

Asia Trail Observation Study

**Office of Policy and Analysis
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Introduction

Purpose of the Study

The National Zoological Park (NZIP) has an ongoing interest in understanding its visitors' behaviors as they explore its exhibitions, as well as how their behaviors contribute to what they take away, particularly in terms of learning. Toward this end, the NZIP asked the Smithsonian Office of Policy and Analysis (OP&A) to conduct an observation study of visitors to *Asia Trail*. The study results can be used to aid decisionmaking related to visitor experiences on the second stage of *Asia Trail*, the Elephant Trail, now under development, and in general help the Zoo provide even more positive visits to its exhibitions.

For this study specifically, NZIP was interested in gaining insight into the following:

- How long do visitors spend on *Asia Trail*?
- What types of activities and elements of the Trail did visitors engage in and for how long?
- What kinds of behaviors did visitors perform in association with various exhibition elements?
- Did "comfort" factors such as crowding and weather affect the amount of time visitors spent on the Trail?

A team of NZIP staff and volunteers observed 101¹ visitors as they traveled *Asia Trail* over a two-month period between June 10 and August 15, 2008. Fifty-six visitors (56%) were observed as they explored the exhibition going downhill from the Connecticut Avenue entrance to the Zoo, and 45 visitors (45%) were observed as they walked the exhibition uphill from the entrance near the Panda Plaza Grille.

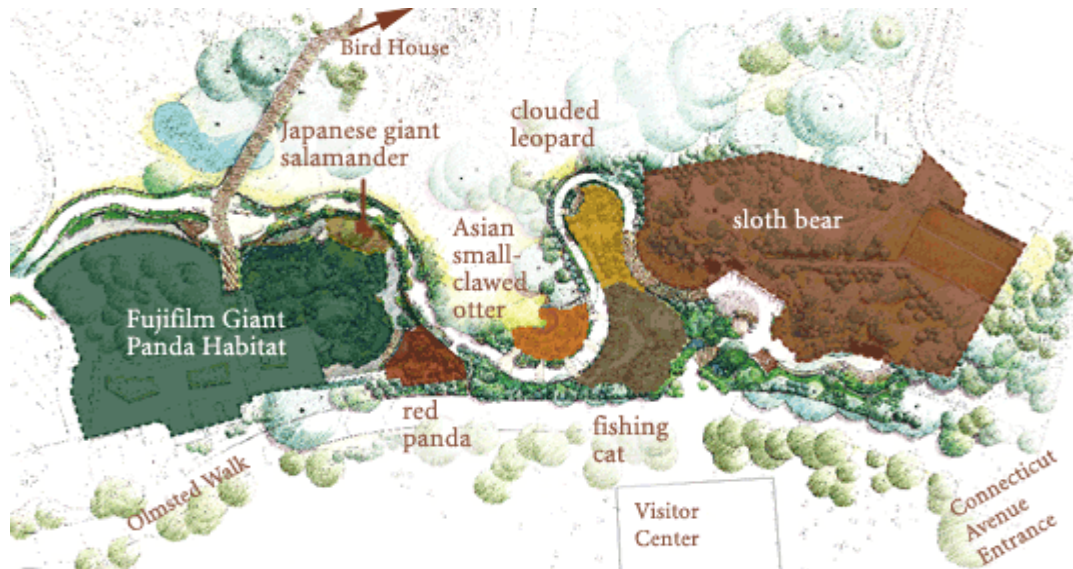
¹ The results presented in this report are representative of visitors observing *Asia Trail* during the period of the study and have a 95 percent probability of being within a margin of error of +/- 10%.

Description of *Asia Trail*

In October 2006, the National Zoo opened *Asia Trail* to the public. The Trail, which encompasses the Fujifilm Giant Panda Habitat, is home to six additional threatened or endangered species native to the Asian continent—Red Pandas, Asian Small-Clawed Otters, Fishing Cats, Clouded Leopards, Sloth Bears, and a Giant Japanese Salamander. The series of exhibits covers nearly six acres, with a quarter-mile pathway that winds through realistic outdoor habitats (see Exhibit 1).

Asia Trail was designed to be an immersive experience of sights and sounds that offers different vantage points for looking at the animals, including glass viewing areas that bring visitors eye-to-eye with them. The Trail incorporates a range of interpretive options, including signage, interactive games, and bronze statues of animals, and volunteer interpreters and Zoo staff are available on the Trail at different times. One goal of *Asia Trail* is to impart a strong conservation message by demonstrating conservation methods in Asia such as sustainable agricultural practices and use of alternative fuels (e.g., bio-gas stoves). In addition, interactive Decision/Dilemma Stations allow visitors to experience the conflicts of interest that arise when trying to conserve species, habitats, and livelihoods. Finally, *Asia Trail* highlights the conservation work of National Zoo scientists.

