrichment may occur before 10 a.m. or at feeding time.
Ulana	F	No heart shape on forehead	2004	
Saida	F	Heart shape in fur on forehead	2004	

SOME OF OUR ANIMALS

SPECIES; NAME	SEX	DISTINGUISHING CHARACTERISTICS	BORN	LIFE SPAN IN CAPTIVITY; ENRICHMENT NOTES
RED PANDAS				18 years
Rupert Jr.	M	Larger; darker face and body	2011	No visible feeding; separated and fed inside. Enrichment before zoo opens. Cubs are leaving in 2017 for another zoo.
Maliha	F	Smaller; whiter face and buffier body	2014	
Son	M			
Daughter	F	Has a lighter face; is more adventurous		
BAT-EARED FOXES (may not be out below 50° F)				13 years
Giza	F	More of a "raccoon" mask; "scrunched-looking" face	2007	No visible feeding; separated and fed inside. Enrichment before zoo opens.
Jabari	M	Mask not as pronounced	2010	
MEERKATS (may not be out below 50° F)				17 years
	F		2004	Difficult to tell apart. Fed 12:30 p.m.-1 p.m., 3 p.m.-4 p.m.. Enrichment generally in morning before public arrives.
	F		2004	
	M		2004	
BANDED MONGOUSES (may not be out below 50° F)				12 years
	M		2009	Difficult to tell apart. Fed 12:30 p.m.-1 p.m., 3 p.m.-4 p.m.. Enrichment generally in morning before public arrives.
	M		2009	
	F		2010	
	F		2010	
	F		2010	
	F		2010	
	M		2010	
MOOSE (not out in hot weather)				15-20 years
Willow	F	No antlers	2013	From Alaska. Kept in separate pens during male rut. Fed at 9 a.m.
Meeko	M	Antlers	2014	
BACTRIAN CAMELS				20-30 years
McKenzie	F	Longer face, more defined ridge on snout	1998	Food out by 10 a.m.
Ernest	M		2010	
LLAMAS				15-29 years
Christina	F	White face, brown on back	1991	Fed 3x a day (9 a.m., 12:30/1 p.m., 3 p.m.-4 p.m.) Enrichment 1 p.m.-2 p.m.
Zorro	M	Black	1996	
Anastasia (Annie)	F	Smaller; mostly white, brown on face; funny teeth	1999	
Elvira (Ellie)	F	Smaller; black/brown	1999	
GOATS (Pygmy goats)				22 years
Dottie	F	Black/white, white back, big black dot on left side	2012	Fed 3x a day (9 a.m., 12:30/1 p.m., 3 p.m.-4 p.m.) Enrichment 1 p.m.-2 p.m. in winter months only.
Flynn	M	Mostly black, black legs, two wattles at throat area	2012	
Clyde	M	Mostly black, more white than Flynn, white stripe across shoulder area	2012	
Chester	M	Mostly white, black stripe down back	2012	
Julian	M	Mostly white, no black stripe down back, tan socks	2012	
GOATS (Kinder goats)				
Walter	M	Much larger than pygmies; mostly black	2012	
Julian	M	Much larger than pygmies; tan with white splotches	2012	

SOME OF OUR ANIMALS

SPECIES; NAME	SEX	DISTINGUISHING CHARACTERISTICS	BORN	LIFE SPAN IN CAPTIVITY; ENRICHMENT NOTES
BONGOS (may not be out below 40° F)				18-20 years
Bock	M	Bigger, darker, missing some of right horn; Penny's father	2003	Females are housed separately from male except during breeding season; housed with hornbills. Fed 9:30 a.m.-10 a.m.
Bella	F	Has both horns	2008	
Penny	F	Yearling (not Bella's daughter)	2014	
BLACK RHINOS (not out in cold, slippery weather)				40 years
Doppsee	F		2007	Fed at 10 a.m. Enrichment in yard before let out.
BALD EAGLES				20-40 years
Missing wing tip	F	Missing tip on right wing; from Alaska	1986	No set time for feeding/enrichment
Leuca	M	Missing most of one wing, usually lower to ground; from Michigan	2006	
Hal	M	Flighted; usually on higher perches		
RAVENS				Up to 40 years
Lily	F	Smaller	2006	No set time for feeding/enrichment
Rocky	M	Larger	2009	
GROUND HORNBILLS (may not be out below 40° F)				Up to 70 years
Esther	F	Band on left leg	2006	Housed with bongos. No visible feeding; fed off exhibit.
Stella	F	Band on right leg	2006	
MAGELLANIC PENGUINS (may not be out below 32° F)				12-14 years
White Left	F	White tag on left flipper	1998	Hand-fed at 9:45 a.m. and 3:45 p.m.
Green Left	F	Green tag on left flipper	2006	
Blue Left	F	Blue tag on left flipper	2007	
Yellow Left	F	Yellow tag on left flipper	2010	
Green Right	M	Green tag on right flipper	1998	
Yellow Right	M	Yellow tag on right flipper	1999	
Black Right	M	Black tag on right flipper	2010	
Orange Right	M	Orange tag on right flipper	2012	
White Right	M	White tag on right flipper	2013	
Brown Right	M	Father lived 26 years	2015	

WHY USE ANIMALS IN EDUCATION?

Humans have an innate affinity for animals/nature and over 90 percent of AZA-accredited zoos and aquariums incorporate live animals in their education programming.

BIOPHILIA

In his 1984 book, *Biophilia*, Edward O. Wilson defined biophilia as “the urge to affiliate with other forms of life”.

1. The biophilia hypothesis suggests that there is an instinctive bond between human beings and other living systems.
2. Even small amounts of greenery in urban settings make a difference

HUMAN/ANIMAL BOND

1. American Veterinary Medical Association: “The human/animal bond is a mutually beneficial and dynamic relationship between people and animals that is influenced by behaviors that are essential to the health and well-being of both. This includes, but is not limited to, emotional, psychological, and physical interactions of people, animals, and the environment.”
2. Center for the Human/Animal Bond, Purdue University:
 - Human-animal interaction has profound physiological consequences.
 - People, in the contact with animals experience a decrease in blood pressure, reduced anxiety, and a general feeling of well-being.
 - By observing the behavior of animals, children learn to be more nurturing and perhaps better parents to their own children.
 - The therapeutic value of animals for socially isolated individuals in nursing homes, hospitals, hospices, and prisons has been documented.
 - People in the presence of animals are often perceived to be more happy and healthy.

NATURE DEFICIT DISORDER

People today are not as exposed to nature

- Nature deficit disorder refers to a hypothesis by Richard Louv in his 2005 book *Last Child in the Woods*. Louv claims that causes for the phenomenon include parental fears, restricted access to natural areas, and the lure of the screen
- Children have limited respect for their immediate natural surroundings.
- Attention disorders and depression may develop.
- Studies of students in California and nationwide show that schools that use outdoor classrooms and other forms of experiential education produce significant student gains in social studies, science, language arts, and math

THE ROLE OF ZOOS

1. Urbanization of our population in the last two generations
2. Average 12–18 year olds spend nearly eight hours/day interacting with electronic devices
3. Nature Deficit Disorder
4. Sedentary (childhood obesity, Vitamin D deficiency, etc.)

TEACHING TECHNIQUES

I. Introduction: “How we learn” handout

- A. Must be fun
- B. “Exploration rooms”

Notes _____

II. Teaching is communication

- A. Visual
 - 1. Body language (eye contact)
 - 2. Awareness of what the audience is seeing
- B. Auditory
 - 1. Voice (tone, inflection, volume, word choice)
 - 2. Ambient noise
- C. Having a conversation, not a lecture
 - 1. Talk with them
 - 2. Listen to them
 - 3. Ask questions

III. Learning styles handout

- A. Need to be cognizant of learning styles
- B. Providing a context for your audience
 - 1. Weights
 - 2. Distances
 - 3. Snow leopard/Nepal
 - 4. Vet, doctor
- C. Multiple repetition

IV. Constraints/things to be aware of

- A. Novelty effect
- B. Social/cultural aspects
- C. How their day went
- D. Prior knowledge

V. Problems: prevention and resolution

- A. Carrot-and-stick, but be positive
- B. Rowdy kids/inappropriate behavior
 - 1. Prevention
 - a. Rights and responsibilities sent prior to visit
 - b. Setting the stage
 - i. Addressing the group leader
 - ii. Explain why
- B. Encouraging/managing questions
- C. Inattentive parents/teachers
- D. Provide information teacher wants: ask! (time limits)
- E. Parents/students who want to answer all the questions
- F. What if I don't know the answer?

VI. Ecophobia

- A. What it is
- B. How to avoid it
 - 1. Success stories
 - 2. Discuss solutions

MULTIPLE INTELLIGENCES & LEARNING STYLES

Think about your students and their intelligences. Can you find categories for each student with the descriptions below?

PLAYS WITH WORDS

We start with the person who loves to play with language; to tell stories and read and write. This learner is pretty good at remembering names, places, dates, and similar. If you give this person an opportunity to hear, see and say words associated with the desired outcome, they will, readily, learn practically anything of interest to them.

PLAYS WITH QUESTIONS

Here is a learner who likes to figure things out by asking questions, exploring, and doing some experimenting. This person is, usually, good at math, and logic/problem solving. This person learns best when you've provided opportunities to classify, categorize, and work with abstractions and their relationship to one another.

PLAYS WITH PICTURES

This person is one who enjoys drawing, designing, and looking at pictures, slides, videos, and films. This person is especially proficient at imagining, sensing changes, doing puzzles, and reading charts and maps. Information is best absorbed by visualizing, using the "mind's eye," manipulating (working in some way) with pictures and colors.

PLAYS WITH MUSIC

A hummer of tunes, a singer of songs; probably plays an instrument, and is always listening to music. This person excels at remembering melody, noticing the rhythms of life, and keeps perfect time. Therefore, this learner gets new information via melodies, musical notation, or rhythm as a critical aspect of the delivery system.

PLAYS WITH MOVING

A person in motion; touching while talking, and using the body to express ideas. This person is a dancer, plays sports, and participates in producing a variety of crafts. Learning here has to have a kinetic component; interacting with space in some way so as to process, and remember, the new information through the body.

PLAYS WITH SOCIALIZING

The joiner; always with a group of people and talking with friends. Leading others is an obvious skill, along with organizing, mediating, communicating and generally understanding people and how to work well with them. Impart new information to this person by giving opportunities to compare and contrast, interview other with and about information, sharing ideas, and cooperating to accomplish any given task.

PLAYS ALONE

This person really does better alone; pursuing self-defined interests. Excels at "knowing" herself, follows instincts with confidence and is an original. New information is absorbed best when the projects are individual, self-paced, and singularly oriented.

BRIEF HISTORY

European wildlife laws from 1600–1800s

- Feudal system: if you owned the land, you owned the wildlife on the land.

European settler attitudes in North America

- “Unlimited abundance” in regards to natural resources, especially wildlife, fisheries, timber, and land

Overexploitation of those natural resources continued unabated, leading to the disappearance of several species, which led to debunking of “unlimited abundance”: passenger pigeons and bison are the two most glaring examples

- Causes: Unregulated or “market” hunting (bounties) and habitat loss (clearing of forests, plowing of prairies), for predators such as wolves, coyotes, cougars, etc.

CONSERVATION MOVEMENT

Teddy Roosevelt: Due to his passion, social stature and role as president, he was very impactful (quote from 1907 speech: “The conservation of natural resources is the fundamental problem. Unless we solve that problem it will avail us little to solve all others.”) He was a leader for those who had a pragmatic approach to conservation.

John Muir: Another passionate conservationist, his primary vision was one of preservation: Responsible for Yosemite becoming a national park, founded the Sierra Club.

STATE WILDLIFE LAWS:

They are administered by the Michigan Department of Natural Resources. State laws can be more restrictive than federal laws, but federal laws always supersede state laws.

Michigan’s Endangered Species Act: Passed in 1974. Modeled after federal act, it covers species that are federally listed and found here, but also includes species that may be rare here but not in other parts of their range.

Game vs nongame: Through hunting/fishing license fees, Pittman-Robertson and Dingell- Johnson acts and other fees, wildlife and fish species that are game animals have major sources of funding for research, habitat work and management. These efforts often help many nongame species as well. However, there are no significant amounts of funding strictly dedicated to the 99.9 percent of species that are not hunted or fished, unless they get so scarce that they are listed under a state or federal endangered species program.

NATIONAL WILDLIFE LAWS

Evolution of U.S. wildlife laws:

Lacey Act: Passed in 1900, major reauthorization in 1981, multiple amendments and additions even today. Banned the interstate transportation of wildlife or products made from them.

Migratory Bird Treaty: 1918 treaty between U.S., Canada, Mexico, and a few years later, Japan and Russia were added. Banned the possession of live/dead birds, feathers, eggs or products made from them.

Migratory Bird Hunting Stamp (“Duck Stamp”): Passed in 1934. A mandatory stamp is required for anyone hunting waterfowl in the United States. Funds go for research and habitat procurement and protection helped fund purchase of many wildlife refuges (close to \$1 billion raised to date)

Federal Aid in Wildlife Restoration Act (Pittman-Robertson Act): Passed in 1937. A federal excise tax on all firearms, ammunition and archery equipment sold in U.S. Funds are used for hunter safety, wildlife research, habitat procurement (state game areas like Rose Lake) and protection (over \$3 billion raised to date).

Federal Aid in Sport Fish Restoration Act (Dingell-Johnson Act): Passed in 1950. A federal excise tax on all fishing equipment, some watercraft and related items. Funds are used for fisheries research, habitat protection, public access sites and fish hatcheries (over \$5 billion raised to date).

Animal Welfare Act: Passed in 1970. Administered by the USDA, this act sets standards and provides for the creation, inspection and enforcement of those standards which pertain to the welfare of animals that are involved with activities that involve the public or research. Funding to this point has only allowed this to occur for mammal species. Our zoo gets a couple of unannounced USDA veterinary inspections each year.

Endangered Species Act: Passed in 1972. Created laws to protect species of plants and animals that are threatened or endangered and provides funds to help with the development, implementation and monitoring of species recovery plans. Some of the “poster child” species are bald eagles, grizzly bears, American alligators, and peregrine falcons. This act needs to be reauthorized every few years and each time faces strong political pressure to weaken or eliminate it.

Marine Mammal Protection Act: Passed in 1972. Provides protection for some marine mammals that may have been exempted from the Endangered Species Act and gave some more specific protections for these species

Wild Bird Conservation Act: Passed in 1992. This was passed in response to an extremely large trade in imported birds, especially parrots and finches, many of which were becoming threatened and endangered.

WILDLIFE LAWS

INTERNATIONAL WILDLIFE LAWS

Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES): Drawn up in 1973. This is basically an international version of the Lacey Act. For the 170+ nations that have signed this treaty, the importation of listed plant/animal species and/or products containing them is prohibited. It is coordinated by the International Union for Conservation of Nature (IUCN) and is very effective in some of the countries that have signed on, but there are many countries which do not have the laws, resources and/or commitment to effectively curtail illegal trade.

ILLEGAL TRADE IN WILDLIFE NOW A GLOBAL EPIDEMIC

Booming economies in several large southeastern Asian countries have created enormous numbers of people who now have financial means to acquire traditional medicines, carvings, food items and other products utilizing threatened

and endangered species. In 2014, rhino horn was selling for \$60,000/kilogram (\$1,700/ounce), which is double the current price of cocaine and triple the price of gold. The same criminal organizations involved in illegal arms, drugs and human trafficking are becoming more and more involved. The wildlife trade has high profits, low risk of getting caught and low penalties when convicted. Some estimates (annual) for illegal trade in living natural resources, as of 2014:

- Wildlife trade: \$18–\$20 billion,
- Fisheries: \$12–\$20 billion,
- Timber: \$7–\$10 billion.

Massive conservation and enforcement efforts, along with strong international cooperation are being employed, but it is an uphill battle. Educating consumers to understand the plight of the species involved is also being undertaken. It is hoped that this may help reduce the demand for such products.

The mission of an AZA Species Survival Plan® (SSP) program is to cooperatively manage specific, and typically threatened or endangered, species population within AZA-accredited zoos and aquariums, certified related facilities, and sustainability partners.

There are currently more than 450 SSP programs, each managed by their corresponding taxon advisory groups (TAGs), within AZA. Each is responsible for developing a comprehensive population studbook and a breeding and transfer plan which identifies population management goals and recommendations to ensure the sustainability of a healthy, genetically diverse, and demographically varied AZA population.

Many of these SSP programs represent species that urgently need to be conserved and protected in the wild, such as the giant panda, California condor, and lowland gorilla. SSP programs, as well as AZA-accredited zoos and aquariums, significantly contribute to field conservation efforts, species recovery, veterinary care for wildlife disease issues, establishment of assurance populations, as well as many other species-focused conservation efforts.

The AZA Board of Directors recognizes that:

1. Cooperative animal management is vital to the long-term survival of professionally managed zoological parks and aquariums and their valuable and often irreplaceable live animal collections and;
2. All AZA-accredited institutions and certified related facilities should be fully committed to the animal management, conservation, and public education goals as well as the collaborative spirit of the SSP partnership.

AZA POLICY FOR FULL PARTICIPATION IN THE SSP PROGRAM

Collaborative management of individual animals within the greater whole of the AZA-accredited zoos and aquariums, certified related facilities, and sustainability partners population is critical to ensuring the long-term survival of the species represented in its SSP program. The policy for full participation in the SSP program ensures that all AZA stakeholders have input into the SSP planning process and fully comprehend, agree to, and follow the final SSP breeding recommendations.

SSP MASTER PLAN

An SSP master plan articulates long- and short-term goals for a population. It plans the “family tree” of each managed population to minimize the rate of loss of genetic diversity and maintain the long-term demographic stability of the population. Breeding and other population management recommendations are made for each animal with consideration of logistical feasibility, animal welfare, and other factors that can improve SSP outcomes.

In addition to breeding recommendations, master plans also include a recommendation not to breed certain animals for sound husbandry reasons and the betterment of the population. The

board recognizes that, in the collaborative process of managing the SSPs, the responsibility of each SSP management group is to make sound master plan recommendations, and also recognizes that, at times, these may conflict with a member institution’s plans. The board emphasizes the responsibility of all institutions to cooperate in SSP master planning.

FUNCTIONS

Each SSP program is supervised by an SSP coordinator and composed of a management group, appointed from AZA members, and several expert advisors. All SSP program functional and management processes are specified in the Species Survival Plan® program handbook, however primary functions include:

- Overseeing the development of a studbook.
- Establishing management, research, and conservation priorities.
- Developing a breeding and transfer plan, in coordination with the population management center (PMC).
- Developing non-breeding plans, in coordination with the wildlife contraception center (WCC).
- Serving a specific role in conflict resolution issues that may arise.
- Collaborating with other institutions/agencies to ensure integrated conservation initiatives.
- Increasing public awareness of wildlife conservation issues.
- Developing and implementing ex situ and in situ education strategies.
- Developing in situ reintroduction programs, if possible.
- Serving as an AZA expert and providing a discussion forum for topics applicable to the species.
- Providing species-specific information to the TAG in their development of a taxon-specific “Animal Care Manual.”

BREEDING AND TRANSFER PLANS

Each breeding and transfer plan summarizes the current demographic and genetic status of the population and identifies breeding or non-breeding recommendations with consideration given to each animal’s social and biological needs as well transfer feasibility. All recommendations designed to maintain or increase a healthy, genetically diverse and demographically stable population.

ADDITIONAL INFORMATION

SSP programs originally focused exclusively on threatened or endangered species, and while that is still the highest priority, SSP programs are also in effect for many other species—especially those whose zoo population is very small or at risk.

Accredited zoos and aquariums do not normally get animals from the wild! For many decades now, well over 90 percent of all of our animals come from other zoos and aquariums.

Maintaining a genetically diverse and healthy population of every species is important, but especially for endangered species when there is such a small gene pool remaining.

I. WHAT IS ECOLOGY?

Ecology is the scientific study of the interactions among organisms and their environment.

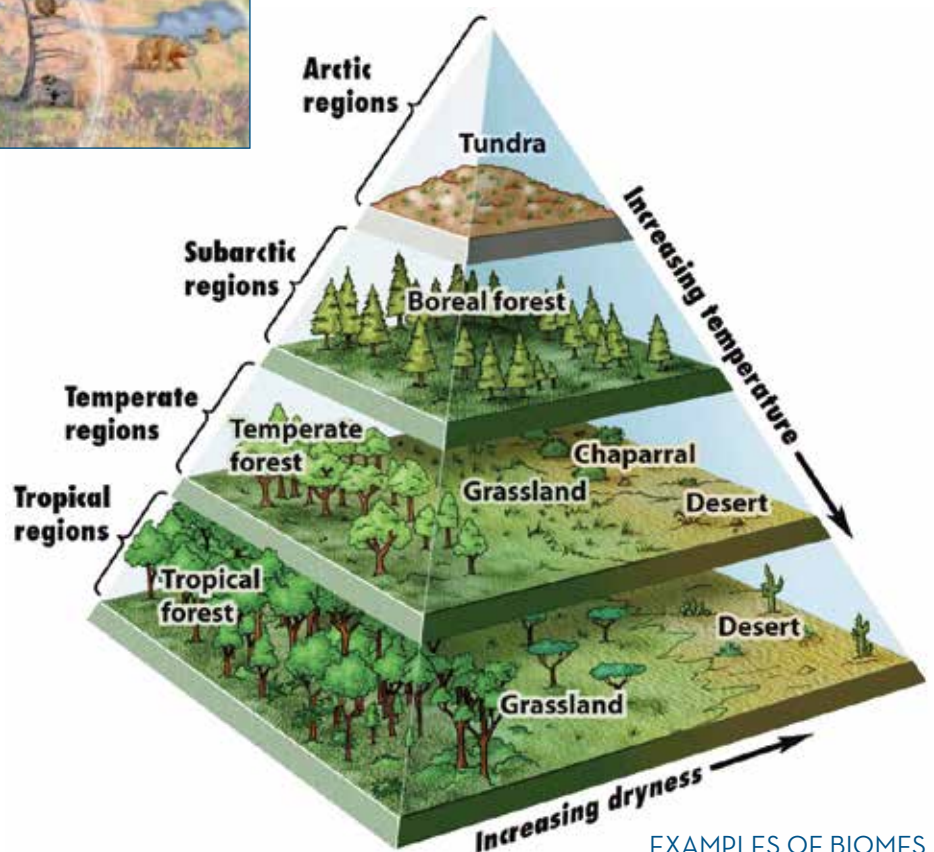
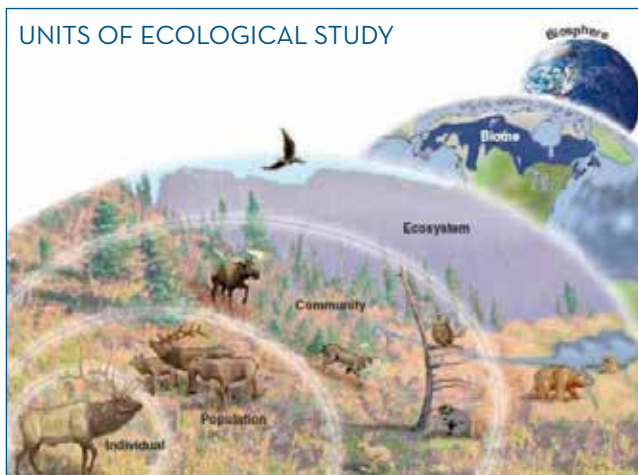
II. CHALLENGES OF ECOLOGY

- Need to have extensive knowledge in a diverse array of scientific disciplines
- Infinite number of living (biotic/abiotic) components
- Like trying to understand complex plot of movie by looking at a few isolated frames

III. BASIC UNITS IN ECOLOGICAL STUDY

- Population: The number of organisms within arbitrarily set boundaries
- Community: All living organisms within a given locality.
- Ecosystem: Community plus all the non-living components of that environment with which the community interacts.

