Elephant welfare study results:
How Elephant Lands enhances welfare

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Animal Based Welfare Assessment

Animal Welfare refers to an animal's collective physical, mental, and emotional states over a period of time and is measured on a continuum from poor to excellent.

Types of Welfare Indicators

Behavior

Behavioral diversity, activity, species-appropriate behaviors, time budgets, etc.

Physiology

Hormone levels, adrenal response, reproduction, nutrition, etc.

Physical Appearance & Health

Body condition, muscle tone, species-specific health parameters, etc.

Evaluating Effectiveness of Elephant Lands

Elephant Lands welfare-based design

Design focused on meeting the elephants' physiological, psychological and social needs 24 hours a day.

- Encourage activity throughout the entire day
- Promote a diverse range of natural behaviors
- Offer increased opportunities for choice and control
- Provide biologically meaningful challenges

Welfare indicators for evaluation

- Distance walked
- Reproductive and adrenal hormone analysis
- Behavior assessments

Study timeline

Monitored our herd over 4 years
(Sept 2012 – end of 2016) through
3 phases of transition to the new habitat

In the old habitat
prior to construction
(baseline)

During
construction

Move to new barn
through 1 year after opening

Methods

Distance walked

- Average daily distance was measured using GPS monitoring.
- Multi-institutional study used for distance in former habitat.
- We collected GPS data for two females and two males.
- Elephants wore GPS anklets for 24 hours every 2 weeks.
- Distance calculations included only outside habitats.

Methods

Adrenal & reproductive hormones

- Reproductive hormones in serum are measured for routine management.

- Adrenal hormone metabolites in fecal samples were measured to assess adrenal response to changes.

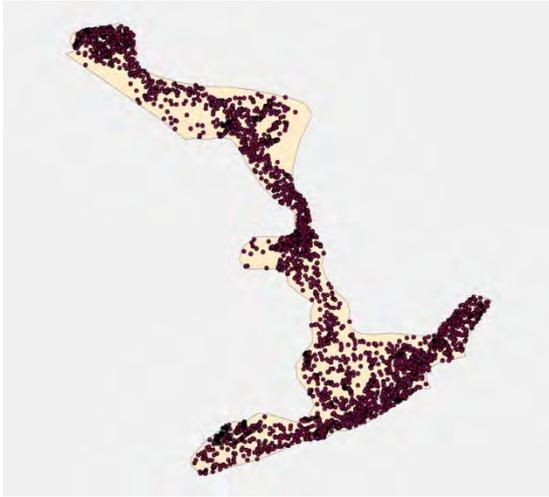- Samples were collected weekly for all individuals.

Behavior

- Behavior video on each individual was recorded weekly, morning & afternoon, 2min every 30min – total 8min/wk.

- Video team was 14 Visitor Animal Survey Team (VAST) volunteers.

- Hierarchical list of behaviors.

- Behaviors are coded by observers trained to 85% reliability criteria.
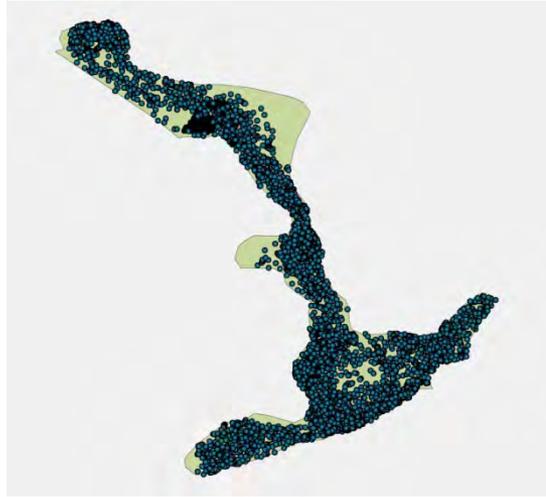
Distance Walked

- In the previous elephant habitat:
  - Chendra averaged 10.7 miles a day.
  - Sung-Surin averaged 4.7 miles a day.

- In Elephant lands:
  - Chendra averages 10.9 miles a day.
  - Sung-Surin averages 9.6 miles a day, doubling her average.
  - Samudra walks at least 6 miles a day.

- Reported average walking distance of wild elephants is 1.9 to 7.5 miles a day under normal environmental conditions.

- Oregon Zoo elephants appear to walk at least as far as, and possibly farther, than their wild counterparts on a daily basis.