Exhibit 1. Map of *Asia Trail*



Methodology

The OP&A study team developed an observation instrument for recording visitors' exploration of *Asia Trail*, working closely with Zoo staff. The study team divided *Asia Trail* into 15 sections, with a map for each section that showed the various exhibition elements with which visitors could stop and engage. Observers used the maps to record how, if at all, visitors engaged with the elements in each section (see the Appendix for the study findings by section and copies of the section maps). The forms also contained an area in which to record background information on each section at the time the observed visitor passed through: date of the visit, time of entry onto and exit from *Asia Trail*, weather, crowding (number of people in the section), availability of a Zoo interpreter, and visibility and movement of animals.²

Observation protocol: OP&A trained a team of NZP staff and volunteers to observe visitors and record their behaviors on the observation forms. Observers were asked to select the visitor to be observed at the point of entry onto the Trail, using variable interval sampling. If the person selected for observation was a child who appeared to be under 5 years of age and in a stroller, the observer would select the next eligible person for observation. Two types of individuals were excluded from this study: people directly associated with the Zoo, such as staff, interns, volunteers, and contractors; and people in an organized group (e.g., a tour or school group), who typically could be identified by a similar shirt/hat or badge.

The observers were then asked to record:

- The date, time of day, and point of entry onto *Asia Trail*
- The selected visitor's demographic characteristics (estimated age, group composition, and gender)
- Background information for each section of *Asia Trail* the observed visitor entered:
 - Status of the animals: visible, moving, or not out
 - Availability of an interpreter
 - Weather—pleasant or not (e.g., very hot and humid or drizzly)
 - Crowding—estimated number of people in the section as the visitor walked through
- Elapsed time visitors spent in each section
- Stops at elements within each section of the Trail and the elapsed time for each stop.

Exhibition features: the observation forms showed three types of exhibition features on the Trail:

² To determine whether there is a relationship between the visibility and movement of the animals, availability of interpreters, number of visitors in a specific section, weather, and the amount of time spent by visitors in a section, the study applied several analytical techniques such as analysis of variance, t-tests, and regression.

- **Elements**—examples are Maps; Bronze Statues; Animal, Plant, etc. Identification and Information Labels (sometimes noted on the form as ID1, ID2, etc., with part of the element’s title); Interactives, which include hands-on activities; Benches; Conservation Decision Stations/Plazas; Curiosity Stations; and Check It Out features.
- **Viewing Areas (animal habitats)**—places where a visitor can look into an animal’s habitat.
- **Landscapes**—areas alongside the Trail or that can be seen from the Trail but are not part of the animal habitats per se.

Possible visitor behaviors: the form identifies up to six behaviors in which a visitor might engage at an exhibition element. The observers were asked to record whether the visitors engaged in any of the behaviors at an element and the amount of time spent at the element:

- **Stop**—the observed visitor stops *fully for at least two seconds*
- **Touch**—the observed visitor actually touches the element
- **Talk**—the observed visitor talks either with a companion(s) or NZP/FONZ staff member/interpreter
- **Point**—the observed visitor specifically points at the element
- **Photo**—the observed visitor takes a picture at the element or has someone else take a picture
- **Sit**—the selected observed sits on a bench within the exhibition section.

Limitations of the data:

All data derive from what the observers believe they saw the selected visitor do. As such, there is potential for a degree of human error in recording visitor behaviors. To improve the accuracy of the observers’ estimations, before the actual observations began, the OP&A study team conducted several trial observations with each observer to provide guidance and answer questions. The observers then conducted several trial observations on their own to become thoroughly familiar with the observation forms and to improve their ability to conduct observations. Even so, observers could not be completely certain about a visitor’s behavior at an element. For example, even though the observed visitor might have stopped in front of an exhibition panel, he or she might have just looked at the panel’s graphics rather than reading the information provided, or might have been thinking about something else entirely and paid no attention to the text.

For ethical considerations, during the time of observations, *Asia Trail* staff posted signage at both entrances to the Trail alerting visitors that an observation study was taking place. It is possible that some visitors might have behaved differently on the Trail knowing that they might be observed.