- Defined by physical terrain and microclimate: no specific shape, can't be drawn on map.
- Many different ecosystems may exist within a different ecosystem, size varies. Determined by physical parameters which then indicate which species of animals would live there.
- Example: Wetlands
 - Marsh: dominated by grasses, rushes or reeds
 - Bog: water is acidic, low in nutrients; floating mats of vegetation, sundew and pitcher plants are only carnivorous plants in Michigan, cranberries
 - Swamp: wooded; permanent or seasonal water
 - Fens: grassy
 - Riparian zone: areas along stream; in Iowa, you can tell when a stream is coming because you can see trees from a great distance
- Biome: Region of the earth with characteristic climate and associated communities



EXAMPLES OF BIOMES

ECOLOGY

BIOME SUMMARY CHART

Biome	Climate	Soil	Plants	Animals
Desert	Very hot days, cool nights; less than 10 inches (25 cm) of rainfall per year	Poor in animal and plant decay products; often rich in minerals	none to cacti, yuccas, bunch grasses, shrubs, and a few trees	Reptiles, arthropods, small rodents, some birds. The Sahara Desert is home to camels, gazelles, antelopes, and small carnivores.
Tundra	Very cold, harsh, long winters; short, cool summers; 10–30 inches (25–75 cm) of rainfall per year	Nutrient-poor, permafrost layer a few inches below the surface	Grasses, wildflowers, mosses, small shrub	Musk oxen, migrating caribou, Arctic foxes, weasels, snowshoe hares, owls, hawks, various rodents, occasional polar bears
Grassland	Cool in winter, hot in summer; 10–30 inches (25–75 cm) of rainfall per year	Rich topsoil	Mostly grasses and small shrubs, some trees near sources of water	American grasslands include prairie dogs, foxes, small mammals, snakes, insects, birds. African grasslands include elephants, lions, zebras, giraffes.
Deciduous Forest	Mild winters and summers; 30–50 inches (76–127 cm) of rainfall per year	Rich topsoil	hardwoods such as oaks, beeches, hickories, maples	Wolves, deer, bears, and a wide variety of small mammals, birds, amphibians, reptiles, and insects.
Taiga	Very cold winters, cool summers; approx. 20 inches (50 cm) of rainfall per year	Acidic, mineral-poor, decayed pine and mostly spruce needles on forest floor	Mostly spruce, fir, and other conifers	Rodents, snowshoe hares, lynx, sables, ermine, caribou, bears, wolves; birds in summer
Tropical Rainforest	Hot year-round; 8–100 inches (200–400 cm) of rainfall per year	Nutrient-poor	Greatest diversity of any biome; vines, orchids, ferns, and a wide variety of trees	More species of insects, reptiles, and amphibians than any place else in the world; monkeys, other small and large mammals, including elephants; wide variety of colorful birds

IV. ECOLOGICAL SUCCESSION

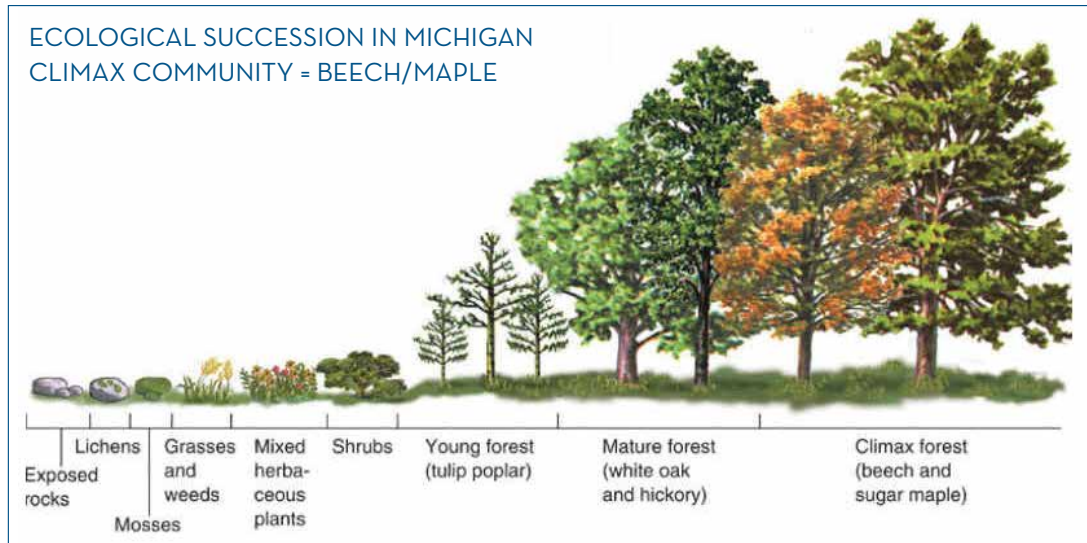
The slow orderly progression of changes in community composition during development of vegetation in any area, from initial colonization to the attainment of the climax typical of a particular geographical area;

A. It is accompanied by changes in the associated animal communities (e.g., A forest succession may traverse the following overlapping stages: algae, lichens, mosses, herbs and grasses, shrubs and bushes, subclimax trees, and climax forest.)

B. Progression of plant and animal communities over time

1. Erosion, weathering breaks down rock
2. Pioneer: earliest succession stage (lichen can live on rock surface)
3. Plant species are extremely tough: can survive extreme temps and humidity
4. Seeds that can disperse need lots of sun to grow
5. Climax community: final stage of succession (biome)

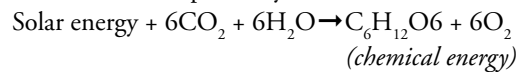
C. Ways to set succession back: disease outbreak, insect outbreak, natural disasters



V. ENERGY FLOW IN LIVING SYSTEMS

A. Major tool in understanding ecosystems

B. Photosynthesis is the process by which plants use the energy of sunlight along with carbon dioxide and water to make food. It can be depicted by the formula:



1. Chlorophyll = product in plant that allows photosynthesis to take place
2. Some organisms (such as ones that live in the deep ocean where no sunlight can reach) use sulfur instead of sunlight to produce energy

C. Cellular respiration is the set of the metabolic reactions and processes that take place in the cells of organisms to convert biochemical energy from nutrients into energy (in the form of adenosine triphosphate (ATP)), and then release waste products:



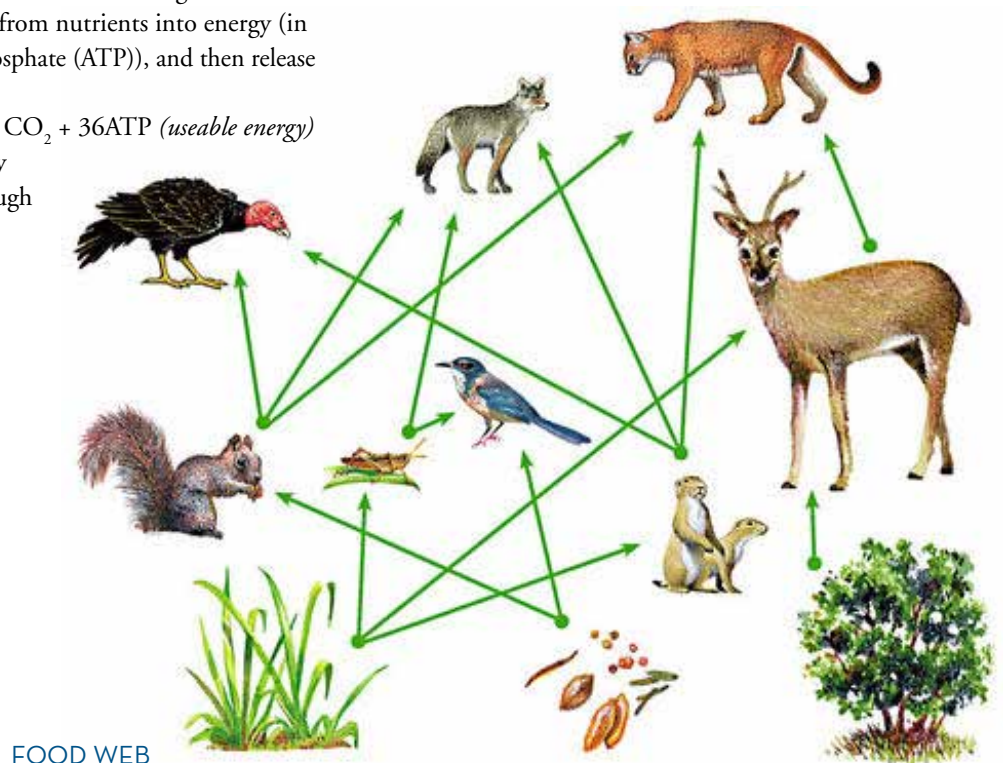
D. Food chain: The one-way transfer of food energy through a series of other organisms, with repeated consumption and being consumed.

Examples:

1. grass, rabbit, fox
2. grass, grasshopper, frog, falcon
3. grass, grasshopper, frog, snake, red-tailed hawk

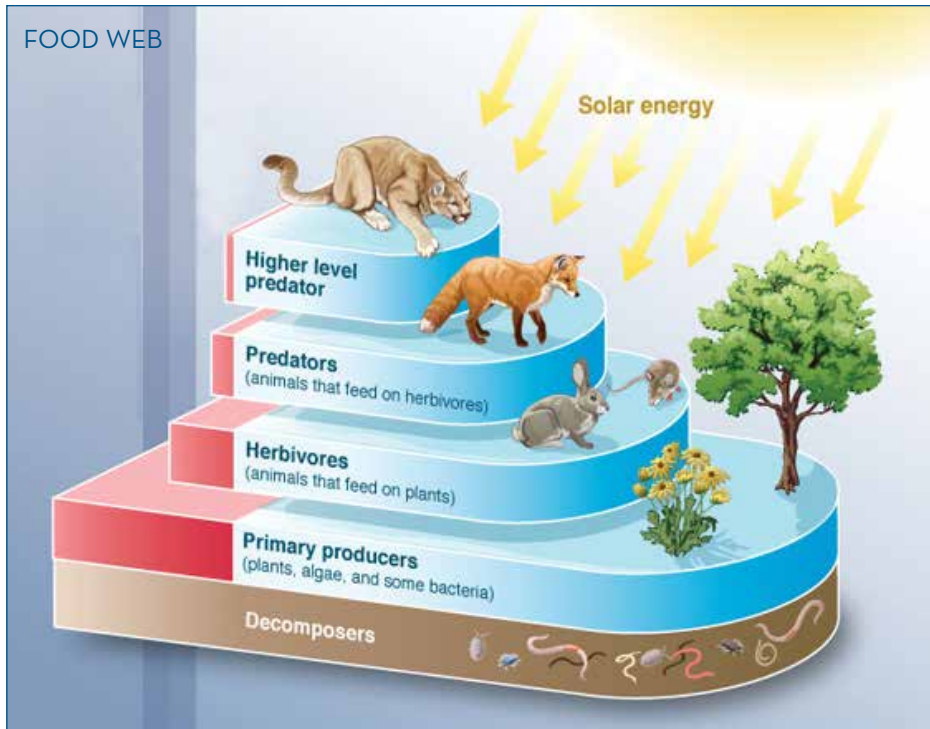
E. Food web: It depicts feeding connections (what-eats-what) in an ecological community and is a better representation of how species are interconnected in an ecosystem than the traditional food chain.

1. It is comprised of countless interconnected food chains.
2. They are the interconnected network of pathways for the recycling of nutrients from producers, through herbivores, carnivores, omnivores, and decomposers, finally returning the producers.



FOOD WEB

ECOLOGY

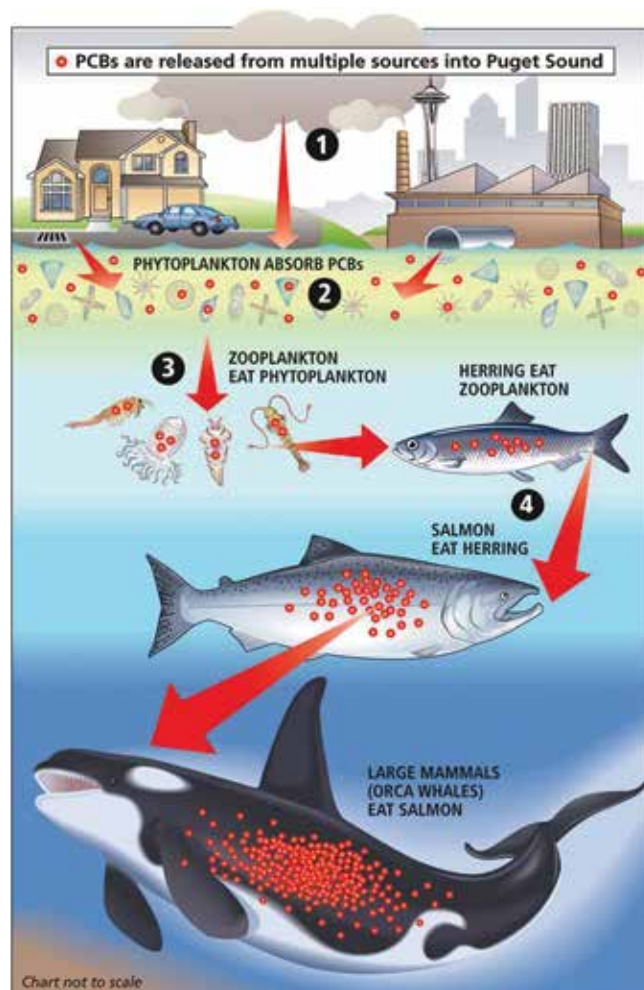


F. Food pyramid: divided into trophic levels (autotroph [plants], heterotroph [animals]):

1. Base: producers (the largest; plants)
2. Primary consumers: herbivores (deer, cows, rodents, llamas, pandas). Can also be omnivores.
3. Secondary consumers: Carnivores (cougars, wolves, weasels, hyenas) Can also be omnivores.
4. Apex: apex predators. Different animals in different ecosystems: e.g., wolves in UP, tigers in Siberia
5. Not always simple: bears could be at several levels the same day or at different times of the year (Acorns can make up 80 percent of their diet in the fall; in winter, they are more carnivorous.)
6. 10 percent rule: only 10 percent of energy is carried to next level, i.e., herbivores have to consume a lot more plants compared to the amount of prey a carnivore has to eat. Also, think of the number of zebras (a lot) versus the number of lions.
7. Biomass: organic matter derived from living, or recently living, organisms. Less biomass gets passed up the food pyramid
8. Decomposers: species that eat detritus (formerly living material that that is starting to decay).

VI. BIOACCUMULATION/ BIOMAGNIFICATION

- A. Bioaccumulation: increase in concentration of a pollutant in an organism (DDT is an example)
- B. Biomagnification: increase in concentration of a pollutant in food chain
- C. Biomagnification: aquatic insect gets 1,000 molecules; fish eats 1,000 insects = 1,000,000; otter eats fish = 1 billion



BIOMAGNIFICATION

VII. SYMBIOSIS

Long-term ecological relationship between (usually) two species

- A. Mutualism: both species benefit. Corals (animals) which have zooxanthellae (plants) that live in corals; mites on hissing cockroach; oxpeckers riding on the backs of rhinos
- B. Parasitism: one benefits, one is hurt
- C. Commensalism: one benefits, one isn't affected (remoras and sharks)

VIII. HABITAT

The region where a plant or animal naturally occurs; native environment. Typically includes food, water, shelter, and space. *Note: more complete definition will include everything that species needs in its environment to survive.*

- A. Limiting factor: anything preventing population from growing or even being present:
 1. Density dependent: food, space, number of predators, reproductive rate, disease
 2. Density independent: natural disasters (fire, flood, drought), weather

IX. NICHE

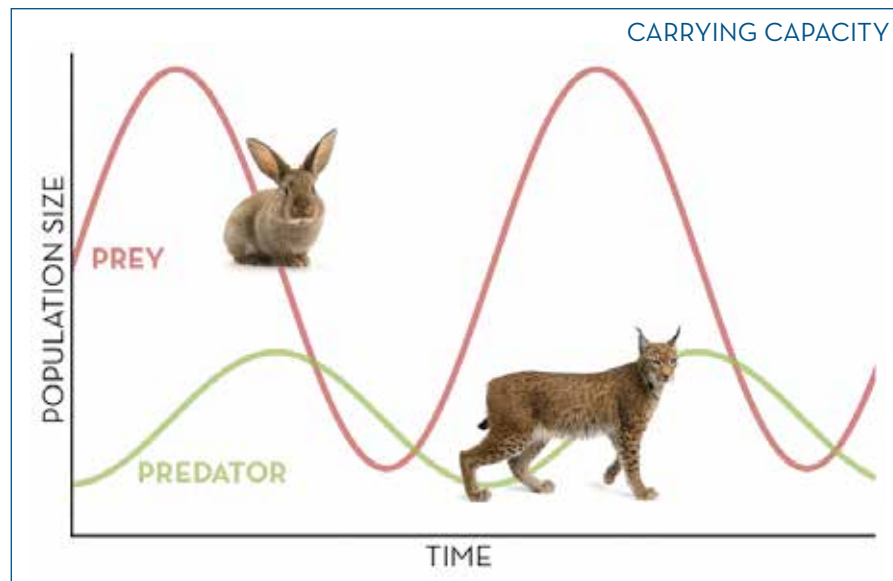
The particular role of a species within the community, defined in terms of all aspects of its lifestyle (food, competitors, predator, and other resource requirements)

- A. Context: animals' job
- B. Competitive exclusion principle: no two species can occupy same niche at the same time
 1. Red-tailed hawk versus great horned owl= niche switching

X. CARRYING CAPACITY

Geographic area that can support a certain species long term

- A. Example: Four rabbits living in backyard; by mid-summer may have 18 rabbits; by fall 12; by winter eight; and by spring back to four
- B. Graph number of animals versus time: goes in waves; carrying capacity is straight line
- C. Disease, predation, size, loss of food, parasites, cars = cause change in population



XI. BIODIVERSITY

The degree of variation of life. This can refer to genetic variation, species variation, or ecosystem variation within an area, biome, or planet.

- A. Normally a reduction or loss of biodiversity indicates a system that is becoming less stable and/or healthy; greater biodiversity is more stable
- B. Keystone species: have own niche, but it's so critical that if disrupted, ecosystem could collapse
- C. Environmental indicator species: specialist (narrow range of tolerance) as opposed to a generalist (eat almost anything)
- D. Sustainability: how biological systems endure and remain diverse and productive

XII. CONSERVATION

Sustainable management of natural resources

XIII. PRESERVATION

A tool of conservation: take only memories, leave only footprints.

PREY/PREDATOR RELATIONSHIPS

Nature films have well documented the variety of hunting techniques utilized by different predators that ultimately spell doom for the intended victims, but what is rarely addressed are the ways in which prey animals are well suited for escaping predation. It should be noted that this discussion will focus on prey and predatory animals will focus on terrestrial, vertebrate animals. These types of interactions are also found at the invertebrate level.

Special characteristics and behaviors contribute to the continuation of the species whether it is prey or predator: Please be aware that these are general trends and by no means hard and fast assertions for all predators and their prey. Remember: All predators can be prey!

POSITION OF EYES

Prey animals typically are herbivores and must spend a great deal of time eating in order to meet their nutritional needs. Eyes on these animals are placed far apart and on the sides of their heads for better peripheral vision. This enables the animals to routinely feed and still be able to detect movement behind them even when their heads are lowered for grazing. They rarely have a large field of depth perception. Predators, on the other hand, must be able to perceive three dimensions in order to be an accurate hunter. Their eyes are situated in the front of their heads and are close together giving them a large field of depth perception.

POSITION OF EARS

Ears also play an important role for survival. Prey animals tend to have flexible ears (sometimes these ears are able to rotate 180 degrees independently of one another) which are positioned on top of the head. This enables them to detect sounds from any direction without turning their heads. Predators, meanwhile, have less flexible ears which are focused toward the front, and they are equipped with stereophonic sound. This enables them to locate prey. Even though it seems as if each is evenly matched, prey animals are particularly well suited for escaping predation by often possessing keen senses and great agility.

SAFETY IN NUMBERS

Some animals live in herds which makes it difficult for a predator to successfully capture an individual. With so many eyes, ears and noses on the alert, it makes getting close enough for an attack a difficult task. In addition, individuals in the middle a better chance of escaping predation than those on the fringes. In some herds, sentinels are used to keep alert for danger so that the rest of the herd may concentrate on feeding and resting.

SIMULTANEOUS CALVING

This reproduction phenomenon is a means of securing survival for some of the offspring of the current breeding season. By flooding the predator market with so many potential prey, there is no way all of the babies could be taken

during that breeding season. If the birthing season is sporadic throughout the entire year, there would always be vulnerable offspring available for the taking. There is a potential risk of losing an entire year's worth of offspring.

FLIGHT DISTANCE

Animals have an established "flight distance" or space that they maintain between themselves and a potential predator. This distance is their "head start" in order to escape the impending attack. Animals that exhibit this behavior include a variety of plains dwelling animals such as the gazelles, zebras and antelopes of Africa.

CAMOUFLAGE

The ability to blend in with ones surrounding is the accepted definition of camouflage. There are, however, many forms of camouflage/coloration which benefit prey and their predators. Some forms enable them to hide while other forms advertise their presence and potential danger.

- **Cryptic:** When an animal is the same color as the environment in which it lives, this is an example of cryptic camouflage. Lions, walking sticks, Arabian oryxes, sand gazelles, white-tailed deer, mountain lions, wild sheep, and Arctic foxes are all cryptically camouflaged.
- **Disruptive coloration:** refers to the type of coloration in which the outline of the animal's body is broken up. Examples include tigers (stripes), leopards (spots), zebras (stripes), giraffes (irregular patches). This coloration allows these animals to either get lost in their backgrounds (a form of cryptic camouflage) or to get lost in a crowd of like colored individuals such as zebras.
- **Counter-shading:** This is a camouflage technique utilized by animals that may inhabit differently lit environments. Typically these animals' bodies are contrasting in shade with half of their bodies being dark and the other half being light. Penguins have black backs and white abdomens. In the water, the black blends in with the black of the ocean floor while the light ventral region blends in with the sunlight filtering down through the water. This very common in many aquatic species. Also, many arboreal animals exhibit this same type of camouflaging such as tree-dwelling snakes.
- **Mimicry:** This is where one species mimics the appearance of another species. These animals typically are attempting to fool a potential predator that they are actually a much more dangerous species. For instance, the monarch butterfly is bright orange with black markings and if eaten, they are poisonous to the consumer. The viceroy butterfly is similarly colored yet it is not harmful to its consumers. Another example is the Sinoloan milksnake. Its band of yellow, red and black are similar to the banding pattern found on the coral snake, a venomous snake found in the southeast United States. Predators that have come in contact with such animals learn to avoid the colors that communicate to them danger, and mimics benefit from their acquired knowledge.

ANIMAL HANDLING AND OUTREACH

POLICIES AND PROCEDURES

ELIGIBILITY

To be eligible to handle outreach program animals on or off zoo grounds, an individual must meet the following criteria:

1. Be a docent in good standing;
2. Successfully complete all animal handling classes required by the education department of Potter Park Zoo, including all required refresher animal handling courses.

RATIONALE

Zoos have a responsibility to provide an effective educational experience. They must speak to the public's emotions before they can make convincing conservation arguments—and nothing has a more compelling effect on human emotions than contact with a living, breathing animal. The education animals at Potter Park Zoo are working ambassadors of their species and for all wild animals. They stimulate interest and appreciation, dispel myths and fears, reconnect visitors with the natural world and stir all those they encounter to action. (Roger Williams Park Zoo)

SAFETY

1. The most important consideration in all animal handling situations is safety—safety for the audience, the handler and the animal. **Failure to adhere to animal handling rules and guidelines will result in the loss of animal handling privileges or dismissal from the docent program.**
 - The key to having successful live animal presentations is to be alert, calm, prepared, and to always use common sense. Never forget that all animals have a mouth—and anything with a mouth can bite!
2. Never allow anyone not associated with the zoo and trained as a handler to ever handle our animals. Any exceptions will be determined by the zoo director, general curator or the education curator.
3. Never allow anyone to put their fingers into an animal's home enclosure or travel crate. This includes everyone, including staff and docents.