Habitat Utilization

GPS locations in outside habitats

Samudra: Using the entire habitat

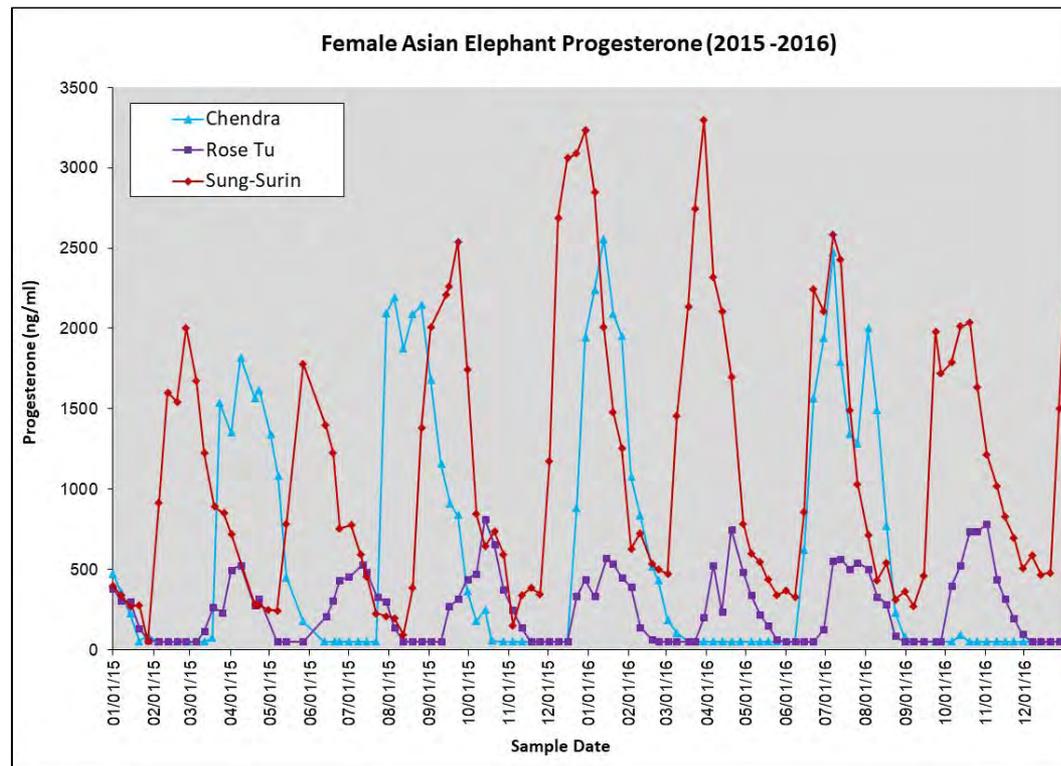Sung-Surin: Usage in winter (November) similar to summer (August)