It is important to note that there were some changes to *Asia Trail* over the period of the observation study, so that the observation forms were not always a true reflection of the Trail:

- For at least one day during the study period, the sign placed at the intersection between *Asia Trail* and the path toward the Bird House exhibition was pointing in the wrong direction for the Trail. This might explain why 33 visitors (33%) of visitors exited the exhibition without completing the Trail.
- The Giant Japanese Salamander was absent during the entire observation period, although other exhibition elements in this section were still in place.
- The Red Pandas were gone from their habitat for part of the observation period.
- Some exhibition features were not visible due to overgrowth of plants (this was true for at least two plant IDs).
- Some exhibition features were removed temporarily (e.g., one Log Book in the Lower Giant Panda section), and other exhibition features were moved to different locations (e.g., Giant Panda ID4 [Incredible]).

Organization of the Report

The next section contains the study findings for *Asia Trail* as a whole, followed by the OP&A study team's thoughts and discussion on the results of the study and how they might be used. The Appendix contains the findings for each section of the Trail and corresponding maps with displays of the data for each element in the section.

Overall Findings

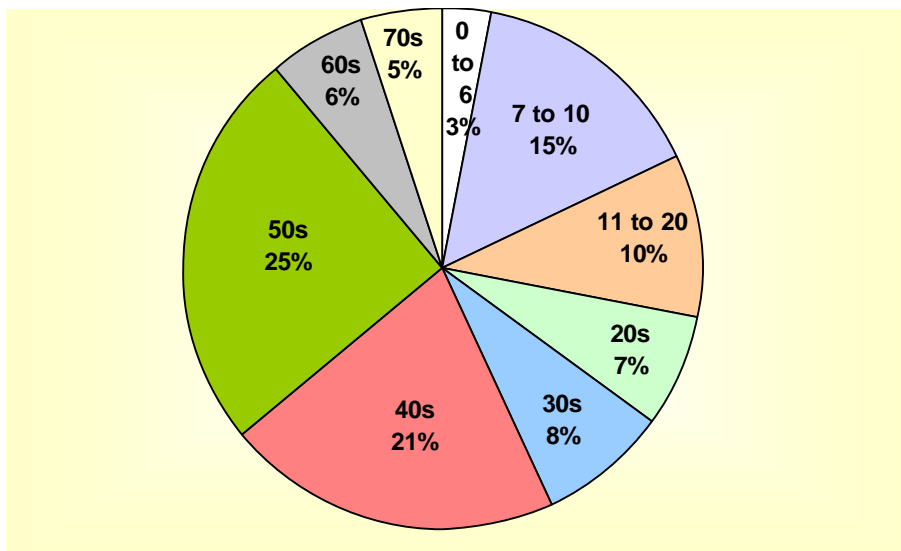
The Demographics of Observed Visitors

The observers estimated the age, gender, and group composition of the randomly selected visitors.

Estimated gender: the gender of the *Asia Trail* visitors was tilted slightly toward female visitors (n=56 compared to n=44 for male visitors).

Estimated age: a large majority of the observed visitors were estimated to be middle-aged (in their 40s and 50s) and young (between 7- and 20-years old) (see Exhibit 2).

Exhibit 2. Age distribution of observed visitors to *Asia Trail*



Estimated group composition: the vast majority of observed visitors (n=98) were accompanied by other individuals (54% of the groups consisted of one or more adults with one or more children estimated to be under 15; 22% included one or more adults; 12% consisted of one or more adults with one or more of the members estimated to be under 15 and in their 20s; 9% included groups of one or more adults with members estimated to be in their 20s; and 2% included groups with members estimated to be under 15 and in their 20s. Only 2 visitors were alone.

Visitors' Engagement with *Asia Trail*

Path through the exhibition: visitors had complete control over the path they chose while on *Asia Trail*. They could choose to stop in a section or walk straight through, traverse the Trail without stopping at all, or leave the Trail at any of three exits or by walking back along the Trail to the point of entry. Several paths chosen by observed visitors stand out (see Exhibit 3):

- **Not all visitors passed through all exhibition sections:** 6-7 out of 10 observed visitors explored the vast majority of sections of the Trail, but three exceptions are noteworthy:
 - 8 in 10 observed visitors (n=79) went into the Upper Giant Panda section.
 - 2 in 10 observed visitors (n=21) explored the Giant Panda Conservation Station.
 - Only 14 of 101 observed visitors walked through the Bamboo Interpretation section, making it the least visited section.