CONSIDERATIONS WHEN SELECTING AN ANIMAL

1. Only those animals housed in the outreach animal quarters in the Education Center and the enclosures immediately behind the Discovery Center are to be used for animal presentations.
2. Before loading any animal for outreach or encounter make sure that there are no restrictions noted on the cage. Keepers will attach a restriction card on the cage of any animal that should not go out. Reasons for restrictions:
 - Medical considerations
 - Snakes that are in shed
 - Behavioral issues and/or training
3. If an animal appears ill, stressed, or exhibits any other unusual behavior, then do not use it—even if there are no restrictions. Report the behavior to staff in person or by

leaving a note for the keepers on the white board in the animal quarters.

4. Select animals you are comfortable with. Spend lots of time practicing handling the animals before you use them in presentations. If you have questions or need assistance, ask the education curator or asst. education curator.
5. Think about how the animal will fit into your presentation. How will it illustrate the topic? How does it relate to the other animals selected for the program?

CRATING AND TRANSPORT

1. Whenever going into the education animal quarters, you must step into the footbath immediately upon entering. The footbath must be used each subsequent time a person leaves the Discovery Center building.
2. All education animals must be in a travel crate/container whenever they leave the animal quarters unless they are taken directly through the access door into one of the adjacent classrooms.
 - a. Make sure each animal goes in the appropriate transport cage. They are labeled!
 - b. Always place newspaper/bedding and cage covers on the bird/mammal travel crates prior to an animal being placed into the crate (Check the posted list for specifics).
 - c. Snakes and sheltopusik must be placed in a tied cloth bag before being placed into their plastic travel container.
 - It is a good idea to take an extra cloth bag when going on outreaches with a snake or the sheltopusik in case they defecate.
 - d. Always double check to make sure travel containers are securely latched and lids are snapped completely shut.
3. You must sign out each animal in the animal checkout log. **Fill the log out completely!** This rule applies anytime an animal leaves their home enclosure.
 - a. Each individual animal has its own check-out sheet.
 - b. The docent who removes the animal from its home enclosure signs it out, and the docent who puts it back signs it in.
 - c. Please note the details of the program using the check boxes.
 - d. Location, type of program (e.g., BZL, Spring Fling, Science Fair, etc.) and any behavior information can be recorded in the "Notes" section.
4. When you remove an animal from its enclosure, remove the animal ID card and clip it to the top of the transport crate. Be sure you are removing the appropriate ID for cages with more than one animal (e.g., ferret-light vs. ferret-dark).
5. When carrying travel crates, they should always be carried with the door facing behind you.
6. Only docents and zoo staff should carry animal containers.
7. Never leave cages unattended unless absolutely necessary and then only in a secure, locked area with appropriate temperature and ventilation.

ANIMAL HANDLING AND OUTREACH

8. Never stack cages/coolers on top of each other in the van.
9. Always align bird travel crates in a transport vehicle so that their cage is perpendicular to the direction of travel (the cage faces towards the sides of the van, not towards the front or back).
10. If you are exhibiting an animal on zoo grounds:
 - a. Set up in one location, using cones or stanchions to delineate the area
 - b. Never stroll through the zoo with an animal out of its transport container.

CRATING AND TRANSPORT: WEATHER CONDITIONS:

Tropical birds and mammals, arthropods and reptiles can all be at risk if exposed to extreme weather conditions. (Note: the ideal temperature range for the animals that travel in the large white coolers is about 78–84 degrees. There is a thermometer on the inside of the cooler lid.)

Cold temperatures

1. All birds and mammal traveling cages will be covered with proper sized covers, including door flaps.
2. Reptiles and arthropods will be transported in coolers with the rigid water bottles containing hot water. Note: Cooler lids should be kept closed except when removing or replacing animals in/out of the coolers.
3. Warm up the van before loading. Allow at least 20 minutes of warm-up time. **DO NOT USE REAR FLOOR VENTS.**
4. Park close to buildings when loading and unloading.
5. Avoid direct drafts on the animals.

Hot temperatures

1. All birds and mammal traveling cages will be covered with proper sized covers, including door flaps.
2. Reptiles and arthropods will transported in coolers with rigid water bottle filled with hot water.
3. Run air conditioner in van for 20 minutes before loading. **DO NOT USE REAR FLOOR VENTS.**
4. Avoid exposing animals or their cages to direct, intense sunlight.
5. Make sure birds and mammals have access to water frequently

SPECIAL NOTES FOR REPTILES

1. All snakes and the Sheltopusik must be transported in a cloth bag contained within a plastic tub.
2. No snake bag or tie is to be used more than once before being laundered. They must be washed after every use—**no exceptions!**
3. When unloading snakes and sheltopusik, docents should then immediately place used bags and ties in the laundry bag.
4. Never use a snake bag or tie unless it comes directly from the cupboard.

5. All plastic transport tubs and lids for ALL reptiles must be sprayed thoroughly with disinfectant every time they are used and placed on the labeled shelf to the right of the floor sink right side up. Then, set the timer for 10 minutes. When the timer goes off, rinse the containers and place them on the drying rack upside down.
6. Always wash your hands with soap or hand sanitizer after handling any of the snakes or sheltopusik and before handling another species of snake or the sheltopusik.
7. Never have two snakes, or a snake and the sheltopusik, out at the same time if you are in a situation where the animals are displayed at a table and the audience is allowed to touch.

SHARP

This acronym will help you remember the general principles of animal handling:

Support: The animal will be supported at points where the body is normally supported. In many instances the animal will adjust itself.

Head away: When animal are presented for touching, the back side will be presented and head kept away from the public. Public will be encouraged to touch in the direction fur or scales grow.

Awareness and knowledge: Presenters must remain alert. They must always be aware of the animal and the audience, be familiar with the animal's natural history before the presentation and admit they do not know the answer to a question rather than give incorrect information.

Restraint: Animals will be restrained as little as possible but handlers will be prepared to increase restraint if necessary. A firm but gentle touch will be used.

Plane: Each animal will be held on its natural plane. (Roger Williams Park Zoo)

DOCENT/ANIMAL INTERACTION

1. Always support the animal completely as most animals have a fear of falling. **Use of cell phones is not allowed when handling an animal.**
2. Always look in a cage and observe the animal before attempting to bring it out.
 - a. If an animal is sleeping or unaware, gently make it aware of your presence prior to picking it up.
3. Always work with at least one partner. Never go out on an outreach or do an encounter by yourself!
4. Only one animal per person may be handled at one time. If the parrot is on its portable perch or an opossum is in its bed on a table, there must be a docent with them at all times with no other animals under their control.

ANIMAL HANDLING AND OUTREACH

5. Never treat the animals as pets or talk to the audience as if they are pets.
 - a. If you touch the eagle owl's head to demonstrate his "ear tufts," then explain to the audience you are not petting the bird but simulating cooperative grooming.
 - b. With the parrot, explain that they do not "talk" in the human sense but are incredibly adept mimics.
 - c. With the opossum, explain that it wraps its tail around you for support, not because it likes you.
 - d. Never allow animals around your face or neck or on your shoulders. This is for your safety. Also, we do not want to give the wrong message to the audience—outreach animals are not pets and should not be treated as such.
6. Parrots should be handled on a stick—no exceptions.
7. Gloves must be worn while handling the armadillo, porcupine, parrot, opossum, and raptors.
8. Always be aware: aware of your surroundings, aware of your audience, and especially be aware of the animal you are handling. Note its demeanor and body language. The animal will often give you plenty of indication if it is not comfortable. Be on the lookout for dogs and very young children.
9. Let the animal's behavior determine how long you keep it on display. Birds and mammals usually do not tolerate handling as long as reptiles.
10. Specific snake and sheltopusik protocols: They are very important!!
 - a. Whenever you handle any of the snakes or the sheltopusik, you must use sanitizer before handling any other snake or the sheltopusik, even if you handle several other animals in between.
 - b. If you have educational animals out in a table/station setting, only one snake or sheltopusik should be out at the same time in the same location.
11. Never bring an animal out of its cage if you have any doubts about its health, behavior, or the environmental conditions of the area in which you are presenting. You can always explain to an audience why it is not appropriate for the animal to come out.
12. When handling animals, docents will follow the following dress and hygiene guidelines:
 - a. Avoid strong-smelling lotions, potions, etc. on your hands. The scent may distress the animals.
 - b. Avoid wearing the following:
 - i. Loose fitting clothing
 - ii. Loosely woven clothing
 - iii. Jewelry such as long necklaces, bracelets, watches, or large rings
 - iv. Strong-smelling perfume, cologne, aftershave, or lotions
 - c. Follow dress code:
 - i. Always wear docent vest and name tag
 - ii. Have neat appearance
 - iii. Closed-toed foot ware is required when handling animals
 - iv. No extremely short shorts or pants with holes or "strategic" tears
13. Wash your hands!! This rule is for all audiences when touching, it is imperative docents wash their hands prior to loading animals, after loading animals, after unloading animals and after cleaning cages—wash thoroughly with disinfectant soap.

PREPARING THE AUDIENCE

1. Always prepare your audience prior to bringing an animal out:
 - a. Let them know that the animals will likely defecate, urinate and exhibit other normal behaviors.
 - b. Let them know what behavior is expected from the audience (Quiet, no sudden movements, etc.)
 - c. Reassure them that the animals will stay within your control at all times.
2. Never let the audience get out of control. You are the one who dictates what behavior is acceptable. (i.e., noise level, movements, etc.) Be polite, but firm. Note: Make sure this is done using positive tones and word choice.

AUDIENCE/ANIMAL INTERACTION

1. Docents may allow the audience to touch the animals if the situation is appropriate:
 - a. The audience is well-behaved and following directions well;
 - b. The audience is of suitable size;
 - c. There is sufficient time;
 - d. The animal is behaving well;
 - e. There is sanitizer available, either in the school classroom or from the supply tub in van.
2. The animals are always held with their head towards the docent and the tail towards the audience if touching will occur.
3. Give specific, detailed directions to the audience:
 - a. They are not petting the animal, only touching;
 - b. One person at a time;
 - c. Using only one finger;
 - d. Only in the direction of the tail;
 - e. Holding up one finger lets docent know which audience members want to touch and are following directions, while not holding up a finger means they do not wish to touch.

ANIMAL HANDLING AND OUTREACH

4. Never allow a member of your audience to touch the head of animals or place any part of their body near the mouth of an animal. No exceptions! This reduces the likelihood of someone getting bitten.
 - a. If an audience member is attempting to use more than one finger or their hand begins to go towards the animal's head, then the docent must immediately pull the animal back and/or step back, remind the audience of touching "rules", and then resume touching if the audience is compliant.
 5. We never allow touching of any birds or invertebrates, the armadillo, porcupine, or opossum!
 6. We never promise audiences or group leaders that touching of the animals will occur. For most presentations it is not suitable.
 7. Make sure everyone knows to use sanitizer immediately following the presentation, or immediately after touching if the audience is walking past a demo table.
 8. Make sure anyone wishing to touch has relatively dry, clean hands—not dripping wet with sanitizer, sticky fingers from food, etc.
4. Clean and disinfect all travel containers used:
 - a. Invertebrates: only use water to clean and leave the containers by the sink in the reptile room to dry.
 - b. Reptiles
 - i. No snake bag or tie is to be used more than once before being laundered—they must be washed after every use—no exceptions!
 - ii. When unloading snakes and Sheltopusik, docents should then immediately place used bags and ties in the laundry bag.
 - iii. Never use a snake bag or tie unless it comes directly from the cupboard.
 - iv. All plastic transport tubs and lids for ALL reptiles must be sprayed thoroughly with disinfectant every time they are used and placed on the labeled shelf to the right of the floor sink right side up. Then, set the timer for ten minutes. When the timer goes off, rinse the containers and place them on the drying rack upside down.
 - c. If the containers are not dry, set them in the floor sink or shelf above to air dry.
 - i. Doors to mammal and bird cages should be closed to avoid damage to the hinges (water will still be able to drain out.)

RETURNING ANIMALS

1. Make sure each animal goes back in the same enclosure from which you removed it! Animals placed in the wrong enclosure can suffer unnecessary injuries or stress. Check the ID tag on your crate and match it to the picture of the animal on the enclosure. Return the tag to the marked "clip here" location on the matching picture when you return the animal. If you are not sure, check with zoo staff before returning the animal. It is always better to call than to put an animal in a dangerous situation!
2. Animals should only be placed in enclosures that are suitably prepared for them. Enclosures should always have a substrate, clean water, and usually a food dish and enrichment items. If you had to move any items to get the animal out, make sure you replace them in the appropriate location in the enclosure. In the unlikely event that the appropriate enclosure is not prepared for the animal, do NOT attempt to prepare it yourself. Contact a member of zoo staff for directions on how to handle the situation.
3. Leave a note for the keepers on the white board with all pertinent information, if needed:
 - a. Any unusual behavior or apparent health problems
 - b. Snakes and sheltopusik: leave a note if they defecate or regurgitate.
 - c. Notes about the need for nail trimming
4. Make sure each enclosure door is latched tightly and secured properly after putting the animal back.
5. Be sure to sign in all the returning animals in the checkout log. Double check the cage numbers when you do this.
 - a. Tenrecs will need to be signed in on both the tenrec log and the regular checkout log
7. Make sure that any mess (cardboard bedding, paper towels, muddy footprints, etc.) is completely cleaned up before you depart.
8. Make sure to wash your hands before leaving the animal quarters.

IN CASE OF AN INJURY (HUMAN)

1. If you get bit, remain calm. This is for your safety, the animal's safety and the mental well-being of your audience. Do not try to pull away, as most animals only bite harder. Pulling also increases the likelihood of the bite becoming a laceration. Have your partner assist you in getting released and putting the animal back in its cage. If a ferret, reptile or parrot bites and will not release, then a gentle spray of water will normally cause them to release.
2. If you get bit or scratched and the skin is broken or you are badly bruised, an accident form must be completed as soon as possible—no exceptions!!
 - a. Contact PPZ security ASAP @ 517.230.3790
 - b. Security officer will complete the form with your information
 - c. If the skin is broken or you are badly bruised, you must seek medical treatment—no exceptions. Note: Docents are liable for any and all costs associated with medical treatment for injuries received while serving as a docent.
 - d. Docents who are bitten and receive medical treatment will be required to undergo a refresher course from the education curator or assistant education curator
3. If a member of the audience gets bitten, first make sure that first aid is applied. If medical care is required, make

ANIMAL HANDLING AND OUTREACH

sure you assist in ensuring that medical help is received.

Note: Zoo public safety (517.230.3790) must be notified immediately. They will contact the appropriate zoo staff and make sure all essential paperwork is completed.

IN CASE OF AN ANIMAL MEDICAL EMERGENCY

If an animal is injured or has any adverse health conditions, call the zoo immediately (zoo public safety @ 517.230.3790) and inform them of the problem. Security will notify appropriate zoo staff—who will then direct you on what to do. In most cases this will simply be to return the animal to the zoo. The outreach van has a list of emergency phone numbers posted on the visor.

IN CASE OF A VEHICLE ACCIDENT WITH THE OUTREACH VAN

If you are in a vehicle accident, make sure you have the name, license number and insurance company of the other driver involved. Call the local police and have a report filed. Notify zoo public safety immediately (517.230.3790). They will assist you and notify appropriate zoo staff.

SPECIAL EVENT ANIMAL HANDLING

Docents may only handle one animal at a time.

BE AWARE OF YOUR ANIMAL AT ALL TIMES!! It is easy to get distracted talking to the audience or to fellow docents, but you **MUST** be aware of your animal's mood and body/head position, as well as the audience, at all times. Be vigilant!

Docents must use two-handed control **AT ALL TIMES**. At no time should your hands not be touching the animal (except for armadillo in playpen). **Use of cell phones is not allowed when handling an animal.**

Animals may be set on the table on a towel as long as two-handed control is maintained.

DO NOT set animals down on top of pelts or other artifacts. Defecation/urination by the live animal will ruin the pelt or artifact. If there isn't room to set down the animal, don't set it down or remove some pelts/artifacts.

Do not use the opossum bed or armadillo pen for animals other than the opossum or armadillo, respectively.

Do not have more than one legless reptile (snakes or sheltopusik) out at a time to minimize the possibility of disease transmission between the legless reptiles.

Make sure only one person touches the animal at a time, and that the audience is using appropriate one finger touch.

Make sure that all guests use sanitizer before leaving the room. Make sure the sanitizer is not going to drip or squirt on any pelts or artifacts. If there isn't room, remove some pelts or artifacts.

TOUR: ANIMAL ADAPTATIONS

OBJECTIVES

Audience will understand the concept of animal adaptations and how those adaptations give them a better chance of surviving in the wild. They should be able to differentiate between physical and behavioral adaptations and understand that animals typically have adaptive behaviors that correspond to each physical adaptation. In addition, audience should understand that by observing physical adaptations of a species we can often predict/deduce many of their behaviors and habitat use.

KEY TERMS

Physical adaptations, behavioral adaptations, behavior, tools, habitat, instinct, learned, camouflage, prehensile, eye/ear location,

BEFORE YOU START

Discuss with the other docents where each of you will start. Remember that visiting a diverse selection of animals will allow you to compare and contrast their different adaptations. Do not forget about the coral reef exhibit—many of the topics for this tour can be seen/interpreted there.

GETTING STARTED

It is important that right at the beginning of your tour you establish a good understanding of the definition of adaptations. Animals depend on their physical features (parts of their bodies they use as “tools”) to enable them to survive in their habitat. They use these tools to help them obtain food, keep safe, build homes, withstand weather, attract mates, etc. These tools or physical features are called physical adaptations. Physical adaptations do not develop during an animal’s life but over many generations. The shape of a bird’s beak, the number of fingers, color of the fur, the thickness or thinness of the fur, the shape of the nose or ears are all examples of physical adaptations which help different animals to survive.

Note: During this discussion, make sure it is a discussion. Ask your audience questions, have them give examples of physical adaptations and as they do, have them also determine how that adaptation may help the animal survive better in the wild. Whatever exhibit you are standing next to, have them point out some physical adaptations on that particular animal.

Helpful hint: For younger audiences, having them repeat new terms like “adaptation” as a group a 2–3 times helps them retain the term more readily. After you have established a good understanding of physical adaptations, then you should introduce the concept of behavioral adaptations. Behavior is any activity an animal does with its body. Behavioral adaptations are actions an animal takes (behaviors) that help it survive. Give examples: a wolf trotting with its nose to the

ground—this behavior allows them to find prey, by using two of its physical adaptations—a great sense of smell (long nose filled with scent receptors) and a body with special legs and shoulders that is built for covering great distances without tiring. After you give them a couple of examples, ask your audience to give a few of their own. As they give examples of behavioral adaptations, help them determine some of the physical adaptations (tools) that are used during those behaviors.

Helpful hint: If you cover eye/ear placement of prey/predators early on in your tour, you can have the audience tell you whether or not each mammal you visit is a prey animal or predator by using just that information.

PPZ ANIMALS

Following is a list of some of the animal exhibits along with some suggestions which point out a few of the many ways in which you can use the animals to highlight and illustrate the concepts and terms listed above. Remember, these are only a few suggestions. Be sure to consult the animal data sheets for more detailed information on their various adaptations.

Arctic fox: Note placement of eyes and ears; seasonal variation in color of fur, thickness of winter fur, camouflage. Behavioral adaptations: Curling up body with thick tail in front of their face when its extremely cold; when food is really scarce in the winter, they have been known to scavenge polar bear kills.

North American river otter: Note placement of eyes and ears; webbed feet, tail used as rudder, dense under fur which traps air for insulation—these adaptations allow otters to be experts at catching fish.

Bald eagle: Note placement of eyes; incredible eyesight for detecting at great distances (prey can be spotted over 1 mile away); will scavenge, especially in the winter when food is scarce; will also migrate (a few miles or a thousand) in the winter to find ice-free water; will occasionally steal fish from osprey, another raptor—which is even better at catching fish than the eagle; large, wide wings are designed for gliding and soaring—an energy efficient way to search for food

Gray wolf: Note placement of eyes and ears; wolves are social (pack) and hunt their (which are often much larger that they are) as a well-coordinated team; like most large predators, they have “feast or famine biology”—kills may be several days apart and they can take advantage of hunting success by consuming very large amount of meat, up to 20 pounds! Wolves locate prey with their incredible sense of smell—up to a thousand times better than ours. Bodies are built to travel long distances (smooth, energy efficient trot) they can cover 50+ miles in one day!

TOUR: ANIMAL ADAPTATIONS

Farm yard: Yaks, goats and reindeer/caribou are ruminants, an adaptation for digesting hard to digest foods; caribou make long migrations twice each year to find food on the tundra, extra large hooves help prevent them from sinking in deep snow and/or wet, spongy tundra of the summer.

Kangaroo/wallaby: Pouch is used to keep joeys safe; large hind legs give them ability to leap great distances: long, large tail serves as support and balance

Camels: Note placement of eyes and ears; discuss the camel's hump (if you ask what is in the hump, most people will say "water") and fat storage—humps are much larger in the fall and winter; camels are ruminants; camel bodies are very efficient in their use and conservation of water; camels can drink up to 30 gallons of water once they do come across some in the desert. Camels can defend themselves from predators by biting and kicking—unlike horses and donkeys, they can kick in all four directions.

Eagle owls: Describe some of the many adaptations they have which are used in procuring food—night vision, great hearing, silent flight, powerful feet, sharp talons, hooked beak, etc.

Patagonian maras: Note placement of eyes and ears; like rabbits, these animals, produce two types of fecal pellets: soft ones which are re-ingested (to get more nutrition from their poorly digested food; eating of feces is called coprophagy); and firm pellets which are not re-ingested; use cryptic camouflage. Note: You can talk about predators of the maras (jaguars, eagles) and lead into a discussion of the differences in adaptations between predators and their prey.

Spider monkeys: Their prehensile tail allows their hands to be free to pick fruit and grab insects. Being social gives them multiple eyes and noses to find food and to detect predators.

Magellanic penguins: Exhibit counter-shading; insulate bodies with down and fat, webbed feet, wings modified into flippers; talk about the parents taking turns with incubation and feeding of the young.

PRIMATE BUILDING

Mandrills: Their bright colors on faces and rumps used for communication; males have large canines for defense and intimidation of male rivals; social groups (troupe) allow for predator detection and defense

Big cats: Note placement of eyes and ears; extremely powerful jaws and legs; sprinters, not endurance; retractable claws; spend most of their day resting, conserving energy; have very elastic stomachs and can consume large amounts of meat when they make a kill.

Lions: are only social large cats (pride), often hunt extremely large prey; utilize cryptic camouflage contrast this with the disruptive coloration of zebras, one of their prey.

Amur tigers and snow leopards: Have fur with color patterns than can function as either cryptic or disruptive depending on the color of the habitat; both are solitary; have extra heavy winter coats.

BIRD/REPTILE BUILDING:

Birds: discuss differences in bills, gizzards and use of grit, crops and food storage; placement of eyes, type of feet, length of legs; types, shapes and colors of feathers

Snakes: Loosely hinged jaw for swallowing large prey; either constrictors, swallow prey while still alive (garter snakes), or are venomous; tongue is used for taste/smell; some have heat sensing pits (*Massasauga rattlesnake*), cryptic camouflage.

Lizards: Cryptic camouflage; tongue used for taste/smell; have eyelids; have ears

Amphibians: All of our species are carnivorous; poison dart frogs use bright colors to warn predators, frogs' tongues attach at the front of their mouths and are sticky—the tongue is flicked out to capture insects and other small prey. Zoo diet: Varies with species: meal worms, crickets, wax worms, fish.

BACK YARD GARDENS:

Snakes: Relevance of camouflage; hiding places to escape predators, ambush prey; habitat for prey species—insects, rodents, etc.; nesting; sun/shade for thermoregulation.

Birds: Sources of food: nectar (hummingbirds), insects, seeds; nest sites (both natural and man-made); escape cover from predators; shelter from wind and precipitation; camouflage; sexual dimorphism; territories.