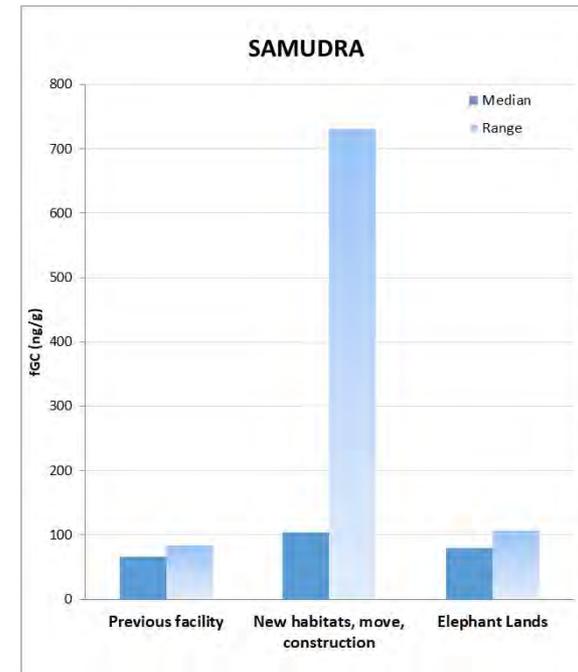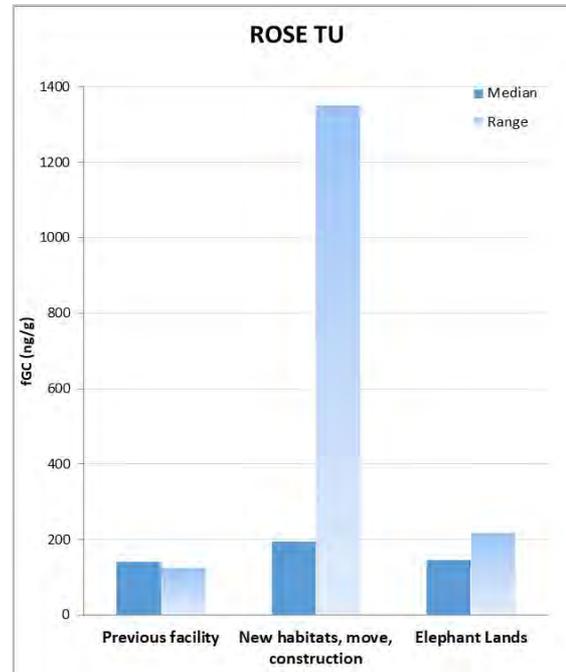Chendra: Using resources nearest the public, plus feeders at top of North Meadow
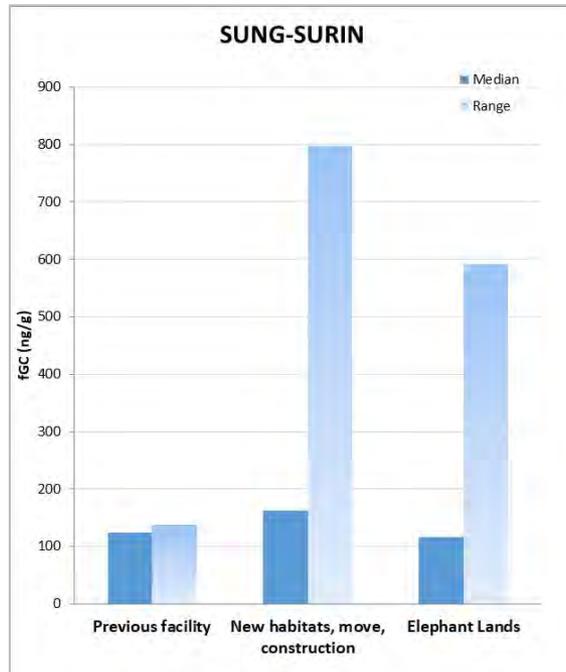
- Elephants are using the entire habitat and it's resources.
- They have indoor/outdoor access, and even on cold days individuals spend 4 to 20 hours outdoors.
- Movement in Elephant Lands is more self-directed — they have *choice* and *control*.

Reproductive Hormones

- Historically, female elephants at Oregon Zoo show normal reproductive cycles, even through major social changes.

- Adult females continued cycling regularly throughout the transition to Elephants Lands, which is one indicator of normal reproductive health for the herd.