Exhibit 3. Observed visitors' paths through the sections of *Asia Trail*, in order of frequency of visitors

<i>Asia Trail</i> sections	Total # of visitors who passed through	# of visitors who spent at least 1 minute	# of visitors who made at least 1 stop
Upper Giant Panda	79	64	64
Upper Red Panda	67	50	50
Fishing Cats	66	50	50
Otters	66	50	50
Lower Giant Panda	66	44	44
Clouded Leopard	65	54	54
Sloth Bear Trestle Bridge	65	49	49
Sloth Bear Theatre	65	48	48
Sloth Bear Conservation Station	65	21	21
Lower Giant Panda 2	63	42	42
Giant Panda House	60	57	57
Giant Japanese Salamander	60	31	31
Lower Red Panda	59	34	34
Giant Panda Conservation Station	21	11	11
Bamboo Interpretation	14	11	11

- **A third of observed visitors (n=33) exited *Asia Trail* at the Bird House entrance/exit without completing the Trail:** 22 observed visitors who started the Trail at the upper entrance and 11 who explored the Trail starting at the lower

entrance left the Trail at the Birds House entrance/exit. One reason, as noted, is that observed visitors might have been misdirected by an incorrectly placed direction sign; another is that some observed visitors wanted to visit the Birds House and just happened to get there via part of *Asia Trail*; and yet another is that some visitors did not intend to complete the Trail.

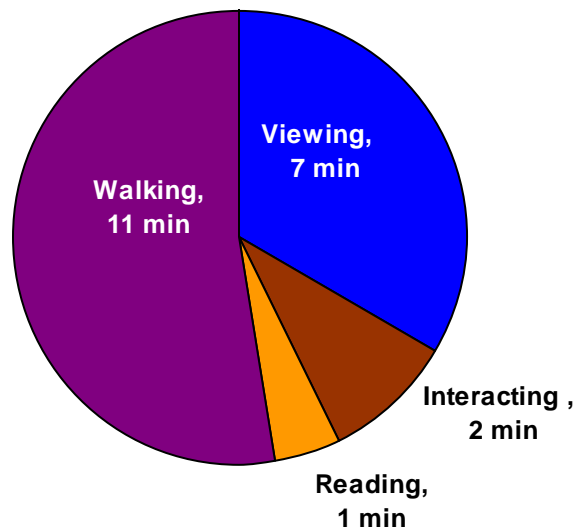
- **Almost a quarter of observed visitors (n=22), and more than half of those who entered the exhibition at the lower entrance, only visited the Giant Pandas** (including Lower Giant Panda section, Giant Panda Conservation Station, Lower Giant Panda 2 section, Giant Japanese Salamander section, Lower Red Panda section, and Giant Panda House): this finding might indicate that a large proportion of visitors came only to see the Giant Pandas.

Number of Overall Stops and Time Spent by Visitors on *Asia Trail*

Observed visitors spent, on average, around 21 minutes on *Asia Trail*: however, the amount of time that observed visitors spent on the Trail varied widely. The least amount of time was 5 minutes, and the longest amount was 57 minutes (see Exhibit 4).

- 50 percent of observed visitors spent between 13 and 30 minutes on the Trail.
- Males, on average, spent 5 minutes more on the Trail than females (24 minutes and 19 minutes, respectively).
- There was no difference in the amount of time people spent on the Trail based on point of entry.

Exhibit 4: Average Time Spent by Observed Visitors on *Asia Trail* by Type of Activity (21 minutes)



Observed visitors spent, on average, slightly less than half their time stopped at exhibition elements (10 minutes): two visitors did not spend any time on stops. One visitor spent 49 minutes on stops, the greatest amount of time. The middle half of visitors spent between 4 and 13 minutes on stops (see Exhibits 4 and 5).

- Observed visitors stopped, on average, at 14 different locations on *Asia Trail*. The highest number of stops made by any visitors was 48. Half the visitors made between 7 and 18 stops (see Exhibit 5).
- Visitors going downhill made 4 more stops, on average, than visitors going uphill (15 and 11 stops, respectively).
- There was no difference in the amount of time visitors spent on stops based on gender.

Exhibit 5. Time spent on *Asia Trail* overall and on stops, and number of stops, by observed visitors

<i>Time spent on the Trail overall and on stops and overall number of stops</i>	<i># of visitors</i>	<i>Total</i>	<i>Mean</i>	<i>Median</i>	<i>Minimum</i>	<i>Maximum</i>	<i>Percentile 25</i>	<i>Percentile 75</i>
Total time spent on <i>Asia Trail</i> (minutes)	101	2,157	21	19	5	57	13	30
Total time spent on stops (minutes)	99	998	10	8	0	49	4	13
Total time spent on stops (seconds)	99	59,876	605	494	25	2,926	224	802
Overall stops on <i>Asia Trail</i>	99	1,343	14	11	1	48	7	18

Types of Activities Engaged in by Observed Visitors

Following are the findings relative to the types of behaviors that observed visitors engaged in, in order of frequency (see Exhibits 4, 6, 7 and 8).