Mammals: Food—vegetation for herbivores/omnivores and prey for carnivores/omnivores; escape cover; shelter—vegetation, brush piles, wood chuck burrows; nesting/birthing areas; camouflage (e.g., mice and rabbits)

MIDDLE/HIGH SCHOOL

In addition to more depth and detail with the above topics, you can add discussion of the following terms and concepts: natural selection, evolution, simultaneous calving, coprophagy, ruminants.

Natural selection: the gradual, nonrandom process by biological traits which become either more or less common in a as a function of differential reproduction of their bearers. It is a key mechanism of evolution—"survival of the fittest." One way to help them understand natural selection—have them give examples of domestication in animals selective breeding in plants. Then give examples of some of our zoo animals.

TOUR: ANIMAL ADAPTATIONS

Evolution: Evolution is any change across successive generations in the heritable characteristics of biological populations. Think of it as natural selection on a large scale and over a longer period of time. Due to environmental pressures, natural selection is a continuous process and thus species are constantly evolving. Fossil records and genetic research provide the scientific basis of evolution.

Carnassial teeth: These large, pointy teeth are upper and lower teeth (either molars or premolars and molars) modified in such a way as to allow enlarged and often self-sharpening edges to pass by each other in a shearing manner. In some carnivores, such as the cats, the carnassial teeth are well-developed. Other carnivores, such as the bears, are less-developed and have become adapted to an omnivorous or even herbivorous diet.

Simultaneous/synchronized calving: A strategy utilized by several species of large ungulates in which most of the population gives birth within a very short period of time. In the Serengeti in Africa, 500,000 wildebeest calves are born within a 2–3 week period. In northern Canada and Alaska, 80–90 percent of all caribou calves are born within a 10-day period in early June. The synchronization serves two important functions: it reduces the chance that an individual calf will be killed by predators and calving almost always coincides with the peak abundance of nutritious plants.

Coprophagy: This is a behavioral digestive process seen in rabbits, hares, guinea pigs, most rodents and several other mammal species. Literally translated, coprophagy means “feces ingestion.” However, in the species mentioned above it involves the production of special “soft pellets” in the cecum, which maintains cultures of beneficial bacteria. These soft pellets have twice the protein, and half of the fiber of the typical hard fecal pellet. They also contain high levels of vitamin K and B vitamins and are usually immediately ingested after being expelled.

Ruminants: Ruminants have a fore-stomach with four chambers. These are the rumen, reticulum, omasum, and abomasum. In the first two chambers, the rumen and the reticulum, the food is mixed with saliva and separates into layers of solid and liquid material. Solids clump together to form the cud (or bolus). The cud is then regurgitated, chewed slowly to completely mix it with saliva and to break down the particle size. Plant fibers, is primarily broken down in these chambers by microbes (bacteria, protozoa, and fungi). Ruminating mammals include cattle, goats, sheep, giraffes, American bison, European bison, yaks, water buffalo, deer, camels, alpacas, llamas, wildebeest, antelope, and pronghorn.

TOUR: ANIMALS IN WINTER

OBJECTIVES

Identify five animals on exhibit that remain in Michigan or northern climates all year and list at least four adaptations that enable animals to cope with the changing seasons.

TERMS

Adaptation, cold-blooded, hibernation, migration, warm-blooded

ADAPTATIONS

Features that allow animals to adjust to their environment. They may be phenotypic (an acquired trait that is acquired during growth and development, such as the muscles of a weightlifter) or genetic (the inherited spots of a cheetah). They may be physical or behavioral.

PPZ ANIMALS

Arctic fox: Dor camouflage, the thick coat is white in winter, changing to a summer coat of gray. Fur on the soles of their feet help give them better traction on the snow and ice and help keep feet warm. Another adaptation, their small ears and thickly furred to help prevent frostbite.

North American river otter: Remain active throughout the winter months. Otters seem to enjoy tobogganing, using riverbanks as slopes to slide onto the ice. Thick fur traps body heat, insulating them from cold air/ water.

Bald eagle: Migrate until find open water; a few miles or a thousand. Scavenge deer in northern Michigan.

Gray wolf: Found in four-season climates all around the world and in tundra habitats, wolves grow thicker coats in winter to help insulate them against the cold. Bushy tails can be wrapped across the nose to keep it from freezing while they sleep. Hunting together in a pack, wolves take advantage of deep snow, which will tire or strand prey like deer, elk or moose.

Barred owl: Don't migrate. Have feathers in their legs for warmth.

Red panda: Live at higher altitudes, cooler climate. Sun in treetops in winter to warm up, save energy.

Pallas cat: Live in climates with temperatures ranging from 100°F to -45°F (38°C to -43°C). Pallas cats are poorly adapted to moving through deep snow, so their habitat is restricted to areas with less than 4 inches (10 cm) of snow cover during the winter.

Amur tigers: Live in a four-season habitat. Their coats become much thicker and shaggier as winter approaches, and they become more active in cooler weather.

Snow leopards: Live in the Himalayan Mountains where it is winter most of the year. Small ears, a long, bushy tail, hair on the pads of their feet and a thick coat are adaptations for another winter animal, the Arctic fox. To eat during the winter, they follow the herds of migrating hoof stock.

Moose: Moose are perfectly adapted to live in cold weather, and the colder the better. Their large body size reduces heat loss because of the low surface-area-to-volume ratio. Long legs allow adult moose to handle snow depths of 36 inches (white-tailed deer can handle about 18 inches), although moose do prefer to spend the winter in an area that provides plenty of browse near a sheltering, mature mixed-wood or coniferous forest. This shelter actually serves a dual purpose—not only does it help moose deal with crust or very deep snow, it protects them from heat! Moose are so well insulated from the cold that winter temperatures of 23°F (-5°C) will make them pant. As our winter temperatures can be quite variable, moose depend on the shade of softwood cover to keep them cool during our warmer winter days. On warm winter days, some moose will lie flat in the snow to try to dissipate their body heat. Moose will begin panting at 68°F (20°C) and summer temperatures as low as 57°F (14°C) can cause moose to begin to suffer from heat stress.

Magellanic penguins: Found in about the same climate as northern Michigan. They have a heavy layer of fat and down feathers to insulate and migrate north to warmer waters.

BIRD/REPTILE BUILDING

Reptiles/amphibian: All are cold-blooded and therefore unable to be out in our cold climate seasons. They employ hibernation to survive. Their bodies slow down in the winter while they stay buried in holes. While underground, the temperature remains fairly constant. In the spring, when the sun warms the earth, they “wake up” and are ready to return to the surface. Birds have excellent insulation with their downy feathers next to the skin, helping to keep heat in.

Bactrian camel: Thick coats protect from inclement weather; camels shed in spring. Bactrian camels are able to survive temperature ranges temperatures from over 100° F (38° C) in the summer to -20° F (-29° C) in the winter. The wool is so luxurious it is used to make fine winter garments. Humps comprised mostly of fat—used as reserve fuel in winter.

Note: If time allows, you can always show some of the pelts, penguin down and other appropriate biofacts in the education center.

TOUR: CAREERS AT THE ZOO

OBJECTIVES

To expose students to the variety of positions and professions associated with zoos.

Students will be able to:

1. List at least four zoo related jobs/professions
2. Describe two jobs/professions with some detail concerning skills necessary to work in these fields.

GETTING STARTED

Introduce yourself, rules while on tour. What are some of the jobs your audience can name that involve animals? There are many different jobs that need to be filled in order to run and maintain a zoo.

PENGUINS

Brief information about the animals.

Does anyone know how high a penguin can jump out of the water? Exhibit designers, those who build cages or exhibits for animals, need to know this. Why? We actually had all our penguins escape opening day by jumping out over a low spot in the rock work. These penguins can porpoise 6 feet out of the water.

Point out the ID bands and discuss their importance for the keepers. Mention the “medicated” fish and their importance to maintaining the health of all the penguins.

BIRD/REPTILE HOUSE

Reptiles in particular require special care—cold-blooded. Keepers need to know how to tell when one is sick, how to properly care for their cages, and design exhibits that keep them healthy.

Birds: Several breeding pairs on exhibit. Keepers need to know what each species needs in order to breed successfully. Other professions include breeders and trainers.

SMALL MOATS

Animal info as needed.

Wildlife biologist: monitor wild animal populations; help with managing wild areas; with some endangered animals they are needed to capture and collar animals so they can be monitored; when populations start to decline, a wildlife biologist is usually the first to notify the proper authorities so that the animals may be saved; important for advising legislators on environmental issues.

Forestry Service: manages forests and other wild areas to ensure that there is adequate food available for the native wildlife; protect our country’s natural heritage.

Conservation officer: enforces hunting laws and protects native plants and animals from being destroyed or taken illegally.

KANGAROO BARN

Show cooler and carnivore diet.

Nutritionist: someone who develops well balanced diets for the animals at the zoo in order to keep them healthy; responsible for researching and experimenting to derive the best possible formula of foods to maintain the animal collection in good health.

FELINE/PRIMATE HOUSE

Keeper: need to know behaviors of animals in their care in order to properly care for them (cats and their diets); they try to provide animals with some activity to prevent boredom; mention transmission of diseases and precautions that keepers take to keep their animals healthy.

Veterinarian: cares for the health of the entire collection; animals can’t tell a veterinarian where it hurts (compare to their doctor); can’t always weigh animals before you them medication, so the vet needs to be able to guess weights.

Vet assistant: aids veterinarian

Animal behaviorist: studies animal behaviors in wild to discover ways to meet needs of captive counterparts; study animals in captivity to see how zoos can improve their care of these animals; provide information to the rest of the world to further the understanding of animals.

OTHER ZOO OPPORTUNITIES

With nearly 200 million people visiting AZA institutions annually, all zoo and aquarium employees have the opportunity to educate the public about the critical need for the conservation of wildlife and wild lands. This responsibility assures an interesting and rewarding career, but the profession requires more than a commitment to conservation—it requires hard work.

Zoo and aquarium employment is not always glamorous. Much of the work requires physical strength, as well as the ability to make detailed observations and keep information up-to-date. It takes a special kind of dedication to provide care to captive animals that require attention 24 hours a day, seven days a week, come snow, rain, or shine.

The conservation and scientific programs in zoos and aquariums have become highly technical and specialized. Although practical experience with animals may sometimes be substituted for academic training, most entry-level keeper positions now require a four-year college degree.

Training in animal science, zoology, marine biology, conservation biology, wildlife management, and animal behavior is preferred. Curatorial, research, and conservation positions typically require advanced academic degrees.

Students wishing to pursue animal-related careers are encouraged to carefully review the curriculum of the schools they wish to attend, as some programs focus more on a zoological application than others. Students who are interested

TOUR: CAREERS AT THE ZOO

in the business side of zoo and aquarium operations should concentrate on skills related to a particular area of expertise, such as accounting, public relations, marketing, or personnel management. Whatever your career goal, guidance counselors can offer assistance in determining the most appropriate course of study.

SALARIES

Salaries for zoo and aquarium employees vary depending on the institution and its location. Institutions located in metropolitan areas generally offer higher salaries. An animal keeper's salary can range from minimum wage to more than \$30,000 a year, depending on skills and tenure. Salaries for other employees usually compare favorably with those prevailing in that region.

POSITION DESCRIPTIONS

Listed below are some positions in zoos and aquariums and a brief description of duties. Not all positions are found in all facilities, and responsibilities often vary.

Director/chief operating officer: executes policies as directed by the governing authority. Responsible for the institution's operation and plans for future development.

Assistant director: assists the director and assumes charge in the director's absence.

Finance manager/director: manages the institution's finances, including payment of bills, purchasing, investments, and the preparation of financial statements.

General curator: oversees an institution's entire animal collection and animal management staff. Responsible for strategic collection planning.

Animal curator: manages a certain portion of an institution's animal collection; i.e., mammals, birds, fish, reptiles, etc.

Veterinarian: responsible for the health care program for the animal collection and the maintenance of health records.

Veterinary technician: assists the veterinarian and provides care to the animals under the supervision of the veterinarian.

Registrar: maintains computer records on the animal collection and applies for permits and licenses to hold or transport animals.

Curator/coordinator/director of research: supervises research projects, serves as liaison between the institution and the academic community, and publishes articles in scientific journals.

Curator/coordinator/director of conservation: oversees the institution's conservation activities, including field projects. Serves as liaison with government wildlife agencies and other conservation organizations.

Conservation biologist/zoologist: provides scientific and technical assistance in the management of the animal collection and assists in conducting various research or field conservation projects.

Head keeper/aquarist: supervises a section or department of the institution; provides training and scheduling for keepers.

Senior keeper/aquarist: provides primary animal care for a department.

Keeper/aquarist: provides daily care to the institution's animals, including diet preparation, cleaning, general exhibit maintenance, and record keeping.

Operations director/manager: responsible for the daily operation of the institution's physical plant and equipment.

Curator of exhibits: creates exhibits and assists in the design of graphics.

Curator of horticulture: responsible for the botanical collection and its application to the animal collection, as well as daily maintenance of the institution's grounds. **Curator of education:** plans and implements the institution's education programs.

Public relations/affairs manager/director: promotes the institution, its mission, and its programs to the public via the media.

Development director/officer: develops and manages fundraising activities which can include writing grant proposals and attracting corporate sponsors, as well as soliciting private donations.

Marketing director/manager: creates advertising campaigns and other activities to increase public awareness of the institution.

Special events manager/coordinator: develops and implements events to attract visitors throughout the year.

Membership director/manager: responsible for maintaining and increasing institution memberships for families and individuals and designing special events for members only. May also be in charge of "adopt-an-animal" programs to raise funds.

Gift shop manager: manages staff and all aspects of gift shop operation from buying products to designing shops.

Visitor services manager: supervises the staff and facilities that cater to the visiting public including concessions and restrooms.

Personnel manager/director: responsible for all personnel matters including payroll, insurance, and tax matters.

Volunteer coordinator: responsible for recruiting and maintaining a staff of volunteers/docents. Duties include scheduling docents for on- and off-grounds activities and keeping docents abreast of new developments to relate to the public.

Docent/volunteer: duties may include diet preparation, small animal care, teaching educational programs, leading group tours, and staffing special events.

Review some of the jobs/professions by asking them to name some and describe what they do. Which jobs would they like to work?

TOUR: EXHIBIT DESIGN

OBJECTIVES

1. List five needs of animals in captivity
2. List five basic considerations of exhibit design based on the needs of the animals, the caretakers, and the visitors
3. Describe three different barrier designs to prevent animals from escaping
4. Design an exhibit that incorporates the needs of the animals, the caretakers, and the visitors

INTRODUCTION

Welcome your group and go over expected behaviors while at the zoo. Begin your program by asking your audience why they would consider putting wild animals in captivity. In other words, why zoos? The answer: Potter Park Zoo exists for conservation, education, recreation, and scientific studies. Zoos work together to save endangered species through work in zoos and around the world. Resident animals serve as ambassadors for their wild relatives to help zoo visitors build connections that will foster stewards for the world's wildlife.

Lots of questions need to be answered before creating an exhibit. Among them are:

- **Which animal or animals do you want to exhibit? Why?**

- **What are the basic needs of the animals in zoos?**

Access to food, water, and shelter...

- What kind of foods do they eat?
- What provisions are made for their comfort?
- Is there access to heating/cooling, depending on the time of year?

Space to exercise and move about

- How much space do they need?
- Do they need privacy from visitors?
- How will they exercise?
 - How fast do they run?
 - How high can they jump?
 - Do they tunnel underground?
 - Do they climb?
 - Do they leap?
 - Do they swim?

- Behavioral enrichment that challenges them, occupies their day, and provides opportunities to be active mentally and physically and exhibit natural behaviors
- Access to companions, if they are group dwelling in nature
- Access to privacy for breeding and birth. May need a place to be separated from mother and babies. Is space available for more animals?

- **What are the needs of the zookeepers?**

- How do the keepers access the exhibits? Can they go in with the animals or do they need extra pens to shift them in order to clean and maintain the exhibit?

- **What are the needs of the medical staff?**

- How do the veterinarian and other health care professionals access the animals?

- **What are the needs of zoo visitors?**

- Can they see the animals easily?
- Is there a place to sit to watch animal activity?
- Is there a cover for shade or rain?
- Visitors need restroom facilities and a place for refreshments.
- Many zoos are providing spaces near exhibits for fund raising functions.

FEATURES OF EXHIBITS

Otters and Arctic foxes: These exhibits were opened in 2006. A lot of research went into the design. Staff visited several zoos to see what other people were doing, and what they would have done differently. The new exhibits are vast improvements over the previous enclosures for the animals, which were in the small moats. One of our otters at the time was more interested in the grass of the new exhibit rather than the pool because he had never experienced it before.

In both of the exhibits the perimeter fence goes down and over a few feet so if they dig in the exhibit, the animals will encounter mesh and will not be able to dig out. There is also hot wire to remind the animals not to get too close to the fence. Otters in particular can be little escape artists. Their heads are flattened, so the shape as well as the size of the mesh had to be considered. One of our previous otters found a way to get out within minutes of being put into the exhibit for the first time.

Otters: The water is not heated or cooled in the otter exhibit. In the winter, bubblers next to the glass in the pool help prevent the pool from freezing over. The sand patch was added for the otters to roll in to clean their fur. The exhibit also lends itself to small private events and has been rented out in the past, an example of an exhibit serving multiple functions.

Arctic foxes: They have a shade tarp over part of their exhibit in the hot weather.

Bald eagles: Built in 2008. Special fencing material was ordered that would give good viewing and be safe for the eagles. Move back. Can you even see the mesh? There is a top on the enclosure when because even non-flighted birds might be able to "ladder" themselves up and out. Also, we want to keep raccoons out. Notice the shelter and heat source. This is necessary since the birds are outside year round. In the warm months the small pond is filled with water and sometimes there are live fish in the pond for enrichment.

Wolf Woods: The perimeter fence is a double fence. The interior fence also is buried about three feet below the surface to prevent the wolves from tunneling out. Holding pens allow

TOUR: EXHIBIT DESIGN

the keepers to shift animals off exhibit, so they can clean. The cabin provides an educational opportunity by showcasing two prey animals and a wolf. Glass viewing takes away the bars but adds wolf pawprints. Plans are in place to expand the exhibit by pushing back the perimeter fence to provide more space.

Raven flight cage: This is one of our newest exhibits. It was made big enough that our male raven could have a female companion. The ravens are fully flighted. Our male can be aggressive so a holding area for shifting was added. Exhibit completion was held up for almost a year because the type of screening was not squirrel proof. The designers had consulted the other zoos that had assured them that their squirrels did not damage the screening. Exhibits like this one—that do not need special climate controls or even running water—can be built relatively quickly and inexpensively by zoo staff—are a good economic choice.

Farmyard: Completely redone from the ground up in 1995. Initially, the gauge of the fence used around the contact area was too small and the goats had it all bent and bulging at the end of the first year just by standing on it. Because of the summer heat, the umbrella was added. The wooden climbing structure—with stair steps and a platform—in the goat exhibit is behavioral enrichment. Windows to the vet clinic allow visitors to observe medical procedures.

New red panda exhibit: Originally designed and built by women architects as a spider monkey exhibit, it has been newly redesigned in 2016 for the red pandas. The red panda used to be housed across from the snow leopard. In the past we have tried unsuccessfully to breed red pandas. It is thought that they might not have bred due to the proximity of the snow leopard, which looks a lot like the clouded leopard, a predator of the red panda. The new exhibit is more spacious, with more climbing opportunities, and two indoor stalls to cool off in the summer, one a protected maternity den with multiple nest boxes for babies. We have been rewarded for our efforts with the birth of two panda cubs in 2016.

Feline & Primate Building and exterior: Renovated 1988–89, the old concrete and barred cages were replaced with more naturalistic outdoor exhibits and larger, indoor exhibits. Concrete is easily disinfected. Giving animals naturalistic exhibits compromises the keepers' abilities to sanitize the area. Diseases are spread and parasites are passed onto other group members. The more naturalistic the setting, the harder it is to keep it clean.

Look at the primate enclosures. What equipment has been provided for their behavioral enrichment?

As you pass the cat side, ask your audience to compare and contrast the top of the fences. The lions have just a high fence with no top features; the tigers have in-rigger fencing (a

“kick” at the top to keep them from climbing out); and the snow leopard cage is completely covered. Which cat is the best climber? Next best? Worst? Did your audience know that tigers are excellent swimmers? The big rock in the outdoor exhibit of the lions can be heated when it is cold outside—not to be hot but warm enough to melt the snow and ice.

Even when animals have been successfully exhibited for many years, new animals can surprise the staff with new behaviors. Many times docents and volunteers are asked to do “behavior watches” when new animals are introduced to the exhibit or the exhibit is changed for our existing animals. The great almost-escapes of young lions:

- Young male lion started to climb the trees at the side of exhibit. He might have been able to climb up and over. The area now has electric fencing around the trees.

- The female lion was on the big rock when a peacock flew up on the edge of the glass front of the exhibit. Despite the moat in front of her, she jumped over to a small ledge and managed to hang on and try to pull herself to reach the bird. The ledge now has a sloping surface. The height of the front wall had been increased and the top has an angle. No more leaping lions allowed.

Rhino exhibit: Originally built for elephants, this exhibit has undergone some major renovations, most recently in 2011. The indoor space was greatly increased, allowing zookeepers to better manage the area and to shift the animals inside in winter. A squeeze cage with a built-in scale also allows keepers and medical staff to get a better look at the animals and conduct target training to give shots, draw blood, etc.

The outdoor area has also been expanded and includes an off-exhibit outdoor area that is flat and safer for the rhinos when it is slippery outside. The umbrellas and log posts in the yard are buried six feet down to prevent the rhinos from knocking them down if they charge them. Rhinos in the wild wallow in shallow pools of water. Our rhino likes to create her own wallows from puddles when it rains.

Small moats: Built during the WPA (Works Project Administration) of the Depression, these exhibits were “state-of-the-art.” These were the first exhibits without bars. The concrete keeps diggers from escaping and can be disinfected; the deep moats can be filled with water to make a barrier or can be left dry and the height used to keep non-climbers and non-leapers in. The problem is size. These can only be used for smaller animals, hence the name of this area. Point out the different barriers used to keep animals in: electric wire; steep and smooth walls; and rocks that hang into the exhibit from above creating the optical illusion of having a “roof” over your head when you approach the wall to jump out.

Note the small doors for the animals entering the outdoor exhibits. Zookeepers need a ladder to get down into the exhibits, and the animals must be non-aggressive.

TOUR: EXHIBIT DESIGN

Bird & Reptile House: Built during the same era as the small moats, this building was designed for “jewel case” exhibits (small glass front exhibits that showcase a bird but do not have much space). Reptiles were added. Problems with managing reptiles in these cages: heat source is five feet overhead, so controlling heat is a problem (this is why the building is kept so warm, even in the summer); air circulation is poor; and all lighting is artificial. The species picked for this building are the hardiest (they can survive variations in their environment). An exception is the emerald tree boa: there is a special box behind the scenes to accommodate this snake’s humidity requirements. End-cages feature multi-species exhibits and give plenty of spaces for exercise and breeding to those exhibited. In the last few years, nocturnal exhibits have been added with special lighting for animals such as the bats and screech owls. Many of the exhibits were made larger by knocking down walls between adjacent exhibits to allow animals to have more space.

Penguin exhibit: The pool is six feet deep, and the water is chilled to 55°F (13°C) in the in summer. Note the fan in the rock used to simulate ocean breezes. Misters overhead in the rocks are used to cool the exhibit. The nest boxes extend into a room behind the exhibit where there is heating and air conditioning. The bubbler keeps the water moving to prevent algae build up on the surface, keep mosquitoes from laying eggs and to prevent ice from forming. A mistake made by architects at the time of construction: They did not listen to the keepers when they were told that these penguins jump six feet out of the water! Rocks close to the edge of the pool had to be extended farther out over the water because the penguins, on opening day, jumped out of the exhibit and proceeded to waddle down to the employee parking lot. Problems: Water exhibits are high maintenance areas; pool has to be stripped of algae every two weeks in the summer and every three-to-four weeks in the winter; pool must be resealed every few years to combat leakage; the chiller and filtering system need constant care; and the door leading into the exhibit was built for a penguin not a person, so keepers must crouch and crawl through a three-foot door to access the exhibit.