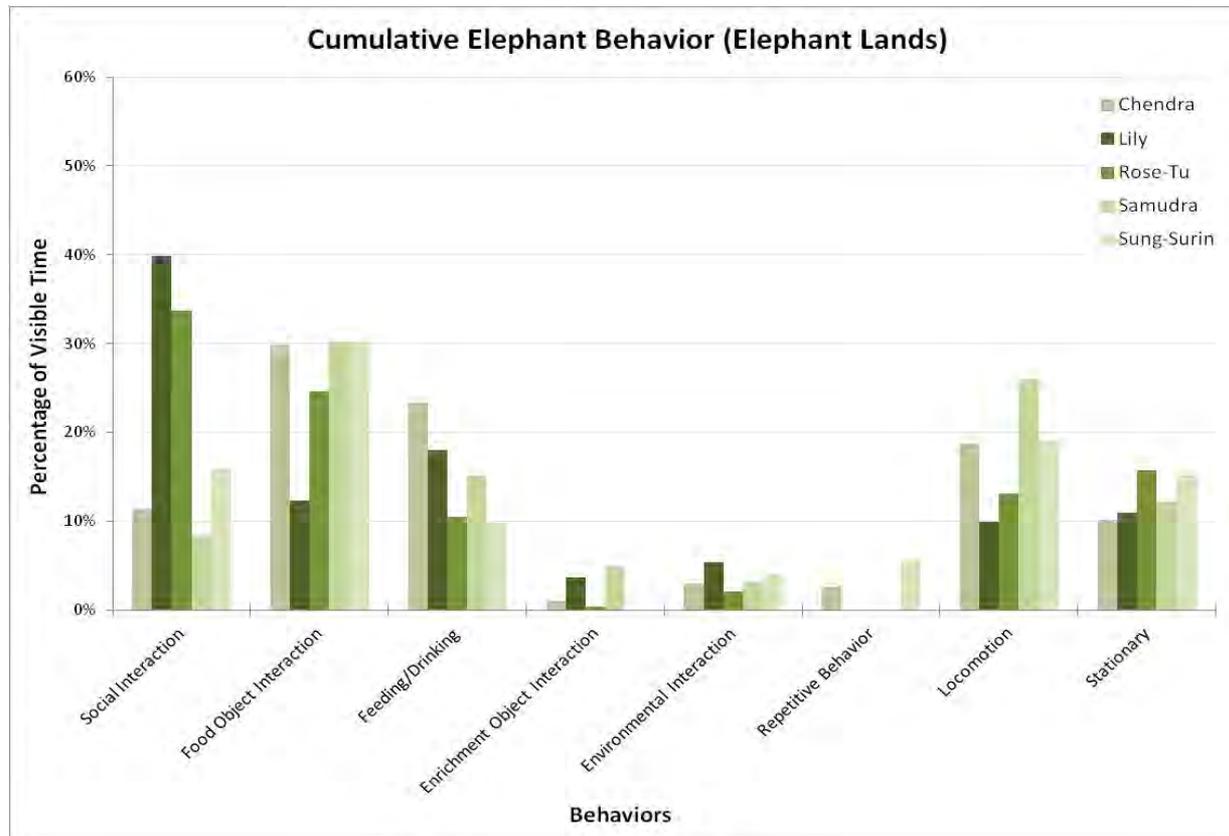Female Asian Elephant Progesterone (2015 -2016)

Adrenal Hormones

- All individuals exhibited the greatest variability in their adrenal activity during the period of major change, suggesting adaptive and normal adrenal responses to life changes, challenges and excitement.

- Elephants returned to baseline levels in the new habitat, suggesting they adapted well to the new environment.

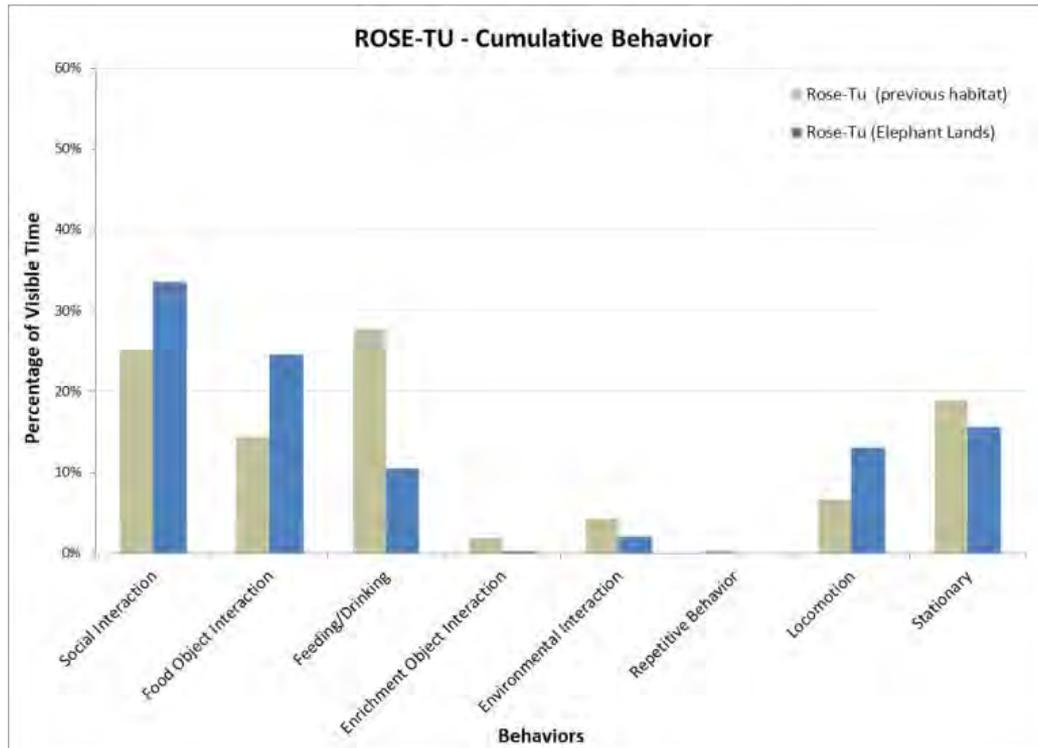- Adaptive and normal adrenal responses are an indicator of positive welfare.