Moose exhibit: It was completed in 2016 in a move away from the old hoofstock model of barn-and fence construction to a naturalistic look – mimicking a natural moose habitat with unobstructed viewing. It includes lots of room to roam; a large, deep pond for swimming and cooling off; a waterfall system; and vegetation similar to what would be found in their natural environment. Water aeration keeps open water near the boardwalk during cold weather. The barn provides larger holding stalls and training walls that allow keepers more access to the animals for voluntary husbandry and medical procedures, and a cool spot in the summer, with shade and fans blowing over ice.

It is very important that native white-tailed deer be kept from the moose, because deer can spread disease (brain worm disease and possibly chronic wasting disease in the future). Note the double perimeter fence at the back of the exhibit.

Measures implemented to protect the public include a “kid-catcher” barrier for the boardwalk, placed at an angle so that if a child did fall into it, the child would bounce back into the catcher and not into the pond. Also, vertical fence posts have pointed tops to discourage setting children on and peek-through areas in the fencing provide opportunities for children to view the pond area without being put into potentially dangerous positions.

CONCLUSION

Use your objectives to review your program. By doing so, you will be able to evaluate whether or not the objectives were achieved. Wish them a good day.

TOUR: FUR, FEATHERS, SCALES AND SLIME

OBJECTIVES

Using their exterior coverings as a starting point, compare and contrast characteristics of arthropods (insects, spiders), fish, amphibians, reptiles, birds and mammals. Students should be able to differentiate each of these animal groups by their unique identifying characteristics. Include conversations regarding basic life stages for most of the animals (i.e., egg, larva, pupa, adult for insects, comparison of egg types for fish, amphibians, reptiles and birds). Make sure that your audience has a good understanding of cold-blooded and warm-blooded. Provide some basic understanding of heredity, that animals get the characteristics of their type of animal from their parents.

KEY TERMS

Cold-blooded, warm-blooded, invertebrate, vertebrate, arthropod, exoskeleton, arachnid, internal skeleton, symbiosis, mutualism, heredity, traits, reproduction, environment

GETTING STARTED

Engage them by asking questions that pertain to animal coverings or differences between types of animals; for example, how do we tell them apart? Some of the terms they will be learning may be difficult for them to pronounce or remember. One technique for helping them assimilate and remember is to repeat new words several times as a group and to continue referring back to them—you make a game out of it by challenging them to remember and coming back to “quiz” them several times. For lower elementary, heredity can be kept very simple: animals get certain traits (features that we can see) from their parents—an example may be if a black dog and a brown dog mate and have puppies, the puppies will usually be black, brown or black and brown.

INVERTEBRATES

Invertebrates are animals without a backbone. Invertebrates make up more than 99 percent of all known animal species. Most are soft-bodied (sponges, jellyfish, worms, etc.), but the arthropods have an exoskeleton, an all-over body case made of a hard, plates (made up of a tough substance called chitin) that meet at flexible joints. The exoskeleton protects both from attack and from drying out. The word “arthropod” means “jointed foot.” All arthropods are exothermic (cold-blooded) and have jointed limbs and very obvious segments, or divisions, of body parts. Arthropods include insects, spiders, scorpions, ticks, mites, crustaceans, millipedes, centipedes, shrimp, lobsters, etc.

Students are familiar enough with insects and spiders that you can have a discussion of these animals without seeing an actual specimen.

Insects: Have three pairs of legs (six total), and three main body parts: head, thorax (chest), and abdomen. Most insects

have compound eyes. Life cycle varies quite a bit, but the standard is egg, larva, pupa, and adult.

Spiders: spiders, along with ticks, mites and scorpions, are arachnids. They have four pairs of legs (eight total), and two main body parts: cephalothorax (head and thorax together) and abdomen. All spiders are carnivores and most can spin silk, although many do not make webs. The “hair” on a tarantula is not true hair; only mammals have hair. True hair is made of keratin; the hair-like material on a tarantula are actually bristles made up of chitin (the same material that makes up the exoskeleton).

Madagascar hissing cockroach: most insect have wings, although hissing cockroaches do not. Insects also have antennae (arachnids do not). Point out the mites (arachnids) living on the bodies of the cockroaches.

VERTEBRATES

Vertebrates are animals with a backbone and internal skeleton. Compared to most other animals, vertebrates are intelligent with well-developed nervous systems and larger brains. Unlike a shell or exoskeleton, this internal skeleton can grow to a large size without becoming too heavy or clumsy to move. Fish, sharks, amphibians, reptiles, birds and mammals are all vertebrates

Amphibians: Use the mudpuppies in the Bird & Reptile House. Point out they are unusual in that they are aquatic as adults and retain the gills of the larval stage. Amphibians have moist skin, breathe with gills, lungs or through their skin (depending on the life stage and species) and lay soft, jelly-like eggs. The two most recognizable groups are the frogs/toads and salamanders. Water nearby or very humid microclimate is a living requirement for most species. All are carnivorous.

Terrapins/turtles/tortoises: They are reptiles, which means they’re cold-blooded and are covered with scales (even on their shells). All turtles lay soft-shelled leathery eggs. Discuss the shell as the distinguishing feature of turtles. The shell is an integral part of the turtle’s body—if you have it, this is the perfect time to show the preserved carapace with the attached spine and vertebrae.

Lizards: They are reptiles, which means they’re cold-blooded and are covered with scales. Point out lizard characteristics: have eyelids, have external ear openings, have hinged jaws like birds and mammals, usually have long tails, and have soft, leathery eggs (oviparous vs. ovoviviparous). Explain their use of the tongue as a sense organ (Jacobson’s organ). Point out that presence/absence of limbs is not a distinguishing characteristic between lizards and snakes.

Snakes: They are reptiles, which means they’re cold-blooded and are covered with scales. Point out snake characteristics: lack of eyelids, no external ear openings, no functional

TOUR: FUR, FEATHERS, SCALES AND SLIME

limbs, short tails, have very flexible jaws that open as wide in the back as they do the front, and have soft, leathery eggs (oviparous vs. ovoviviparous). Explain their use of the tongue as a sense organ (Jacobson's organ).

Birds: They are warm-blooded, have an internal skeleton, lay hard-shelled eggs, and are the only animals that have feathers. Talk about the various types and functions of feathers. Include coloration and use of colors. The peafowl/pheasants are great example for this discussion. Most see color very well. Most have a body designed for flight—discuss hollow bones, lack of teeth, etc. Contrast them with the flightless birds (penguins). Birds spend a lot of time on feather maintenance (oil gland, molting, preening).

Mammals: They are warm-blooded, have an internal skeleton, give live birth (except monotremes), are the only animals with true hair and all have mammary glands that provide milk for their offspring. Differentiate between the traditional hair versus modified hair, like porcupine quills or tenrec spines. Discuss the hollow winter hair of cervids (deer family), the extremely dense under fur of the river otters—which prevents water from getting to their skin and traps some air between the fibers to add some insulation.

Keep in mind the various types of camouflage as you survey the various animal types.

For upper elementary you can include a discussion on how the features of the various animal types help determine in which environments those animals are found. You can also (if you have them with you) show and contrast mammal bones and bird bones—fused bones of bird's central body essential for attachment of flight muscles, bird bones (in flighted birds) are hollow, etc. If time allows, you may even decide to have a little more detailed discussion on heredity and inherited characteristics—animals that inherit characteristics that allow them to survive better, pass those traits to their offspring. This process is called natural selection.

Middle/high school: This program is seldom requested by middle or high school teachers. If we do get a request for this program with older students, see the education curator for some specific suggestions on how to present.

TOUR: HABITATS

OBJECTIVES

Audience will have an understanding of the concept of habitat and the basic requirements for all living things to maintain their existence. Compare and contrast the differences in habitats. They will learn how animals are adapted for life in their particular habitats. They should be able to describe the relationship between various plants and animals within a habitat—food chains, food webs. Explanations and examples will be given.

TERMS

Adaptations: These are physical features (parts of their bodies they use as “tools”) or specific behaviors (things that they “do” with their bodies) to enable them to survive in their habitat. Animal species “adapt” over many generations through natural selection to better survive in their habitats.

Biome: An extensive community of plants and animals characterized by climatic and soil conditions, the largest ecological niche. In other words, biomes are large regions of generally similar climates and soils with corresponding associated vegetation types and major animal species. The chart above is very useful for understanding the major biomes. *Note: Unless asked to cover it by the teachers, biomes are not typically discussed with elementary students.*

Biodiversity: A contraction of the phrase “biological diversity,” is a complex topic, covering many aspects of biological variation. In popular usage, the word biodiversity is often used to describe all the species living in a particular area.

Climate: The prevailing weather conditions of a region, as temperature, air pressure, humidity, precipitation, sunshine, cloudiness, and winds, Climate determines which plant and animal species can live in a region.

Community: All of the plant and animal species living in a designated area (e.g., a pond community, an oak/hickory forest community, etc.)

Ecosystem: Both the physical (nonliving or “abiotic”) environment and the living (biotic) community of plants and animals.

Food chain: A feeding hierarchy in which organisms in an ecosystem are grouped into trophic (nutritional) levels and are shown in a succession to represent the flow of food energy and the feeding relationships between them.

Food web: The complex intertwining of the interrelated food chains in an ecosystem.

Habitat destruction: Drastic changes in a species’ habitat that make it difficult or impossible for a species to survive.

Habitat changes: Alterations in a species’ habitat that may or may not significantly affect that species’ ability to thrive. These changes may be direct or indirect, may be human induced or may occur naturally.

Natural selection: A process in nature resulting in the

survival and perpetuation of only those forms of plant and animal life having certain favorable characteristics that best enable them to adapt to a specific environment.

Niche: The particular role of a species within the community, defined in terms of all aspects of its lifestyle (food, competitors, predator, and other resource requirements).

BEFORE YOU START

Take a moment to discuss with the other docents where each of you will start. Remember that visiting a diverse selection of animals will allow you to compare and contrast their different habitat requirements.

GETTING STARTED

It is important that right at the beginning of your tour you establish a good understanding of the definition of habitats—the immediate environment in which an animal or plant lives. Even lower elementary students have been exposed to the idea of habitats as the animals’ “home.” Most habitats include four basic components: food, water, shelter and space. You should point out that there many additional living requirements that animals need and these vary from species to species. In other words, **habitat is everything a species needs in its surroundings in order to survive.** Thus each species’ habitat is unique to that organism. For example, you may see both wild turkey and white-tailed deer in a Michigan woods at the same time, maybe even both eating acorns. However, if you look at all of the living requirements for each species they would not be the same—thus deer habitat is different than turkey habitat. For older students differentiate between populations, communities and ecosystems. Also, for the upper elementary, you can introduce the concept of “niche”—the role of a species in an ecosystem (the species’ “job”).

Helpful hint: For younger audiences, having them repeat new terms like “food chain” as a group 2–3 times helps them retain the term more readily.

Note: During this discussion—make sure it is a discussion—ask your audience questions and have them give examples and when they do, be sure to compliment them on their efforts.

EXHIBITS TO HIGHLIGHT

Remember, these are only a few suggestions. You could discuss the habitat for any animal. Be sure to consult the animal data sheets for more detailed information on their habitat requirements.

Arctic fox: They are found on the tundra and the climate has low temperatures, cold, dry winds, and not much rain or snow. There is no vegetation taller than shrubs or small scrawny trees. The ground is covered with snow much of the year, hence the fox’s thick, white winter coat is an important adaptation. This harsh environment limits the availability of other species in its habitat, so when food is really scarce in the winter, they have been known to scavenge polar bear kills and

TOUR: HABITATS

even eat the feces of polar bears.

North American river otter: Otters are dependent upon bodies of fresh water: streams, lakes and estuaries. Please differentiate between river otters and sea otters. Riparian zones (the plant and animal communities and associated physical features found along bodies of moving water) are unique ecosystems. For a body of water to be suitable for otters it must also have healthy populations of fish, crustaceans, shellfish, etc.

Bald eagles: They have some of the same habitat requirements as otters. Habitat destruction, due to pollution (DDT) and human disturbances around nest sights, led to them becoming an endangered species in much of our country 40 years ago (threatened status in Michigan). Due to good conservation practices, their numbers have come back to the point that they have been off the federal endangered species list for many years.

Gray wolves: This species was once found throughout most of North America, South America, Europe and Asia. One reason for that is its ability to live in many different vegetation types. They can also successfully prey upon a variety of larger prey species. Their populations were decimated from pre-European settlers habitat destruction was secondary to unrestricted killing by humans until they became protected in the 1970s.

Forest guinea hogs: This heirloom breed of hog was bred by early North American pioneers to be winter hardy and able to forage for food on its own. It did just fine in the mixed hardwood forests found in the eastern half of our country. They are actually an example of a domesticated species that was allowed “free range” to forage on its own. They and other hog breeds have escaped over the years and feral hogs cause great habitat damage in places like Smokey Mountain National Park.

Red panda: This species is good example of a species that is a specialist—it has very narrow habitat requirements—in this case in its food choice. Although red pandas are omnivores, two thirds of its diet in the wild consists of bamboo. Animals that have narrow habitat requirements are much more vulnerable to habitat changes.

African lions: This species is found in the grasslands of Africa (savanna) because its prey species are large herbivores that depend on the savanna for food. Grassland ecosystems have many different names: savanna, prairie, pampas, and steppes. The lion is a good species to talk about food chains and webs.

Bird & Reptile House: The two multi-species exhibits are both good examples of tropical rain forests and illustrate more realistic animal interactions. Each species occupies a unique niche. Chuckwallas are found in deserts and depend on specific micro-habitats. They, like all reptiles, need to have places within their habitat where they can thermoregulate.

Magellanic penguins: This species is useful for correcting misconceptions about where penguins live. There are only two species of penguins that live out their life entirely on the ice of Antarctica (Emperor and Adele). Magellanic penguins are considered “warm water” penguins, even though where they live the water is still very cold. There are actually some species of penguins that are subtropical: Galapagos and African. Suitable nesting habitats (remote shorelines of the southern South American coast) are often limited which leads to fierce competition for nest sites.

Moose: Moose generally live in forested areas where there is snow cover in the winter, and prefer moist conditions where there are lakes, ponds, and swamps. Moose are limited to cool regions because of their large bodies, inability to sweat, and the heat produced by fermentation in their gut. They cannot tolerate temperatures that exceed 80°F (27°C) for long. In summer, moose seek shade and cool themselves in ponds and streams.

Back yard habitats: Point out that this area does not include animal exhibits, but that visitors have a good chance to see native Michigan wildlife. Back yards create habitats for hundreds of species of plants and animals—especially if people take the time to learn what the habitat needs are of the species they wish to attract. A back yard may not include all of the habitat requirements for a species, but if it contains only one or two, that animal may be seen. Planting the right species of plants in the right locations, placing nest boxes or brush piles—these kinds of actions can make an amazing difference in the suitability of your yard for wildlife. Notice how our back yard demonstration area mixes cultivated areas with adjacent areas that are left to grow naturally and are coordinated with nooks with benches for resting and the observation deck for viewing wildlife. Careful planning can help prevent the appearance of unwanted species, too. Well designed back yards can also create wonderful habitat for the young of another unique species—humans!!

TOUR: HABITATS

For middle and high school students, you can discuss the concepts of biomes				
BIOME	TEMPERATURE	RAINFALL	TYPICAL PLANTS	TYPICAL ANIMALS
Tundra	-70-61°F (-57-16°C)	4-20 in (10-50 cm)	Lichens, mosses, dwarf willows	Ptarmigan, snowy owl, lemming, caribou, musk ox, arctic fox
Coniferous forest	-65-70°F (-54-21°C)	14-78 in (35-200 cm)	Black spruce, white spruce, balsam fir, white birch, aspen	Spruce budworm, tussock moth, moose, snowshoe hare, lynx
Deciduous forest	-22-100°F (-30-38°C)	24-89 in (60-225 cm)	Oak, hickory, beech, maple, black walnut, yellow poplar	White-tailed deer, gray squirrel, skunk, opossum, black bear
Temperate grassland	23-86°F (-5-30°C)	12-78 in (30-200 cm)	Little and big bluestem, gramma grass, buffalo grass	Meadowlark, burrowing owl, prong horned antelope, badger, jackrabbit, coyote
Desert	36-135°F (2-57°C)	0-10 in (0-25 cm)	Prickly pear cactus, saguaro cactus, creosote bush, mesquite, sagebrush	Diamond-backed rattle snake, Gila monster, roadrunner, kangaroo rat, wild pig
Savanna	55-104°F (13-40°C)	10-36 in (25-90 cm)	Baobab tree, acacia tree, grasses	Zebra, giraffe, wildebeest, elephant, antelope
Tropical rain forest	64-95°F (18-35°C)	50-475 in (125-1,250 cm)	Contain about 50% of the world's terrestrial plant and animal species, yet rain forests encompass only about 6% of the world's land area	

TOUR: LAST ARK

OBJECTIVES

Your discussions should include:

- Define the following terms: threatened, endangered, extinct, extirpated, SSP, conservation;
- List causes for reduction of animal populations;
- List the four items necessary to the survival of living things (components of habitat);
- Name at least five animals at Potter Park Zoo that are endangered species.
- Explore ways in which zoos and aquariums are cooperating locally, nationally, and internationally to protect vanishing species from extinction;
- Identify things individuals can do to help the environment and endangered species.

KEY TERMS

Endangered, extinct, threatened, extirpated, habitat, conservation, habitat loss, human encroachment, poaching, SSP, scientific captive breeding, reintroduction, specialist, generalist.

GETTING STARTED

As you prepare for your tour, please keep in mind the following:

- Do not just talk about causes for the reduction of animal populations but also talk about positive actions that are being taken by zoos and others to help the situation. It is important that children not be overwhelmed with the weight of this topic and that they understand that adults are working to improve the situation.

- Ask students to define threatened, endangered and extinct; introduce the term extirpated.
- Have them name some endangered species. See if they can name some of the causes of animals becoming endangered (habitat loss, human encroachment, poaching). Have your students define habitat and its four main components. What happens to them if they cannot find food, water, shelter, and space?
- At some later point in your tour discuss: Why is it important to save species? How do zoos help endangered animals? (education, research, conservation)

Following is a detailed chart of the exhibit animals along with some suggestions which point out a few of the many ways in which you can use the animals to highlight and illustrate the concepts and terms listed above. Remember, these are only suggestions. Remember to keep your discussion to the appropriate grade level of your audience. Be sure to consult the animal data sheets for more additional information.

For upper elementary, include a discussion of how generalists usually tolerate changes better than animals that are specialists.

Middle/high school: With all the information available in the charts below, you can just go into more depth and details with the information provided.

POTENTIAL FOCUS CONCEPTS	PPZ SPECIES	SSP* at PPZ	STATUS OF SPECIES; CAUSES FOR THE REDUCTION OF POPULATIONS	WAYS THAT INSTITUTIONS ARE COOPERATING TO PROTECT VANISHING SPECIES
Breeding research, education	Bongo	x	Endangered; overhunting, habitat loss, habitat destruction; superstitions once protected this animal from hunting.	U.S. zoos have bred animals for reintroduction. PPZ: Successful at natural breeding; unsuccessful attempt at artificial insemination.
Increased knowledge from zoo veterinary work; AAZK Bowling for Rhinos fundraiser	Black rhino	x	Endangered, CITES I; poaching for horn to make dagger handles in Middle East and for use in traditional Asian medicine	San Diego Zoo researchers are looking at how to better manage black rhino populations and increase survivorship and breeding at new translocation sites in the wild. PPZ: Medical knowledge gained through treatment of previous/current rhinos; Bowling for Rhinos fundraiser supports wild conservation efforts.
Zoos working to establish protected areas	Pallas cat	x	Near threatened, CITES II; protected in most areas; eats agricultural pests so is seen as beneficial, poisoning of pest rodents and pikas may affect the cat.	The Wildlife Conservation Society, which operates the Bronx Zoo, is working with governments and scientists in central Asia to establish international peace park to protect animals in the region.

* SSP species are all examples of the Last Ark, that is, reproduction efforts as a hedge against extinction in the wild, even if PPZ is not breeding the species.

TOUR: LAST ARK

POTENTIAL FOCUS CONCEPTS	PPZ SPECIES	SSP* at PPZ	STATUS OF SPECIES; CAUSES FOR THE REDUCTION OF POPULATIONS	WAYS THAT INSTITUTIONS ARE COOPERATING TO PROTECT VANISHING SPECIES
Projects between U.S. and native country	Cotton-top tamarin	x	Endangered, CITES I; habitat destruction, exotic pet trade.	Project between Disney's Animal Kingdom and a Colombian zoo that combines field research, education initiatives, and community programs.
Legislation and enforcement; owning a bird	Parrot/macaw		Most species endangered, all protected in some way, CITES I or II; deforestation, illegal pet trade	Legislation halting the import of endangered birds in the United States has been implemented. Problems with the enforcement of export restrictions in South American countries. Do homework before buying!
Veterinary involvement in field research	Eastern Massasauga rattlesnake		Species of special concern in Michigan and a candidate for federal species list; more common in Michigan than in other parts of its range but in isolated populations; wetland habitat loss, human persecution.	PPZ: Dr. Tara is participating in a research study to learn more about Massasauga rattlesnakes in Michigan. She puts transmitter chips into snakes found in the wild, and they are then returned to where they were found. These chips allow researchers to learn more about the snakes' population, movement, deaths, etc.
Research and education	Spiny Asian turtle		Endangered, CITES II; Asian food market, pet trade, habitat destruction; difficult to breed in captivity.	Zoo Atlanta and Knoxville Zoo have been among very few successful at breeding, information on biology and ecology from these efforts could help conservation in wild. PPZ: Redesigned exhibit to encourage breeding
Amphibian crisis	Puerto Rican crested toad	x	Endangered; human encroachment, predation and competition from introduced animals; amphibians in great trouble worldwide with a fungus a large threat.	Zoos: Breeding and reintroduction PPZ: As of 2016, has sent over 18,000 tadpoles
Breeding research	Red panda	x	Endangered, CITES I; fragmentation and loss of habitat, exotic fur trade.	Zoos breeding; National Zoo an early leader in the SSP program with Knoxville Zoo a current center for red panda reproduction. PPZ: Two cubs born in 2016.
SSP, importance of known lineages	African lion	x	Vulnerable, CITES II; habitat destruction and human conflicts.	African lions are part of an SSP program even though they are not yet endangered. Most captive lions of unknown genetic origin and thus are not included in SSP. PPZ: Currently holding (successful breeding by other zoos, so there is no current need)
How SSP works, increased knowledge of species	Amur tiger	x	Endangered, CITES I; habitat destruction, human encroachment, poaching (traditional Chinese medicine).	PPZ: Birth of three cubs in 2005 and 2011; aspects of SSP matching; movement of animals; loss of cubs; illness/hand-raising. Target training of our tigers allowed their participation in several important research projects.
Conservation organizations, fundraising, partnerships, education of locals	Snow leopard	x	Endangered, CITES I; fur trade, human encroachment (natural prey decreasing due to competition from domestic livestock, human/animal conflicts).	PPZ: Birth in 2007. Pioneering training protocols with our female enables veterinarians to perform ultrasounds, blood work and other medical tests without anesthesia that provide valuable info shared with other institutions; has provided valuable information on her pregnancies and saved her life. Snow Leopard Trust: Includes zoos as fundraising partners for its work building partnerships; uses science and research to sustain a community-based conservation program.

* SSP species are all examples of the Last Ark, that is, reproduction efforts as a hedge against extinction in the wild, even if PPZ is not breeding the species.

TOUR: LAST ARK

POTENTIAL FOCUS CONCEPTS	PPZ SPECIES	SSP* at PPZ	STATUS OF SPECIES; CAUSES FOR THE REDUCTION OF POPULATIONS	WAYS THAT INSTITUTIONS ARE COOPERATING TO PROTECT VANISHING SPECIES
Increased knowledge in the wild	Mandrill	x	Endangered, CITES I; habitat destruction and poaching.	The Wildlife Conservation Society, which operates the Bronx Zoo, is radio-collaring mandrills to gather data that can be used to help ensure protection in areas that they frequent. PPZ: Births in 2007 and 2010; offspring are at other zoos paired with females.
Reserve animals involved in SSP	Red-ruffed lemur	x	Endangered, CITES I; habitat destruction, hunting, pet trade.	Protected area established in Madagascar. Individuals housed at a reserve in Madagascar participate in SSP to increase captive population's genetic diversity and to increase knowledge about species.
University research, partnerships	Ring-tailed lemur	x	Endangered, CITES I; habitat destruction, space on an island is a very limited resource.	Duke Univ. Lemur Center partners with a local zoo in Madagascar to teach locals about reforestation, agricultural techniques, and ecotourism. It is also involved in research, captive breeding, and reintroductions of various lemur species.
Reintroduction, zoo, ecotourism	Golden lion tamarin	x	Endangered, CITES I; habitat destruction, exotic pet trade.	In the 1980s, led by the National Zoo, zoos began breeding and reintroducing tamarins in protected areas in Brazil. Public education in reintroduced areas has been important. PPZ: Holding a pair of siblings
SSP	Spider monkey		Endangered, CITES II; habitat destruction, poaching.	PPZ: Animals are of unknown genetics, so they are not part of the SSP program.
Extirpation comeback, legal protection	Gray wolf		CITES II; human encroachment and overhunting.	Public education and protection of wolves (Endangered Species Act), they returned to Michigan via Wisconsin and Minnesota. By 2015, there were over 600 individuals in the Upper Peninsula (not including Isle Royale). Some wolves have been reintroduced into remote areas of the western U.S., although legal battles remain regarding their population status, hunting and reintroduction.
Extirpation comeback, legal protection, banning of pollutant	Bald eagle		Became endangered (or threatened in six states) in the lower 48 states due to DDT (pesticide which caused thinning of eggshells and deformities in embryos. They are no longer endangered or threatened in most of the U.S.	The use of DDT was banned from use in the U.S. in 1972. Since the banning, eagle populations have recovered significantly. In 1995 they were down-listed in the lower 48 states. In 2007 they were delisted from threatened status in the lower 48 states. There is a wild pair that has successfully nested along the Grand River near the zoo.
Extirpation comeback, improvement in water quality and trapping management	River otter		Status in U.S. varies regionally from endangered to threatened to common, CITES II; habitat destruction, pollution, and human encroachment and recreational activities; extirpated throughout much of its range due to overhunting and habitat destruction in the 1800s; Michigan populations large enough to sustain harvests.	Field biologists from a number of zoos are working with others to monitor populations and potential threats. PPZ: Male born in 2013; currently paired with a female for breeding.

* SSP species are all examples of the Last Ark, that is, reproduction efforts as a hedge against extinction in the wild, even if PPZ is not breeding the species.

TOUR: MEET YOUR NEIGHBOR

OBJECTIVES

To familiarize students with animals that are native to Michigan and be able to explain the different adaptations for life in a four-season environment.

TERMS

Endangered, extirpated, habitat, migration, hibernation, adaptation, temperate deciduous forest

CONCEPTS

More than 3,500 species of plants and animals inhabit the Great Lakes basin, including 170-plus species of fish. The Great Lake, four of which border Michigan, make up the largest body of fresh water on Earth, accounting for one-fifth of the freshwater surface on the planet. Michigan has the second longest shoreline of any state and no point in Michigan is more than six miles (10 km) from an inland lake or more than 85 miles (137 km) from one of the Great Lakes. The temperate deciduous forest biome that covers Michigan is always changing. It has four distinct seasons: winter, spring, summer and fall. Michigan's native animals have to be able to survive the heat of summer, when temperatures can reach into the 90s and even the 100s, and the cold of winter, when temperatures drop below zero and the wind chill can make it feel much colder. And of course, the Upper Peninsula has longer, harsher winters than the Lower Peninsula, and many animals that are adapted to one part of the state might not survive in another part.

ANIMALS TO HIGHLIGHT

Bald eagles: Previously a threatened species, eagles are making a strong comeback in Michigan. Eliminating the use of dangerous pesticides such as DDT and protecting nest sites from human disturbances has made the difference. We have had a nesting pair in the area. During Michigan winters, bald eagles are seen throughout the state (almost all counties), while they nest mainly in the Upper Peninsula (especially the western portion) and the northern portion of the Lower Peninsula. These eagles don't really migrate; they just move south enough to stay ahead of the ice and congregate near open water. Immature birds may move further south.

North American River otters: Northern river otters are listed in Appendix II of CITES. Populations were once extirpated through many parts of their range, due to overhunting in the 1800s, and habitat loss or alteration due to the damming of river systems, especially around heavily populated areas in the midwestern and eastern United States. Population trends have stabilized in recent years and reintroduction and conservation efforts have resulted in recolonization of areas where they were previously extirpated.

Gray wolf: Once endangered in all lower 48 states, wolves are doing well in Minnesota, are recovering in northern Wisconsin and Michigan's Upper Peninsula, and have been successfully re-introduced into some western national parks. Wolves are very secretive in nature, and as humans started encroaching on their environment, wolves were pushed further and further into the wilderness. Re-introduction into various areas in North America has proven fairly successful, and consideration has been given to reclassifying their status on the Endangered Species List.

Raven: Their Michigan range is the Upper Peninsula and northern Lower Peninsula, and they are common in the jack pine forest and live in Michigan year-round.

Barred owl: Live in large, mature forests made up of both deciduous trees and evergreens, often near water. At night they hunt small animals, especially rodents, and give an instantly recognizable "Who cooks for you?" call. Live in Michigan year-round.

Farmyard: Michigan has over 52,000 farms that utilize 10 million acres (4 million hectares) of farmland. Michigan farmers raise most of the species found in our farmyard (can you guess which ones aren't raised in Michigan?) and many are adapted for Michigan's four seasons. Raised for food: Goats, chickens, rabbits, pigs. Raised for wool/fur: llamas, rabbits, goats (cashmere). Burros: often kept with other animals, such as sheep, to help keep the herd calm and look out for predators.

Moose: Due to logging, hunting and brainworm, moose disappeared from the Lower Peninsula in the 1890s, and after numerous reintroduction attempts throughout the 1900s, Michigan's current moose population is estimated at about 400 animals in the UP. The U.S. Fish & Wildlife service is considering whether to add the northwestern moose subspecies found in Michigan to the federal endangered list.

African crested porcupine: Like their New World equivalents, the North American porcupine found in Michigan, Old World porcupines are large, heavy-set, slow-moving animals that rely on their imposing quills for defense rather than on speed or agility. Unlike our arboreal porcupines, African crested porcupines are cursorial and are excellent diggers. Unlike North American porcupine quills, the quills of Old World porcupines lack barbules.

TOUR: MEET YOUR NEIGHBOR

BIRD & REPTILE HOUSE

Eastern screech owl: There are two color morphs (gray and rufous); gray is more common in Michigan. Both color morphs make them very difficult to distinguish from surrounding tree bark.

Other Michigan species in the BRH:

American kestrel

Blue jay

Green heron

American toad

Common gray tree frog

Mudpuppy

Northern leopard frog

Blanding's turtle: Protected by Michigan law as a special concern species

Common musk turtle

Map turtle

Massasauga rattlesnake: Protected by Michigan law as a special concern species and is a candidate for federal listing.

Painted turtle

Black rat snake: Protected by Michigan law as a special concern species

EDUCATION ANIMALS

Eagle owl: Very similar habitat and behavior as the great horned owl (also same genus, *Bubo*), which is found throughout Michigan, except the eagle owl is larger.

European ferret: Michigan has six mustelid species (least weasel, long tailed weasel, pine marten, ermine, fisher, and the American badger). The smaller species are similar in behavior and life history to the European ferret.

Sinaloan milk snake: Milk snakes (*Lampropeltis triangulum*) have many subspecies. The Sinaloan milk snake is a subspecies (*T. triangulum sinaloae*) that mimics native coral snakes. The Eastern milk snake (*Lampropeltis triangulum triangulum*), native to Michigan, is camouflaged to blend in with our deciduous forest.

Brown rat: Not native to Michigan. Can discuss invasive species.

Domestic rabbit: The most common rabbit in much of the U.S., and Michigan, is the Eastern cottontail. Snowshoe hares and European hares (introduced) are also found in Michigan. Hares and jackrabbits are in the genus *Lepus*; all remaining species are referred to as rabbits. While hares are well-adapted for running long distances, rabbits run in short bursts and have modified limbs adapted for digging. Hares are often larger than rabbits and have black tipped ears. Newborn hares are precocial; newborn rabbits are altricial.

TOUR: NOCTURNAL BEHAVIORS

OBJECTIVES

Identify nocturnal animals, their specific nocturnal behaviors and adaptations that enable animals to be nocturnal.

TERMS

Nocturnal, crepuscular, diurnal

CONCEPTS

Nocturnality is an animal behavior characterized by activity during the night and sleeping during the day. Many nocturnal animals have specially adapted eyesight that can adapt to both low (night) and bright (day) levels of light. What are the benefits of being nocturnal? One benefit is resource competition. Being active at night is a form of niche differentiation, or niche switching, where an environment is partitioned by time instead of resources or season. For example, hawks and owls can hunt the same meadow for the same rodents without conflict because hawks are diurnal and owls are nocturnal. This means they are not in competition for each other's prey.

Another benefit to nocturnality is to avoid or enhance predation. One of the reasons that lions prefer to hunt at night is that many of their prey species have poor night vision. Many species of small rodents are active at night because most of the dozen or so birds of prey that hunt them are diurnal. There are also many diurnal species that exhibit some nocturnal behaviors. For example, many seabirds and sea turtles only gather at breeding sites or colonies at night to reduce the risk of daytime predation to themselves and/or their offspring.

Another reason for nocturnality is avoiding the heat of the day (conversely, being diurnal can be a way of avoiding the extreme cold of night for many Arctic animals.) This is especially true in deserts, where nocturnal behavior prevents creatures from losing precious water during the extreme heat of the day. Another reason lions prefer to hunt at night is to conserve water. Many plant species native to hot climates have adapted so that their flowers only open at night when the sun's intense heat cannot wither and destroy their moist, delicate blossoms. These flowers are pollinated by bats, another creature of the night.

KEY ADAPTATIONS:

Tapetum lucidum: a layer of reflective tissue in the eye of many vertebrates. It reflects visible light back through the retina, increasing the light available to the eye. "Eyeshine" is a visible effect of the tapetum lucidum. When light shines into the eye of an animal having a tapetum lucidum, the pupil appears to glow. Eyeshine occurs in a wide variety of colors including white, blue, green, yellow, pink and red. This effect shouldn't be confused with "red-eye," which occurs when a flash of light occurs too fast for the pupil to close, the light

then reflects off the back of the eyeball and appears red due to the large number of blood vessels.

Whiskers: Play an important role in tactile sensory reception.

Silent flight: Nocturnal birds have a comb-like leading edge on the primary wing feathers that allow them to fly silently. This enables them to hear their prey as they fly, and prevents their prey from hearing them as they attack.

Echolocation: Echolocating animals, such as insect-eating bats, emit calls out to the environment and listen to the echoes of those calls that return from various objects near them. They use these echoes to locate and identify the objects. Echolocation is used for navigation and for foraging (or hunting) in various environments.

ANIMALS TO HIGHLIGHT

Gray wolf: During the winter months, wolves can be found moving around during the day. The rest of the year they are usually nocturnal. Since their eyesight is not specially adapted for low light conditions, wolves use their sense of smell and hearing to locate prey when they hunt at night.

Barred owl: The barred owl is the only typical owl of the eastern United States which has brown eyes; all others have yellow eyes. Without exception, barred owls hunt prey that can be swallowed whole. Eyes have a large cornea and pupil for collecting and processing light (unlike many nocturnal animals however, owls lack a tapetum lucidum). They have a distinctive pattern of hair-like feathers on their face, called a facial disk, that channels sound into the ear openings. Most nocturnal owls have asymmetrical ear openings with one opening higher than the other. Asymmetry does not occur in owl species that hunt during the day (e.g., snowy owls).

Pallas cat: Crepuscular

Red panda: Crepuscular, they spend most of the day resting and sleeping in trees.

Snow leopard: Primarily crepuscular, although they have all the adaptations that other cats have for nocturnality, including a tapetum lucidum

Amur tiger: Tigers are most active at night, when their wild ungulate prey are most active, although they can be active at any time of the day. Tigers prefer to hunt in dense vegetation and along routes where they can move quietly. In snow, tigers select routes on frozen river beds, in paths made by ungulates, or anywhere else that has a reduced snow depth. Cats can see about six times better than humans at night. Long sensitive whiskers enable them to find their way through tall grass and

TOUR: NOCTURNAL BEHAVIORS

brushy habitat. Soft padded feet with retractable claws allow them to move about quietly.

African lion: Lions spend up to 20 hours per day resting. Although lions can be active at any time, their activity generally peaks after dusk with intermittent bursts of activity through the night hours until dawn, when hunting most often takes place.

Black rhino: They are less active during the middle of the day, using mornings and evenings to eat, drink, and move around.

Bat-eared fox: 85 percent of activity occurs at night in the Serengeti, while in South Africa bat-eared foxes are mainly diurnal in winter and nocturnal in summer (to avoid the heat).

African crested porcupine: Strictly nocturnal and will even avoid moonlight in open areas.

Seba's short-tailed fruit bat (BRH): These bats fly out at sunset, forage for fruit, eat for about 15 minutes, then nap. They will repeat this cycle throughout the night. They use their memory of an area to get to the general location of food and then use their sense of smell, sight, and echolocation to hone in on the fruit. Over 500 plant species rely on nocturnal bats to pollinate their flowers, including species of mango, banana, cocoa, durian, guava and agave (used to make tequila). The pollination of plants by bats is called chiropterophily.

Screech owl (BRH): Eyes have a large cornea and pupil for collecting and processing light (unlike many nocturnal animals however, owls lack a tapetum lucidum). They have a distinctive pattern of hair-like feathers on their face, called a facial disk, that channels sound into the ear openings. Most nocturnal owls have asymmetrical ear openings with one opening higher than the other. Asymmetry does not occur in owl species that hunt during the day (e.g., snowy owls).

American toads (BRH): Primarily nocturnal and most active during warm humid times of the year. When night falls, American toads come out of their hiding spots and hunt for food. During spring, American toads have one of the most notable mating calls of all Michigan toads: a long high-pitched trill that lasts 4–20 seconds, which can be heard late into the night.

Common gray tree frog (BRH): Nocturnal

Mudpuppy (BRH): Nocturnal; spend the day hiding in deep water under rocks or fallen logs.

Northern leopard frog (BRH): Mostly nocturnal and are well-adapted to cold.

Puerto Rican crested toad (BRH): Nocturnal

Brazilian rainbow boa (BRH): Have heat-sensing pits on their face that allow them to detect the body heat of their warm-blooded prey at night.

Emerald tree boa (BRH): Have heat-sensing pits on their face that allow them to detect the body heat of their warm-blooded prey at night.

Western tufted deer: Active at night, but frequently seen at dawn and dusk.

Reeves' muntjac: Crepuscular, feeding mainly at dawn and in the evening.

EDUCATION ANIMALS

Eagle owl: In addition to the other adaptations that nocturnal owls have, the eagle owl can hear the sound of a rodent squeal over 75 feet away.

Chinchilla: Nocturnal

Domestic rabbit: Crepuscular.

European ferret: Nocturnal

Lesser hedgehog tenrec: Nocturnal, usually found sleeping during the heat of the day in small groups under boulders, tree roots, and in tree holes close to the ground.

Madagascar hissing cockroach: Nocturnal, usually spending their time hiding in crevices.

North American porcupine: Nocturnal

Sinaloan milk snake: often nocturnal and stay in their desert burrows during the heat of the day.

Virginia opossum: Nocturnal

Brown rat: Mostly nocturnal or active at dusk

TOUR: SENSATIONAL ZOO

OBJECTIVES

List the five senses and identify the proper organ for each; identify prey and predator animals based on placement of eyes and ears and be able to explain how this positioning enables them to survive; list those senses most birds use to locate food, and tell what sense vultures use that other birds do not use; describe why a snake or lizard sticks out its tongue; describe how an owl is able to hunt at night using its eyes and ears.

TERMS

Prey, predator, senses, Jacobson's organ, carnivore, herbivore, omnivore

ANIMALS TO HIGHLIGHT

Bald eagle: Keen binocular vision allows them to spot a rabbit up to one mile away. Note sharp beak and talons used for hunting.

Arctic fox: Uses strong odors to mark its territory.

Gray wolf: Eye and ear placement of predator. Exceptional hearing and sight. Wolves have an incredible sense of smell. Smell is used to locate prey and for communication between wolves. Wolves recognize each other (pack members) by smell and mark territories (by urinating and defecating) to warn off neighboring wolves.

FELINE & PRIMATE BUILDING

Cats: All cats are predators; they are true carnivores. How does their camouflage work?

Primates: Mostly plant-eaters, but are classified as omnivores. Why are their eyes in front? Do the primates need to see distances? Where? They are designed for life in the trees or on the forest floor and need to see distances when moving through their habitat. Spider monkeys: prehensile tail not only used for grasping, but also for feeling.

Rhinoceros: Which senses do you think are more developed? Less developed? (*hint: small eyes and big ears*)

BIRD & REPTILE HOUSE

Snakes, lizards: Can you see any of them blink their eyes? Can you spot any ears? Which ones have them and which ones don't? Watch to see if any stick out their tongue; explain how the Jacobson's organ works. Heat-sensing pits in the Massasauga rattlesnake and boas.

Birds: Examine the different beaks and feet of the birds on display. If birds eat fruits, do they need to see in color? Watch how the parrots and macaws use their feet to help hold large food items and to climb.

Bat-eared fox: Do you think they're good listeners?

Binturong: Long whiskers used to feel in the dark. They communicate by making a variety of sounds and by using their many scent glands (popcorn odor).

Meerkats: An individual in the colony (a sentinal) is always on alert looking and listening for predators.

King vulture: Uses its sense of smell in order to locate food; one of the few birds that has a sense of smell. Vultures are scavengers and prey on dead animals. Most other birds cannot smell very well and depend on eyesight and hearing to locate food. Our king vultures watch other species of vultures to locate carcasses.

Black rhino: Look how small their eyes are. Does this mean good or bad vision? What other senses might they use to help them survive? Size doesn't count when determining whether an animal is predator or prey. It definitely has eyes on the side, so it is a prey animal. Who is its predator? Since the rhinos eat plants they are herbivores.

Magellanic penguins: Excellent eyesight for finding fish in water.

Patagonian mara: Observe eye and ear placement; typical of prey animals.

Bongo: Stripes are camouflage. Big ears that swivel around provide excellent hearing. How does a nose being wet enhance the sense of smell?

Barred owl: Huge eyes enable these nocturnal creatures to see exceptionally well at night. If the owl were the size of a human, its eyes would be as big as a soft ball. Because owl eyes are so big, there are no muscles attached to the eyes to move them from side to side. In order to be able to look for prey, owls have flexible necks that allow them to see behind them by turning their heads. They have excellent hearing, which can triangulate a sound, pinpointing its exact location. Ears are offset and one is higher than the other. Sounds reach each ear at different times, which helps them to determine from which direction the sound came.

TOUR: WHAT'S FOR LUNCH?

OBJECTIVES

Compare and contrast herbivore, carnivore and omnivore, including a discussion of eye and ear placement, differences in dentition (identify and describe the use of the canine, incisor and molar teeth); explain beak adaptations for food eaten by different birds; discuss how both prey and predators avoid detection (lack of movement, camouflage, etc.); discuss relationships within a food chain, including photosynthesis and the importance of scavengers.

KEY TERMS

Carnivore, herbivore, omnivore, predator, prey, scavenger, Jacobson's organ, camouflage, detritus, nutrition, food chain, food web, photosynthesis, producers, consumers, trophic levels

BEFORE YOU START

Discuss with the other docents where each of you will start. Make sure one of you has the key to the kangaroo barn. Remember that visiting a diverse selection of animals will allow you to compare and contrast their different food habits.

GETTING STARTED

To get them thinking in terms of food procurement, ask your audience questions such as "What do most animals spend most of their time doing in the wild?" (Other than the big cats, most animals spend the bulk of their time looking for food, while trying to avoid getting eaten!) Early on quiz them about the "voves" and engage them in a discussion comparing and contrasting the "voves." Referring to their own teeth is one way of helping to illustrate differences in various types of animal dentition. If you cover eye/ear placement of prey/predators early on in your tour, you can have the audience tell you whether or not each mammal you visit is a prey animal or predator by using just that information.

Explain to your audience that we have several animal kitchens/food prep areas, each with refrigerators, freezers and sinks. (You may want to ask them why only one has a stove—animals eat their food raw in the wild and cooking it would result in the loss of some nutrients.) Remind them that animals need a variety of nutrients to meet their basic needs.

Following is a list of some of the animal exhibits along with some suggestions which point out a few of the many ways in which you can use the animals to highlight and illustrate the concepts and terms listed above. Remember, these are only a few suggestions. Be sure to consult the animal data sheets for more detailed information on their feeding habits and other pertinent information. Note: Zoo diets are also listed for most of the animals.

ANIMALS TO HIGHLIGHT

Arctic fox: Carnivore; note placement of eyes and ears; seasonal variation in color of fur, cryptic camouflage. When food is really scarce in the winter, they have been known to scavenge polar bear kills. Zoo diet: dry dog food, fish, hard-boiled eggs, carnivore diet.

North American river otter: Carnivore; note placement of eyes and ears; webbed feet, tail used as rudder, dense under fur which traps air for insulation—these adaptations allow otters to be experts at catching fish; discuss the wide variety of prey this predator catches in addition to fish. Because they are so active (high metabolism), our otters are normally fed three times/day. Zoo diet: fish, dry dog food, carnivore diet.

Bald eagle: Carnivore, note placement of eyes; incredible eyesight for detecting prey at great distances (prey can be spotted from one mile in the sky); will scavenge, especially in the winter when food is scarce; will also migrate (a few miles or a thousand) in the winter to find ice-free water; will occasionally steal fish from osprey, another raptor, which is even better at catching fish than the eagle; this a great species to discuss food chains/webs—algae-insects-small fish-larger fish-bald eagle. Be sure to include photosynthesis. For upper elementary students, it's also a good time to discuss producers, consumers, and trophic levels. Zoo diet: fish, mice, bird of prey diet.

Gray wolf: Carnivore; note placement of eyes and ears; wolves are social (pack) and hunt their prey (which are often much larger than they are) as a well-coordinated team; like most large predators, they have "feast or famine biology"—kills may be several days apart and they can take advantage of hunting success by consuming very large amount of meat, up to 20 pounds! Wolves locate prey with their incredible sense of smell—up to a thousand times better than ours. Zoo diet: dry dog food, carnivore diet, fish (as an extra source of protein).

Barred owl: Small animals, including squirrels, chipmunks, mice, voles, rabbits, birds (up to the size of grouse), amphibians, reptiles, and invertebrates. They hunt by sitting and waiting on an elevated perch, while scanning all around for prey with their sharp eyes and ears. They may perch over water and drop down to catch fish, or even wade in shallow water in pursuit of fish and crayfish. Zoo diet: Bird of prey diet, mice.

Farm yard: All of these animals are herbivores, with the exception of two species (have your audience guess which two are not) which are omnivores (chickens and Guinea hogs); note placement of eyes and ears on all the herbivores; goats are ruminants. Zoo diets: varies somewhat depending on animal, but for most it's hay, grain/pelletized food.

TOUR: WHAT'S FOR LUNCH?

Kangaroo barn/freezer: Discuss the feeds that are visible: hay (we use both alfalfa hay, which is high in protein, and grass hay which is lower in protein because some of our herbivores need food which compares to that which they would eat in the wild.) Show them the walk-in freezer and the fish and carnivore diets housed there.