Behavior

- In Elephant Lands, the majority of their time is spent socializing and interacting with their environment in a social context (22%), seeking food and feeding (40%), moving and resting (20%).

- The elephants are engaged in a diverse range of natural behaviors and demonstrating social dynamics of a healthy herd.

Behavior

Food-delivery resources designed into Elephant Lands are achieving the goal of providing foraging opportunities.
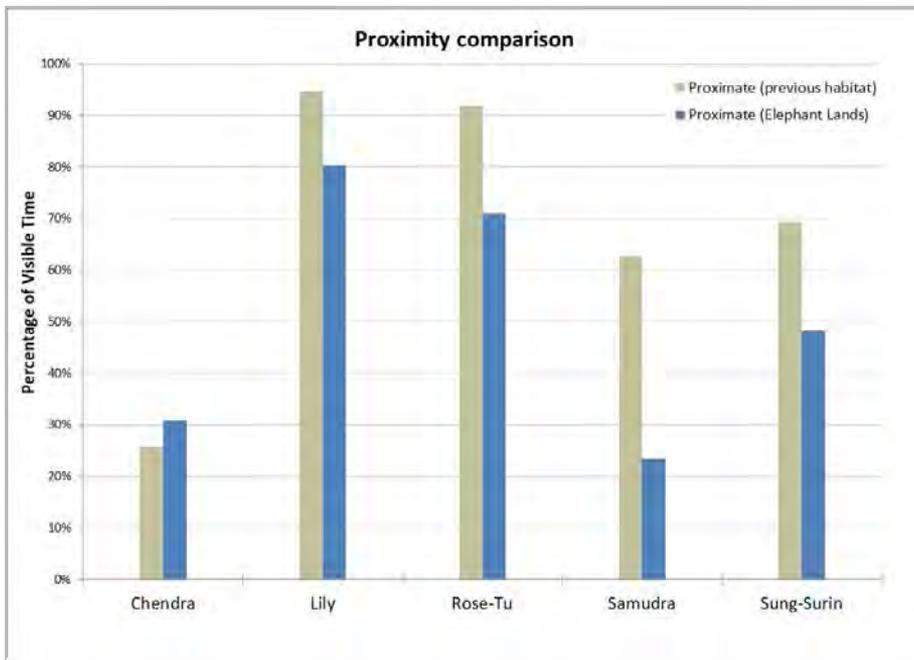