Camels: Herbivores; note placement of eyes and ears; discuss the camel's hump (if you ask what is in the hump, most people will say "water") and fat storage—humps are much larger in the fall and winter; camels are ruminants; camel bodies are very efficient in their use and conservation of water; camels can drink up to 30 gallons of water once they do come across some in the desert. Camels can defend themselves from predators by biting and kicking—unlike horses and donkeys, they can kick in all four directions. Zoo diet: hay and pelletized food (they chew any wood they can reach!)

Patagonian mara: Herbivore; note placement of eyes and ears; like rabbits, these animals, which are actually rodents, produce two types of fecal pellets—soft ones which are re-ingested (to get more nutrition from their poorly digested food—eating of feces is called coprophagy), and firm pellets which are not re-ingested; cryptic camouflage. Note: You can talk about predators of the maras (jaguars, eagles) and lead into a discussion of: predator/prey, food chains, food webs, etc. Zoo diet: hay, pelletized food.

Spider monkeys: Omnivores; using their prehensile tail allows their hands to be free to pick fruit and grab insects. Being social gives them multiple eyes and noses to find food and to detect predators. Zoo diet: primate biscuits, produce on M-W-F.

Magellanic penguins: Carnivore; exhibit counter-shading; discuss why they are the only animals we hand feed (for both nutrition and disease prevention); talk about the parents taking turns with incubation and feeding of the young.

FELINE & PRIMATE BUILDING:

Primates: All our species are omnivores; being social provides multiple eyes, ears and noses to detect predators and food. Tamarins are strictly arboreal (tree-dwelling), lemurs spend a little time on the ground, but are mostly arboreal, and mandrills spend most of their time on the ground and use trees primarily to escape danger and to roost at night. Zoo diets: primate biscuits, produce on M-W-F.

Big cats: All are carnivores; note placement of eyes and ears; extremely powerful jaws and legs; sprinters, not endurance; retractable claws; spend most of their day resting, conserving energy; have very elastic stomachs and can consume large amounts of meat when they make a kill.

Lions: The only social large cats (pride), often hunt extremely large prey; utilize cryptic camouflage contrast this with the disruptive coloration of zebras, one of their prey.

Amur tigers and snow leopards: Have fur with color patterns than can function as either cryptic or disruptive depending on the color of the habitat; both are solitary. Zoo diet (all): carnivore diet, large bones; the big cats are fasted one day/week.

BIRD & REPTILE HOUSE:

There are examples of herbivores, omnivores and carnivores;

Birds: Discuss differences in bills, gizzards and use of grit, crops and food storage. Zoo diets: varies with species, but may include bird of prey diet, meal worms, wax worms, crickets, seeds, produce.

Snakes: All are carnivores; have loosely hinged jaws for swallowing large prey; either constrictors, swallow prey while still alive (garter snakes), or are venomous; Jacobson's organ; cryptic camouflage. Zoo diet: rodents offered weekly. Digestion is slow and temperature-dependent.

Lizards: Carnivores or omnivores, depending on the species; Gila monster is one of only two species of venomous lizards in the world; all of our lizard species exhibit cryptic camouflage.

Amphibians: All of our species are carnivorous; poison dart frogs use bright colors to warn predators, frogs' tongues attach at the front of their mouths and are sticky—the tongue is flicked out to capture insects and other small prey. Zoo diet: varies with species: meal worms, crickets, wax worms, fish.

MIDDLE/HIGH SCHOOL

In addition to more depth and detail with the above topics, you can add discussion of the following terms and concepts: carnassial teeth, apex predator, biomagnification, simultaneous calving, coprophagy, ruminants.

Carnassial teeth: These large, pointy teeth (premolar and first molar), found in many carnivorous mammals, are used for shearing flesh and bone in a scissor or shear-like way. Many modern carnivores, e.g., lions, eat meat from other vertebrates or invertebrates and have well-developed carnassial teeth. In others, the carnassial teeth have become adapted to an herbivorous or to an omnivorous, mixed diet of meat and vegetable. The premolars and molars of modern bears are modified to grind vegetable matter.

Apex predator: Also alpha predators, or top-level predators. Predators that, as adults, are not normally preyed upon in the wild. Apex predator species are often at the end of long food chains, where they have a crucial role in maintaining the health of ecosystems. One study of marine food webs defined apex predators as greater than trophic level four. Food chains are often far shorter on land, with the top of the food chain limited to the third trophic level, as where

TOUR: WHAT'S FOR LUNCH?

such predators as the big cats, crocodilians, hyenas, wolves, or giant constrictor snakes prey upon large herbivores. Also applies to such omnivores as grizzly bears and humans that eat considerable vegetable material as well as much meat but are not themselves prey in most of their range.

Biomagnification: This is the accumulation of a substance up the food chain by transfer of residues of the substance in smaller organisms that are food for larger organisms in the chain. It generally refers to the sequence of processes those results in higher concentrations in organisms at higher levels in the food chain (at higher trophic levels). These processes result in an organism having higher concentrations of a substance than is present in the organism's food.

Synchronized calving: A strategy utilized by several species of large ungulates in which most of the population gives birth within a very short period of time. In the Serengeti in Africa, 500,000 wildebeest calves are born within a 2–3 week period. In northern Canada and Alaska, 80–90 percent of all caribou calves are born within a 10-day period in early June. The synchronization serves two important functions: it reduces the chance that an individual calf will be killed by predators and calving almost always coincides with the peak abundance of nutritious plants.

Coprophagy: This is a behavioral digestive process seen in rabbits, hares, guinea pigs, most rodents and several other mammal species. Literally translated, coprophagy means

“feces ingestion.” However, in the species mentioned above it involves the production of special “soft pellets” in the cecum, which maintains cultures of beneficial bacteria. These soft pellets have twice the protein, and half of the fiber of the typical hard fecal pellet. They also contain high levels of vitamin K and B vitamins and are usually immediately ingested after being expelled.

Ruminants: Ruminants have a fore-stomach with four chambers. These are the rumen, reticulum, omasum, and abomasum. In the first two chambers, the rumen and the reticulum, the food is mixed with saliva and separates into layers of solid and liquid material. Solids clump together to form the cud (or bolus). The cud is then regurgitated, chewed slowly to completely mix it with saliva and to break down the particle size. Plant fibers, is primarily broken down in these chambers by microbes (bacteria, protozoa, and fungi). Ruminating mammals include cattle, goats, sheep, giraffes, American bison, European bison, yaks, water buffalo, deer, camels, alpacas, llamas, wildebeest, antelope, and pronghorn.

Hindgut fermenters: Split into two classifications according to whether they depend primarily on the cecum or colon for microbial digestion. Cecal fermenters include rabbits, guinea pigs, chinchillas, and rats. Large nonruminant herbivores, such as horses, rhinoceroses, gorillas, and elephants, depend more on the colon for microbial fermentation.

BIG ZOO LESSON: RHINO ENCOUNTER

Students meet our rhino and learn about life in the wild and in the zoo: adaptations, the renovation of the exhibit, and conservation. This lesson includes a special visit behind-the-scenes.

OBJECTIVES

- Identify adaptations (senses; short, stout limbs; prehensile lip; horn; teeth; wallowing)
- Identify features (indoor and outdoor) of the black rhino exhibit at Potter Park
- Identify conservation concerns and actions taken to improve the situation

KEYWORDS

Adaptation, herbivore, keratin, prehensile, wallow, endangered, poaching

THE ENCOUNTER

This lesson is scheduled for about one hour beginning at 1 p.m. (Docents should arrive at 12:30 p.m. to prepare with the other docents.) One or two classes participate. Each docent leads half of a class, or up to 15 students. The lesson, rhino barn visit, and three 30-minute stations at a separate locations sharing rhino biofacts, travel time within the zoo included.

Caution: The rhino barn visit includes an up-close visit with a rhino, typically including opportunities for the students to touch a rhino (if the rhino is in the mood).

It is critical for docents to keep their groups together and noise down.

Rhinos are big, dangerous animals, no matter how gentle they seem. The keepers are in charge of the up-close rhino visit. They know the animal's moods and behaviors. No one should place their hands between the rhino and the bars or place their head above the rhino's. They should not move inside the bars at any time when there is a rhino in the stall. A careless or startled move by the rhino can do great damage to us mere humans. And **IF YOU SEE A RHINO BACK UP TO YOU OR YOUR GROUP AND RAISE ITS TAIL, MOVE QUICKLY** so you and your students are not directly behind the animal, or everyone likely to be hit with a shower of urine.

A handful of students and adults will visit a rhino at a time. The BZL site coordinator (or an assigned docent) keeps track of the time and monitors the comings and goings of the small groups to the rhino. The keeper supervises the rhino experience. The docent supervises the rest of his/her group—those that have already visited and those that have not yet visited. Students will be offered hand sanitizer when leaving the rhino barn.

The order and specifics of the above elements are further explained below.

CLASS 1 (Groups A & B)			
<i>Logistics are important. Follow times as closely as you can, but expect delays and be flexible.</i>			
TIME	GROUPS	LOCATION	WHAT IS GOING ON?
1 p.m.	A & B together	Groups enter rhino area through the gate by the penguins.	Each group has a bin outside the rhino barn door in which to place journals and pencils before they enter. No photographs in the rhino barn. Gloves off and in pockets or bin. Inform students of footbath as they enter and the need to be quiet and calm while in the building so as not to startle animals.
1:05 p.m.	A & B together	Rhino barn	Keeper gives brief introduction to whole class.
1:10 p.m.	A & B separate areas	Rhino barn	One group visits rhino while the other group visits kitchen area. BZL site coordinator or assigned docent will move groups of about 4–5 people to the rhino and back in a timely fashion. The keeper is in charge of the rhino interaction. The docent in charge of the rhino group keeps the rest of their group busy at the squeeze cage and refrigerator while a small group is visiting the rhino.
	A & B switch areas	Rhino barn	The groups switch: With their docent, the kitchen group moves to the rhino and the rhino group moves to the kitchen area. Before leaving the building, both groups enter the squeeze cage to get a group weight.
1:30 p.m.	A & B together	Groups leave and travel to biofact site (Safari Room or VEZU, as assigned)	Travel time
1:40 p.m.	A & B together	Biofact site	Both groups gather together in front of their two docents as the docents present the biofacts.
2 p.m.	A & B travel to next location	Groups travel within zoo	Lesson is done. Both groups travel to next BZL activity (as assigned).

BIG ZOO LESSON: RHINO ENCOUNTER

CLASS 2 (Groups C & D)

Keep to your schedule but expect delays, especially when you arrive at the rhino barn. Try some of the debriefs suggested below if you need to keep students occupied while you wait.

1 p.m.	C & D together	Safari Room or VEZU, as assigned	Both groups gather together in front of their two docents as the docents present the biofacts.
1:20 p.m.	C & D together	Groups travel within zoo	Both groups travel to the Rhino Barn.
1:30 p.m.	C & D together	Groups enter rhino area through the gate by the penguins.	Each group has a bin outside the Rhino Barn door in which to place journals and pencils before they enter. No photographs in the Rhino Barn. Gloves off and in pockets or bin. Inform students of footbath as they enter and the need to be quiet and calm while in the building so as not to startle animals.
1:35 p.m.	C & D together	Rhino barn	Keeper gives brief introduction to whole class.
1:40 p.m.	C & D separate areas	Rhino barn	One group visits rhino while the other group visits kitchen area. BZL Site Coordinator or assigned docent will move groups of about 4–5 people to the rhino and back in a timely fashion. The keeper is in charge of the rhino interaction. The docent in charge of the rhino group keeps the rest of their group busy at the squeeze cage and refrigerator while a small group is visiting the rhino.
	C & D switch areas	Rhino barn	The groups switch: With their docent, the kitchen group moves to the rhino and the rhino group moves to the kitchen area. Before leaving the building, both groups enter the squeeze cage to get a group weight.
2:00	C & D travel to next location	Groups travel within zoo	Lesson is done. Both groups travel to next activity (as assigned).

CONTENT

The objectives above are provided to help you structure your presentation. The information below is provided as background. **You are not expected to, nor should you,** try to use all of this information in a presentation. Also, consult the rhino data sheet recently provided to you in your docent training or in subsequent handouts for additional rhino information. If you do not have it in your docent manual, check the files in the docent lounge for a copy.

Timing and logistics are important to the success of this program. Please be prepared to deliver your information in chunks so that you may break away when necessary to move on.

GETTING STARTED

Foster a discussion with your audience. Ask your audience questions.

RHINO BARN LESSON

- Recent renovation and expansion completed in 2011.
- Keepers had input in design of building renovation.
- Building was originally an elephant barn, converted to rhinos in early 1990s.
- New rhinos arrived in June 2011. Doppsee, the female, was born in July 2007. Jello, the male, was born in January 2004. Jello had seizures and took a lot of medications daily to control them. He died in October 2015.
- More space: The recent renovation involved gutting the old exhibit and adding indoor space (from the squeeze cage west).
- Outdoor features: More space, shade “trees,” mud

- More movement: Inside there are more stalls, allowing Doppsee more movement and the keepers the ability to shift rhinos inside in winter.
- The squeeze cage has a built-in scale (Weight records are kept nearby.) The sides of the squeeze cage can pull in together enough to gently prevent Doppsee from moving around much while keepers and medical staff can get a better look at her and conduct target training to better care for her.
- Target training: Keepers target train the Doppsee. Among the behaviors she has mastered are “target,” “poke,” “foot,” and “open.” These behaviors allow keepers and medical personnel to give shots, draw blood, check feet, give oral medications, etc.
- Large, thick, vertical bars allow keepers improved access to the animals.
- Showers: Look for a showerhead in the ceiling of the stalls. Doppsee gets cold-water showers to help with dry skin, especially in winter. Keepers also have the capability to hook up hoses to give warm showers, if needed. Also, in the winter keepers bring in a bucket of mud to put on Doppsee to create mini mud baths.
- Enrichment placement: There is an I-beam along the ceiling in the building that allows keepers to attach enrichment items along a line in the stalls.
- Viewing: There is a large window in the east end of the building for viewing when Doppsee is in the stall facing the window.
- Getting outdoors in winter: Rhinos can tolerate some cold weather. In Africa, it can get below freezing at night. Doppsee is allowed outside in temperatures of 25°F (-4°C) and above if it's not too slippery. She does enjoy the snow. The third

BIG ZOO LESSON: RHINO ENCOUNTER

outdoor yard, which is off exhibit, is flat and safer for her when slippery.

- **Cleaning:** It takes a long time for keepers to clean in the morning. Rhinos produce a LOT of feces, easily 100 pounds an animal per day.
- **Kitchen area:**
 - **Counter area:** There is a scale for weighing food. Note the diet form on the wall. These forms document what each animal is supposed to eat daily. These forms are used for other animals in keeper areas throughout the zoo. There is also a sheet posted with approved enrichments, an easy reminder to keepers about enrichment options for the rhinos. As mentioned above, the weight cards (that is, the weight histories for the individual animals) are kept nearby.
 - **Doppsee's daily diet**
 - **Grain:** 8.8 pounds (contains salt requirement)
 - **Produce:** Usually 2 apples, 2 carrots, 1 sweet potato; may vary, perhaps using turnips or bananas
 - **Grass hay:** About ½ bale of hay
 - **Flaxseed oil**
 - **Vitamin E supplement**
 - **Browse**
 - **Approved enrichment:** Boomer balls, Amazing Graze, large plastic spool-shaped toy, plastic barrels (must turn so do not get heads stuck), grain bags or paper bags, scratching with brush, wood chips, hang branches on lines, paper bags allowed on a weekly basis but **no** cardboard boxes. Food items: Greens, ice treats, bananas, unsweetened juice/Kool-Aid, spices, pasta, bread, applesauce, pumpkins, cantaloupe, grapes, blueberries, strawberries, watermelon, pears, cherries (no pits), peaches (no pits), plums (no pits), green beans, corn on the cob, turnips, asparagus, tomatoes, cauliflower, grapefruit, pineapple, raspberries, lemons, limes, cucumbers, scratch grain, cereal, sunflower seeds, peanuts, peanut butter, molasses
 - The refrigerator contains produce that Doppsee eats. You may find a bucket prepared for Doppsee's daily feed. Hay is kept in bales nearby.
 - Storage for large enrichment devices, such as Boomer balls and green Amazing Graze devices.

BIOFACTS LESSON

One or two tables are set up with biofacts and photographs addressing (1) feeding adaptations, (2) other adaptations, and (3) conservation. Docents should keep the conservation discussion "light" for grades 3 and below. Two docents work together like an encounter to discuss the biofacts and photographs available on the table(s). Ask questions and encourage discussion. At the end of the presentation, students can file by the biofacts and touch the items except the lower jaw and the hair on the tail. Students must be gentle and orderly. Hand sanitize after.

All of the biofacts came from a previous male, Spike, who died in 2008.

Biofacts

- **Lower jaw** (Students **do not touch** this item.): Black rhinos are herbivores. They do not have incisors or canines. They only have large premolars and molars on the sides of their jaws. These are for grinding up vegetation.
- **Horn:** Black rhinos have two horns that rest on a bony plate on the rostrum of their skull. Horns are not attached to the skull as they are in antelope and will continue to grow to their maximum length, even if broken off. The horn is made of keratin, which is the same material that hair and fingernails are made from. Rhino horn, however, is not simply compressed hair, even though you may see fibers at the base of the horns that resemble coarse hair. The evolution of the horn was most likely for impressing the opposite sex. The horn is used as a weapon to stab at predators, though most often it is used to fend off other rhinos. They also use the horn as a tool to push and turn over mud in a wallow, excavate soil at salt licks, and remove branches and bark from trees. The second horn does not appear to serve any functional purpose today.
- **Skin:** The thickness of rhino skin varies across the body with it being thickest around the middle. It can be 1 to 3 inches thick and is rough to the touch. It protects rhinos from thorns and sharp grasses in the African savannah. The skin has sparse hairs that cannot be seen from a distance. The skin inside the folds is smooth, which reduces friction between skin surfaces as the animal moves.
- **Femur:** The femur is the large bone in the thigh. (Compare it to humans. Rhino femurs are in the haunch area of the body.) It connects from the hip socket to the knee area, where it joins the tibia (shinbone) and the fibula in the lower leg. It is designed to provide support to the leg. Various muscles are attached to the femurs so that the legs are able to move.
- **Foot:** Rhinos have three toes on each foot, each with a sturdy hoof-like nail. The middle toe bears most of the rhino's weight. The sole is like a smooth, tough, rubbery pad that cushions the rhino's weight. A rhino can run up to 35 mph at a full charge.
- **Tail** (There are not many hairs left on this tail; students **do not touch** this item.): Most of the body hair is found on the ear fringes and tail bristles.
- **Rhino medicine box** (for use with 4th graders and up): Note the listing of "rhino horn" as an ingredient on the box

Illustrations

- **Black rhino prehensile lip:** The black rhinoceros is a browser and has a prehensile upper lip to find and cut off the browse on shrubs and trees. It has a far smaller head than the white rhino, because it does not need all the muscles for lowering the head.

BIG ZOO LESSON: RHINO ENCOUNTER

- **Black rhino vs. white rhino mouth:** The white rhinoceros in Africa is the species with the wide upper lip. It is the rhinoceros that spends much of its time grazing for which reason it has developed this wide lip to help in cutting off the sharp grass. Therefore, it has far more muscles in the neck area, which are necessary to lift the heavy head because it has to lower the head for the grazing. The hind-head of the skull is much larger than in other rhinos to give an attachment for the muscles.
- **Black rhino habitat:** Black rhinos are mainly found in transitional zones between grassland and forest, in thick thorn bush or acacia scrub.
- **Black rhino habitat with birds:** Birds (oxpeckers and egrets) eat ticks and other parasites they find on the rhino and noisily warn the rhino of danger. Although the birds also eat blood from sores on the rhino's skin and thus obstruct healing, they are still tolerated.
- **Geographic distribution of black rhinos:** Map of Africa illustrating historic and current ranges
- **Wallow:** Rhinos often wallow in mud holes, covering themselves with mud to cool off and to protect themselves from flies. They often sleep in mud holes too. Dopper likes to create her own wallows when it rains and there are good puddles in the yard.
- **For use with 4th graders and up:** Endangered due to poaching for (1) traditional Asian medicine (horn ground into powder and dissolved in boiling water); and (2) dagger handles in the Middle East. Habitat change has also contributed as a secondary cause.

Many conservation organizations are (1) working to expand existing protected areas and improving their

management; (2) establishing new protected areas; (3) improving security monitoring to protect rhinos from poaching; (4) improving local and international law enforcement to stop the flow of rhino horn and other illegal wildlife trade items from Africa to other regions of the world; and (5) promoting well-managed wildlife-based tourism experiences that will also provide additional funding for conservation efforts.

- **Species Survival Plan (SSP) sign:** Zoos are helping black rhinos with scientific captive breeding. (BZL students have probably already learned about SSP during their week before their rhino lesson.)

- **Black rhino mother and baby:** Offspring of former PPZ male, Jemma, who reproduced at the Cleveland Zoo. Baby rhinos range from 75–100 pounds (34–45 kgs) at birth.

DEBRIEFS

Debriefs are techniques used to review and reinforce learning that has just occurred. They are great ideas for keeping your group engaged if you must wait at some point in your lesson.

- Ask review questions about things your group has already seen.
- Have kids pair up. Each student states a rhino fact and compares that to their observation animal.

CONCLUSION

Once all of the students have seen the artifacts and been in the rhino barn, the lesson is over and will often move on to other activities in the zoo.

GIRL SCOUTS TOUR: ANIMAL HABITATS

This tour is designed to help Junior Girl Scouts earn their Animal Habitats badge. Scout will complete steps 1 through 5.

INTRODUCTION

Meet the troop at the Educational Programs gate. Welcome them to the zoo and explain that we have a lot to see and talk about in order for them to complete their badge requirements in the time we have together, so it's very important that everyone follow the rules:

1. Stay together as a group. If we always have to wait for people to catch up, we won't have as much time to spend looking at the animals.
2. If the docent is talking or asking questions, it's important that everyone listen quietly so everyone can hear. If someone asks or answers a question, we should likewise be courteous and listen.
3. Please do not run ahead of the group. Stay next to or behind the docent.
4. Remember, the zoo is home to many animals. Do not yell at them, chase them, or bang on the glass of their exhibits.

ASK THE GROUP

1. What is a habitat?

Habitats are the places where plants and animals live. In order for an animal to survive and be successful, their habitat needs to provide the things they need to live.

2. What are the needs of living things?

Food, water, shelter, space, air, sun

3. What are some examples of different habitats?

There are many different kinds of animals, and many different habitats where they are found. River, forest, rainforest/jungle, desert, ocean, beach, meadow, savannah, plains, etc.

ON-GROUNDS TOUR

Tell the group that they will be visiting some animals that can be found in Michigan. Remind them that if they ever see a wild animal, do not approach it and certainly never try to touch it.

Information that must be included to fulfill the badge requirement is included below for each animal. You may include other information as appropriate. You do not have to visit every animal listed, but make sure you include animals from several habitats.

North American river otters

Habitat: Throughout North America near rivers. They spend a lot of time in the water swimming and hunting, but they also spend a lot of time on the land eating and sleeping.
Range: Throughout North America, but not in as many places as they used to be (extirpation).

Adaptations: Have layer of fat just under the skin that helps keep them warm. They also have very dense fur that traps air near their skin and acts as an insulating layer to keep them warm. Their dark color acts as camouflage (counter shading).
Cleaning behaviors: Keep themselves clean by grooming themselves with their tongue. They also have a special oil gland and they spread the oil over their fur to protect it from the damaging effects of being in the water so much.

Locomotion: Are great swimmers in the water (up to 7 mph), and are fairly fast on four legs on land (up to 18 mph).

Food: fish, frogs, mice, crayfish

Shelter: PPZ's sleep in hollowed out logs.

Bald eagles

Habitat: Lakes, seacoast, reservoirs, and rivers.

Range: North America

Adaptations: Flight feathers are what allow birds to catch the wind and soar; large talons and strong feet for catching prey

Cleaning behavior: Preening

Locomotion: Fly in the air and hop/walk on land.

Food: Primary food source is also fish, so they tend to live near water.

Shelter: They build their very large nests out of sticks and branches on high, craggy cliffs and hilltops, tree tops or platforms. Eagle pairs use the same nest year after year, adding to it each season. They only use the nest while there are eggs and chicks in the nest. Once the chicks are old enough to live on their own (12–16 weeks), the nest is abandoned until the following year.

Gray wolves

Habitat: Forests, taiga, tundra, deserts, plains, and mountains (forests in Michigan)

Range: Majority of the Northern hemisphere

Adaptations: Thick fur keeps them warm. They can curl up and cover their face with their tail to stay warm.

Cleaning behavior: Groom themselves by licking. They also might also roll around in snow, or go into a river, lake or pond.

Locomotion: Wolves walk on all fours and travel in packs

Food: Any animals, and occasional berries and grasses. In Michigan, they eat deer, moose, and occasional livestock.

They hunt in packs so they are able to take down prey much larger than they are.

Shelter: Dens

Red panda

Habitat: Bamboo and temperate mixed forests of the Himalayas

Range: Nepal to the Sichuan province in China

Adaptations: Thick fur keeps them warm, and they can curl up and wrap their tail around their face to keep warm.

Cleaning behavior: Clean by licking.

GIRL SCOUTS TOUR: ANIMAL HABITATS

Locomotion: Walk on all fours, very agile climbers.

Food: Mostly bamboo, some berries, mushrooms, grasses and bark. Will also eat birds, eggs, insects and small rodents.

Shelter: Tend to sleep in trees with their legs straddling branches.

Bongos

Habitat: Ground-level shrublands in rainforests; forests and bamboo zones in mountains

Range: Central Congo, Africa

Adaptations: Fur coloring is great camouflage. Their fur also is said to drip red when wet, which native villagers believed was a sign of magic.

Cleaning behavior: Licking; may also roll in dirt to remove parasites, or go in the water.

Locomotion: Run on all fours and are quite swift, prefers to go under or around obstacles rather than over them.

Food: Browser; eating tips, shoots, and tender bushes

Population threat: Habitat destruction and poaching

Amur tigers

Habitat: Mountainous forests

Range: Primarily the Amur-Ussuri region of Siberia along the west coast of Russia.

Adaptations: Thick fur keeps them warm, orange and black stripes are excellent camouflage.

Cleaning behavior: They stay clean by licking themselves, much like a house cat. They are also good swimmers and enjoy taking a bath in ponds or rivers.

Locomotion: Walk on all fours, are good climbers, and can cover large distances in just a few bounds.

Food: Mainly deer, elk, and wild boar

Shelter: Don't really build homes. Instead, they have a home range that can be up to 400 square miles.

Population threat: Habitat destruction and poaching

Mandrills

Habitat: Dense primary rainforest floor, sometimes coastal forest.

Range: Cameroon, Congo, Equatorial Guinea, and Gabon (Africa)

Adaptations: Gray fur acts as camouflage, and the brightly colored patches are used in communication

Cleaning behavior: Mutual grooming to remove parasites.

Locomotion: Walk on all fours, climbing, swinging, and jumping.

Food: Foragers; fruit, leaves, seeds, nuts, shoots, arthropods, crabs, fish, small vertebrates, and cultivated crops.

Shelter: Live together in troops of about 20, with one dominant male, many females, and offspring. Once male offspring get close to maturity, they leave the troop and form their own by raiding existing troops for females.

BIRD & REPTILE HOUSE

Discuss the following before going in:

There are some habitats across the globe which are endangered. What does endangered mean? One of the habitats that conservationists and scientists are concerned about is the Amazon rainforest. The Amazon is home to many, many different forms of life- plants, animals, birds, reptiles, insects, even people. The rainforest is threatened because people are cutting down the trees for lumber and to clear the way for farms and grazing animals like cattle. When the trees are cut down, that can take away the food, water, and shelter that the animals that live there need to survive. The animals then have to move to a new area and compete with the animals that are already there for food, water, shelter, and space. If there are enough resources, the animals can adapt and survive. If not, not all of the animals may make it. The animals also face another threat. They are illegally collected for the pet trade and sold.

Conservationists are trying to help. One way is to teach the people who live in the Amazon rain forest how to farm more sustainably and effectively, so they don't have to cut down more trees for their farms. They are also finding ways to harvest trees for lumber that remove only some of the trees from an area so that part of the forest isn't completely destroyed. Organizations are also working with the native people to create a demand for their crafts so they can sell them for money instead of collecting animals for the pet trade. Conservationists are also working to replant the rain forest wherever possible. What would you do to help protect the rainforest?

Troop assignment

Send the troop into the Bird & Reptile House and have them look for species that are native to the Amazon rainforest. Have them identify which species are common, threatened, and endangered.

Penguins

Habitat: Sandy beach to wooded slopes, usually within $\frac{1}{3}$ mile of the sea

Range: Southern coasts of South America and Falkland Islands

Adaptations: Countershading coloration; torpedo-shaped body and flippers (modified wings) for swimming

Cleaning behavior: Preening to clean and spread oil from a gland near their tail (waterproofing).

Locomotion: Waddle on land, excellent swimmers.

Food: Fish, krill, sometimes squid.

Shelter: Live together in large colonies. During nesting season, they build shallow nests out of smooth pebbles and rocks.

GIRL SCOUTS TOUR: ANIMAL HABITATS

Backyard Gardens

You can help local wildlife by creating a backyard habitat. What are the four things animals need in their habitat? (food, water, shelter, space)

Even a small backyard can become a great habitat for birds and butterflies. This area has a lot of space. What kinds of food and shelter do they need? Let's explore the garden and look for ways birds and butterflies would find food, water, and shelter.

Gather the group and ask them what they found.

Food: bird feeders, plants (seeds, nectar), insects

Water: river, bird baths, puddler (dew collects on rocks and butterflies drink it)

Shelter: trees, shrubs, birdhouses, nesting material, standing dead trees

Do you think you could try some of this at your house or school? Let them know that they will be making a bird feeder when you return to the Discovery Center.

Review (on your way back to the Discovery Center)

What are the needs of living things?

What is a habitat?

What are some different kinds of habitats?

What happens to the animals if their habitat is lost?

What can you do to help?

Hands-on activities

These will take place in one of the classrooms in the Discovery Center

Pine-cone bird feeder: Refer back to your tour. Ask them if they can think of a way they can help provide habitat for animals. Let them brainstorm ideas. One of the things that needs to be present in a habitat is food and that is where the birdfeeder comes in. To reinforce the needs of living things, ask the scouts what else their backyard might need: (water (birdbath); shelter (escape cover/shrubs); space (make sure they don't hang the bird feeder too close to a building.)

1. Have the scouts label a zip-top bag with permanent marker.
2. Have the scouts tie a piece of yarn to the top of the pinecone.
3. Have the scouts carefully spread lard or Crisco over the pinecone, being sure to fill the nooks and crannies. Explain that the lard or Crisco is fat, and that is a very good energy source for birds, especially when other food isn't plentiful.
4. Once the lard or Crisco is applied, have them carefully roll their pinecone in a plateful of seeds. They can press with their hands to make sure they get good adhesion.
5. Once complete have them put their bird feeders in their plastic bag.

6. Instruct them to wipe their hands first at the trash can with a paper towel to get the seeds off their hands, then head to the restroom to wash their hands, being very careful not to touch anything along the way with their messy hands (sometimes dish soap will clean the lard off their hands better than the bathroom soap).

Insulation activity: One of the challenges animals in cooler/colder climates face is how to keep their "house" warm. What kinds of "houses" do animals live in? (nests, burrow, dens) What are some ways that they can try to keep warm? (body heat, insulation) Insulation works to trap body heat, and it can be a lot of different things (straw, grass, bits of string, mud, shed fur or feathers, what else?) You are going to try your hand at insulating a "nest".

1. Hand out bags of ice (a couple of scouts can share). Have them put the bag of ice on one of their hands and ask them to raise their other hand when they feel the cold.
2. Ask them to set the bags of ice aside. Have them use the materials provided to create a nest that they think will keep an animal warm. Give them a few minutes to try different ideas. Ask them why they think some material might work better than others.
3. When they are finished with the nest, have them put their nest on their hand. Then have them take turns putting the bag of ice on the nest. Does it take longer to feel the cold?
4. Another way animals stay warm is through body fat (blubber). You can try the same experiment, but instead of using a nest, use a zip-top bag of lard or Crisco. The fat acts as an insulator. What animals have blubber? (river otters, penguins, whales)
5. Have the scouts gather up their nest material and put it back in the box. Dump ice in the sink, and set bags to dry (we can reuse them).

CONCLUSION

Ask if there are any questions. Congratulate the group for completing their animal habitats badge (If asked, remind the leader that they will need to purchase the actual badges from the council office.) Pass out patches to the scouts. Have a few extra in case an adult wants to purchase one (\$3, exact change only). Thank them for coming and let them know that they are welcome to stay and visit some of the animals we didn't get to see on the tour (unless the zoo is already closed). If they have to leave, escort them up to the front gate and bid them farewell from there.

GIRL SCOUTS TOUR: PETS BADGE

This workshop will take a look at zoo animals in the context of what we do to take care of them. Even though zoo animals are not pets, they need to be fed and cared for just as a pet would. Scouts will learn what all animals in human care need to be happy and healthy.

Introduction:

Meet the troop at the Educational Programs gate. Welcome them to the zoo and explain that we have a lot to see and talk about in order for them to complete their badge requirements in the time we have together, so it's very important that everyone follow the rules:

1. Stay together as a group. If we always have to wait for people to catch up, we won't have as much time to spend looking at the animals.
2. If the docent is talking or asking questions, it's important that everyone listen quietly so everyone can hear. If someone asks or answers a question, we should likewise be courteous and listen.
3. Please do not run ahead of the group. Stay next to or behind the docent.
4. Remember, the zoo is home to many animals. Do not yell at them, chase them, or bang on the glass of their exhibits.

HANDS-ON ACTIVITIES

Begin in the classroom. The following discussion should be mostly a recap of the encounter. Ask the scouts if they have pets, and what kind. Ask them what all animals, pets or wild, need to live (food, water, shelter, space, air, they may also include love). Explain that even though most zoo animals are still wild animals and not pets, they still need people to provide them with the same things we would provide to pets. Ask the scouts "What do you need provide to pets so they can be healthy and happy?" (food, water, shelter/home, exercise, toys, they may have other ideas.) Review with them that at the zoo, all of those things are provided to our animals by the zookeepers.

REQUIREMENT 4: Make a pet feel loved

Explain that animals need things to help them get exercise and keep them busy/entertained. For pets, we would call those things toys. Here at the zoo, we call it enrichment. We are going to make an enrichment item for a dog or a cat (they have to choose one). The scouts can keep it for their own pet or give it to someone else who has a pet.

The toy is going to be a sock decorated with Sharpie markers then stuffed with poly stuffing, a bell, and catnip (cats) or a scented cotton ball and tennis ball (dogs), then tied at the top. You can mention that many of the zoo animals love different scents, like spices and perfume/cologne.

Step 1: Make sure the tables are covered!

Step 2: Give each girl 1 sock, put out the markers (remind them to share!), and let them decorate. Remind them that we'll be tying it closed at the top, so they shouldn't put words or detailed drawings on that part since we won't be able to see it once it's tied.

Step 3 (for cats): Have the girls put a fist or 2 sized amount of stuffing in. You'll want it to be fairly firm.

Step 4: Add the bell.

Step 5: Add more stuffing.

Step 6: Add the catnip.

Step 7: Add more stuffing.

Step 8: Tie it closed.

Step 3 (for dogs): Have the girls put the tennis ball in, all the way to the toe.

Step 4: Add the scented cotton ball.

Step 5: Tie it closed.

REQUIREMENT 3: Help keep a pet healthy and safe

For this requirement, instead of having a veterinarian explain health issues for three pets, we are going to use our "pet store" education animals to explain some of the health issues.

Explain that part of being a responsible pet owner is keeping them healthy. Part of that is making sure your pet goes to the veterinarian for regular check-ups, and also knowing what health issues are common for your type of pet so you can look out for them. I'm going to show you a few of our education animals, and some people keep as some of them as pets. *(Make sure you cover the following information for each animal below, as well as a few fun facts.)*

European ferret

Life expectancy: 8–10 years

Common health issues: Can easily catch a cold or get a respiratory infection from people. You should not handle ferrets if you have a cold (It's actually a rule here at the zoo.). When ferrets get to be 4–6 years old, it's very common for them to develop problems with their adrenal glands. You will have to take the ferret to the vet for treatment

GIRL SCOUTS TOUR: PETS BADGE

Other things to consider:

- They are nocturnal, so they can be very active while you are trying to sleep.
- They are carnivores so when they bite, it hurts!
- They have a scent gland (related to skunks!) which makes them kind of stinky, so they need regular baths.
- If a ferret escapes from its owner, it can revert back to a feral (wild) state in about two weeks.

Chinchilla

Life expectancy: up to 20 years

Common health issues: Their fur is so dense that if it gets wet, it may never dry completely. This can lead to skin rot, which is of course bad for the animal and very stinky. Their teeth grow for their whole life, so they need things to chew on to wear them down. Otherwise, it can become difficult for them to eat.

Other things to consider:

- They need dust baths, which can create some mess.
- They are nocturnal, so they might want to play while you need to sleep.
- They like to chew on things, and they have strong teeth.

Eastern box turtle

*Note: It is **ILLEGAL** to take a turtle (or any other animal) from the wild and keep it as a pet. Almost all turtle species in Michigan are threatened or endangered or special concern.*

Life expectancy: over 100 years (oldest known was 138, ours is 25)

Common health issues: If turtles are not fed a proper diet, they can develop weak bones and a soft shell. It is important to know what a particular kind of turtle eats, because different turtles eat different things. They also need to have a special light that simulates sunshine to help keep them healthy.

Other things to consider:

- They aren't cuddly or playful, so if you are looking for a pet to cuddle and play with, a turtle might not be the best fit.
- Some turtle/tortoise species can grow to over 100 pounds!
- Turtles live a long time. You will have to make a commitment to it for pretty much the rest of your life.

TOUR (45 MINUTES)

Choose 4–5 animals and answer the following questions through discussion with the girls.

1. Would this animal make a good pet? Why not?

2. What are the costs associated with this animal?

- a. Veterinarian staff
- b. Keeper staff
- c. Medicine
- d. Food
- e. Enrichment
- f. Transportation
- g. Habitat

3. How much space does this animal need?

- a. How active is it?
- b. How big is it?
- c. Does it live with other animals?

4. What kinds of things do we do to keep this animal happy?

- a. Enrichment
- b. Exhibit features

5. How much food does this animal need (in general)?

- a. What do we feed it?
- b. Carnivore, herbivore, omnivore
- c. Keepers monitor how much they eat. If there is a change, it might mean that something is wrong.

6. What kind of human contact does this animal have?

- a. Not very much. We don't snuggle or pet the zoo animals because they are still wild animals, even if they have lived their whole life in a zoo.

7. How do we keep this animal "comfy"?

- a. Cleaning exhibit
- b. Beds or material to make their own bed
- c. Things to keep them warm in winter and cool in summer

8. How do we keep this animal healthy and safe?

- a. Veterinarian staff
- b. Physicals once a year or every other year depending on the animal
- c. Medication if needed
- d. Ways to get exercise (furniture, enrichment)

CONCLUSION

Ask if there are any questions. Congratulate the group for completing their pets badge (if asked, remind the leader that they will need to purchase the actual badges from the council office.) Pass out patches to the scouts. Have a few extra on hand in case an adult wants to purchase one (\$3, exact change only). Thank them for coming and let them know that they are welcome to stay and visit some of the animals we didn't get to see on the tour (unless the zoo is already closed). If they have to leave, escort them up to the front gate and bid them farewell from there.

BROWNIE BADGE WORKSHOP: PETS

This workshop will take a look at zoo animals in the context of what we do to take care of them. Even though zoo animals are not pets, they need to be fed and cared for just as a pet would. While it is not possible to fill all the requirements of the “Pets” badge on this tour, scouts will learn what all animals in captivity need to be happy and healthy.

Encounter, activity, and discussion will fulfill requirements 1, 3, 4, and 5, and give background information for requirement 2.

FORMAT

Encounter with docents followed by hands-on activities by staff or trained docents.

ENCOUNTER

For this badge, there are certain things that need to be covered for 2–3 animals. Listed below the explanations of what to cover is specific information for the ferret, chinchilla, and box turtle. Please make sure that at least two of these three animals are included.

REQUIREMENT 1: Find out what care different pets need

You may include any other animals you wish in addition to the three listed below (for a total of 6 or 7), but tie-in that animal to the topic of pets. Use the questions below to help guide your discussion. Remember, these are young girls (3rd grade or younger) so your discussion can be in general terms. Don’t worry too much about specific costs, amounts of food, dimensions of exhibits, etc.

1. Would this animal make a good pet? Why not?
2. What are the costs associated with this animal?
 - a. Veterinarian staff
 - b. Keeper staff
 - c. Medicine
 - d. Food
 - e. Enrichment
 - f. Transportation
 - g. Exhibit and exhibit maintenance
3. How much space does this animal need?
 - a. How active is it?
 - b. How big is it?
 - c. Does it live with other animals?
4. What kinds of things do we do to keep this animal happy?
 - a. Enrichment
 - b. Exhibit/enclosure features

5. How much food does this animal need? (General terms)
 - a. What do we feed it?
 - b. Carnivore, herbivore, omnivore
 - c. Keepers monitor how much they eat. If there is a change, it might mean that something is wrong.
6. What kind of human contact does this animal have?
 - a. Not very much. We don’t snuggle or pet the zoo animals because they are still wild animals, even if they have lived their whole life in a zoo.
7. How do we keep this animal “comfy”?
 - a. Cleaning exhibit
 - b. “beds” or material to make their own bed
 - c. Things to keep them warm in winter and cool in summer
8. How do we keep this animal healthy and safe?
 - a. Veterinarian staff
 - b. Physicals once a year or every other year depending on the animal
 - c. Medication if needed
 - d. Ways to get exercise (furniture, enrichment)

REQUIREMENT 3: Help keep a pet healthy and safe

For this requirement, instead of having a veterinarian explain health issues for three pets, we are going to use our “pet store” education animals to explain some of the health issues.

Explain that part of being a responsible pet owner is keeping them healthy. Part of that is making sure your pet goes to the veterinarian for regular check-ups, and also knowing what health issues are common for your type of pet so you can look out for them. I’m going to show you a few of our education animals, and some people keep as some of them as pets. *(Make sure you cover the following information for each animal below, as well as a few fun facts.)*

European ferret

Life expectancy: 8–10 years

Common health issues: Can easily catch a cold or get a respiratory infection from people. You should not handle ferrets if you have a cold (It’s actually a rule here at the zoo.). When ferrets get to be 4–6 years old, it’s very common for them to develop problems with their adrenal glands. You will have to take the ferret to the vet for treatment

Other things to consider:

- They are nocturnal, so they can be very active while you are trying to sleep.

BROWNIE BADGE WORKSHOP: PETS

- They are carnivores so when they bite, it hurts!
- They have a scent gland (related to skunks!) which makes them kind of stinky, so they need regular baths.
- If a ferret escapes from its owner, it can revert back to a feral (wild) state in about two weeks.

Chinchilla

Life expectancy: up to 20 years

Common health issues: Their fur is so dense that if it gets wet, it may never dry completely. This can lead to skin rot, which is of course bad for the animal and very stinky. Their teeth grow for their whole life, so they need things to chew on to wear them down. Otherwise, it can become difficult for them to eat.

Other things to consider:

- They need dust baths, which can create some mess.
- They are nocturnal, so they might want to play while you need to sleep.
- They like to chew on things, and they have strong teeth.

Eastern box turtle

*Note: It is **ILLEGAL** to take a turtle (or any other animal) from the wild and keep it as a pet. Almost all turtle species in Michigan are threatened or endangered or special concern.*

Life expectancy: over 100 years (oldest known was 138, ours is 25)

Common health issues: If turtles are not fed a proper diet, they can develop weak bones and a soft shell. It is important to know what a particular kind of turtle eats, because different turtles eat different things. They also need to have a special light that simulates sunshine to help keep them healthy.

Other things to consider:

- They aren't cuddly or playful, so if you are looking for a pet to cuddle and play with, a turtle might not be the best fit.
- Some turtle/tortoise species can grow to over 100 pounds!
- Turtles live a long time. You will have to make a commitment to it for pretty much the rest of your life.

HANDS-ON ACTIVITIES

Move to the classroom. The following discussion should be mostly a recap of the encounter. Ask the scouts if they have pets, and what kind. Ask them what all animals, pets or wild, need to live (food, water, shelter, space, air, they may also include love). Explain that even though most zoo animals are still wild animals and not pets, they still need people to provide them with the same things we would provide to pets. Ask the scouts "What do you need provide to pets so they can be healthy and happy?" (food, water, shelter/home, exercise, toys, they may have other ideas.) Review with them that at the zoo, all of those things are provided to our animals by the zookeepers.

REQUIREMENT 4: Make a pet feel loved

Explain that animals need things to help them get exercise and keep them busy/entertained. For pets, we would call those things toys. Here at the zoo, we call it enrichment. We are going to make an enrichment item for a dog or a cat (they have to choose one). The scouts can keep it for their own pet or give it to someone else who has a pet.

The toy is going to be a sock decorated with Sharpie markers then stuffed with poly stuffing, a bell, and catnip (cats) or a scented cotton ball and tennis ball (dogs), then tied at the top. You can mention that many of the zoo animals love different scents, like spices and perfume/cologne.

Step 1: Make sure the tables are covered!

Step 2: Give each girl 1 sock, put out the markers (remind them to share!), and let them decorate. Remind them that we'll be tying it closed at the top, so they shouldn't put words or detailed drawings on that part since we won't be able to see it once it's tied.

Step 3 (for cats): Have the girls put a fist or 2 sized amount of stuffing in. You'll want it to be fairly firm.

Step 4: Add the bell.

Step 5: Add more stuffing.

Step 6: Add the catnip.

Step 7: Add more stuffing.

Step 8: Tie it closed.

Step 3 (for dogs): Have the girls put the tennis ball in, all the way to the toe.

Step 4: Add the scented cotton ball.

Step 5: Tie it closed.

BROWNIE BADGE WORKSHOP: PETS

REQUIREMENT 5: Feed a pet

For this requirement, we are going to go over the cost of feeding an animal for a day/week/year. We will include a cat, dog, tiger, and penguin.

Dog

Medium sized dog: 2 cups per day

Cost of food: Varies between 34 cents and \$2.22

(or more) per pound (Use \$1.00 as an average cost).

Conversions: Approximately 4 cups in each pound of food = 25 cents per cup

= 50 cents per day

= \$3.50 per week

= \$182 per year

House cat

Medium sized cat: ½ cup per day

Cost of food: Varies between 50 cents and \$2.22 per pound (use \$1.25 as an average cost)

Conversions: Approximately 4 cups in each pound of food = 31 cents per cup

= 15.5 cents per day

= \$1.09 per week

= \$56.68 per year

Tiger

Sivaki (adult male): 7 lbs a day

Cost of food: \$6.00 per pound (Carnivore diet)

= \$42.00 per day

= \$252 per week (*he is fasted one day a week, so it's \$42 x 6 days*)

= \$13,104 per year

Penguin

Adult penguin: Average 20 capelins, or 4–5 herrings a day (PPZ has about 20 penguins)

Cost of food: PPZ spends \$12,000 per year on fish (fish is also fed to birds of prey.) A 20-pound case of fish lasts about two days

CONCLUSION

If this is part of an overnight, have the scouts wash their hands and then move on to ice cream sundaes.

If this is a stand-alone workshop, ask if there are any more questions, hand out their patches, and thank them for coming. Make sure to write down a head count for adults and children and leave it by the computer at the front desk.