ROSE-TU - Cumulative Behavior

- Food object interaction increased by 20%.
- Feeding without interaction decreased by 20%.
- Switch from keeper-delivered food to feeding from food objects.
- Increased foraging is further supported by increases in daily walking distance and observed increase in locomotion (7% increase).
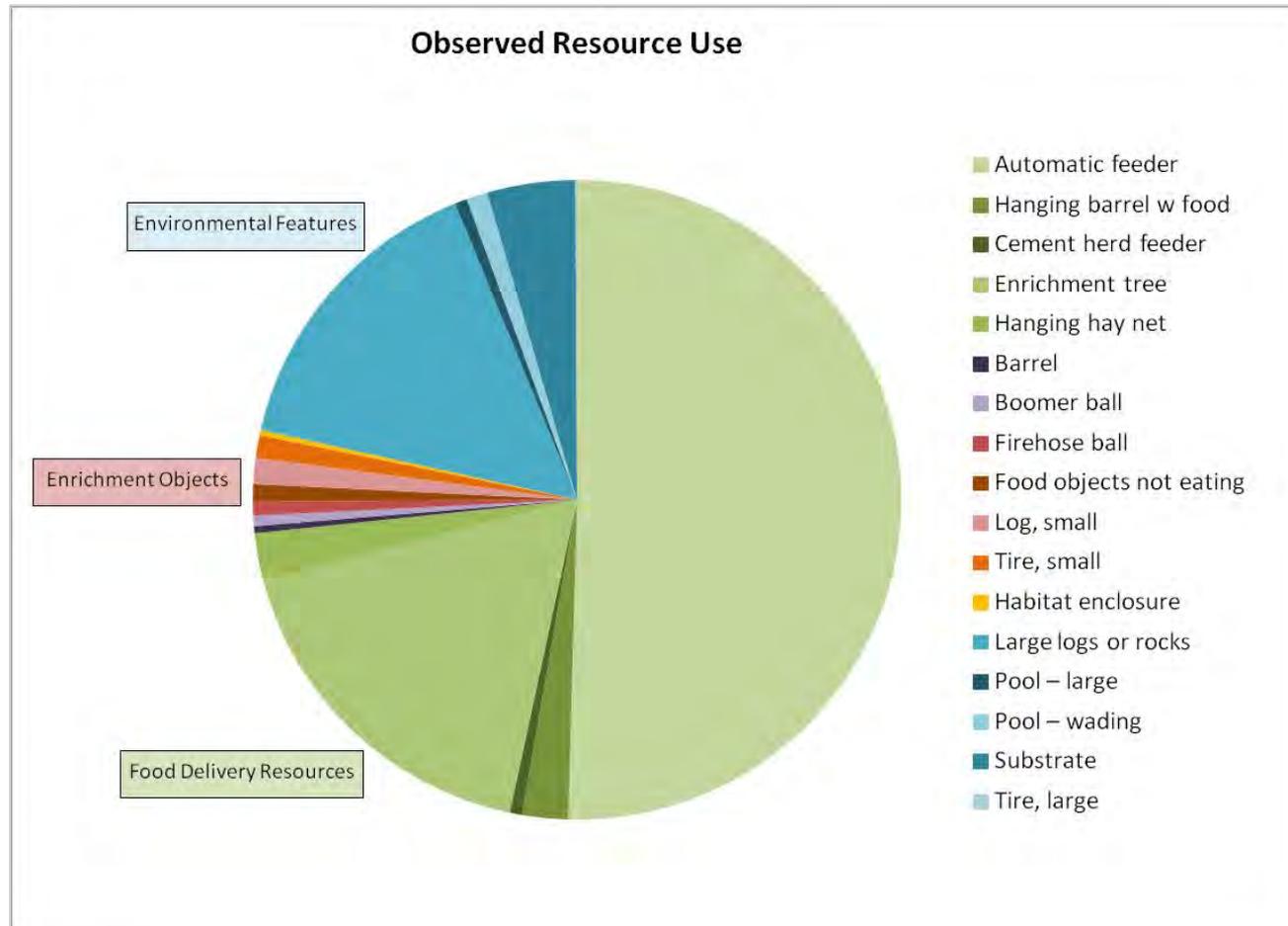
Behavior

Findings indicate increased choice and control over whom they spend time with and how they interact socially.

- Time spent engaging in social behaviors has increased (by 4%).
- Time spent in proximity of other elephants decreased (by 24%), reflecting a choice to spend time away from other elephants.
- Natural dynamics of a herd influence proximity with Samudra and Lily.

Resource Use

Observed Resource Use

Legend:
- Automatic feeder
- Hanging barrel w food
- Cement herd feeder
- Enrichment tree
- Hanging hay net
- Barrel
- Boomer ball
- Firehose ball
- Food objects not eating
- Log, small
- Tire, small
- Habitat enclosure
- Large logs or rocks
- Pool – large
- Pool – wading
- Substrate
- Tire, large

Chart labels: Environmental Features, Enrichment Objects, Food Delivery Resources

- Diversity of resources are used by individuals on their own (e.g. in the pool by themselves) in addition to sharing resources in a social context.
- Rare behaviors are important (pushing logs, mud wallows, playing w objects).

Summary

Results show that the zoo has achieved its goals with Elephant Lands.

- The elephants are expressing a diverse range of species-typical behaviors and demonstrating social dynamics of a healthy herd.

- They are walking further and foraging and exploring more.

- They are using the entire habitat and it's resources.

- They have biologically meaningful challenges, and show adaptive and normal adrenal responses to change & challenge.

- They are exhibiting more choice and self-determination.

Ongoing Monitoring

- Elephants
  - Behavior methods developed for this study are being used in ongoing weekly elephant behavior monitoring.
  - Reproductive hormones are measured for routine management.
  - Adrenal hormones are measured as needed.
- Construction
  - Multiple species (e.g., orangutan, chimp, elephants, giraffes,…)
  - Behavior, physiology, physical condition, keeper notes, noise levels
  - Start in 2018 throughout construction period
  - Graduate Student through our OZ-PSU program

Thank You