Walking and stopping:³ observed visitors spent more than half their time, 54% (1,159 minutes) on the Trail just walking and 46% (998 minutes) stopped at elements (including Viewing Areas and Benches).

³ The total time spent walking is computed by subtracting the total time observed visitors spent on stops from the total time visitors spent on the Trail.

**Exhibit 6. Number of stops on *Asia Trail* by observed visitors,
overall and by type of activity**

<i>Stops overall and by type of activity</i>	<i># of visitors who made at least 1 stop</i>	<i>Total</i>	<i>Mean</i>	<i>Median</i>	<i>Minimum</i>	<i>Maximum</i>	<i>Percentile 25</i>	<i>Percentile 75</i>
Total stops on <i>Asia Trail</i>	99	1,343	14	11	1	48	7	18
Total stops by type of activity ⁴								
Viewing	97	685	7	6	1	17	4	10
Using interactives	77	376	5	3	1	28	1	6
Reading	70	226	3	3	1	12	1	4

**Exhibit 7. Time Spent on Stops on *Asia Trail* by Observed Visitors,
Overall and by Type of Activity**

<i>Time on stops overall and by type of activity</i>	<i># of visitors who made at least 1 stop</i>	<i>Total</i>	<i>Mean</i>	<i>Median</i>	<i>Minimum</i>	<i>Maximum</i>	<i>Percentile 25</i>	<i>Percentile 75</i>
Total time spent on <i>Asia Trail</i> (minutes)	101	2,157	21	19	5	57	13	30
Total time spent on stops (minutes)	99	998	10	8	0	49	4	13
Time spent on stops by type of activity (minutes) ⁵								
Viewing animals	97	704	7	5	0	26	3	10
Using Interactives	77	149	2	1	1	11	0	2
Reading	70	80	1	1	0	6	0	1

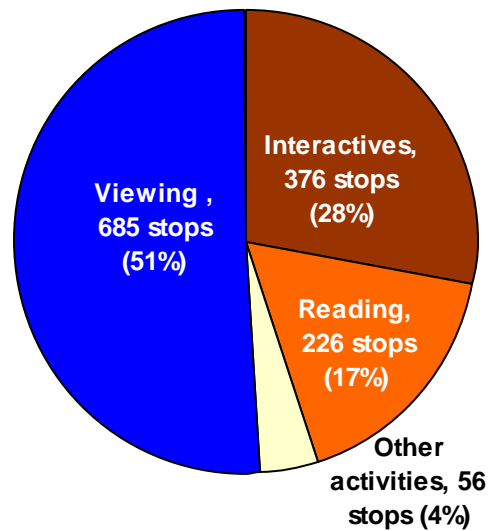
⁴ The total number of stops associated with viewing, using interactives, and reading does not add up to the total number of stops made by visitors on *Asia Trail* because the stops associated with “benches” and “landscapes” were excluded from this analysis.

⁵ The total time spent on stops associated with viewing, using interactives, and reading, does not add up to the total time spent by visitors on stops because the time spent by visitors at “benches” and “landscapes” was excluded from this analysis.

Viewing: when stopped, 97 observed visitors spent *most* of their time viewing the animals and their habitats, making at least 1 stop at a Viewing Area. About a third of their time (33%) was spent viewing the animals and their habitats.

- The 97 observed visitors who made at least 1 stop at Viewing Areas made a total of 685 stops at these elements, or 51% of the total number of stops (1,343). On average, observed visitors made 7 stops at Viewing Areas. The frequency with which they stopped at Viewing Areas ranged between 1 and 17; 50% of them made between 4 and 10 stops (see Exhibits 6 and 8).
- The total time that observed visitors spent viewing animals and their habitats was 704 minutes, which accounted for 71% of the time the visitors spent on stops (998 minutes) and 33% of the time spent on the Trail (2,157 minutes). The 97 observed visitors who made at least 1 stop at Viewing Areas spent, on average, 5 minutes looking at the animals and their habitats. The least amount of time spent by any visitor at a Viewing Area was 10 seconds, while the longest was 26 minutes. Half the visitors spent between 3 and 10 minutes viewing the animals and their habitats (see Exhibits 4 and 7).

Exhibit 8: Stops on Asia Trail by Observed Visitors by Type of Activity (1,343)

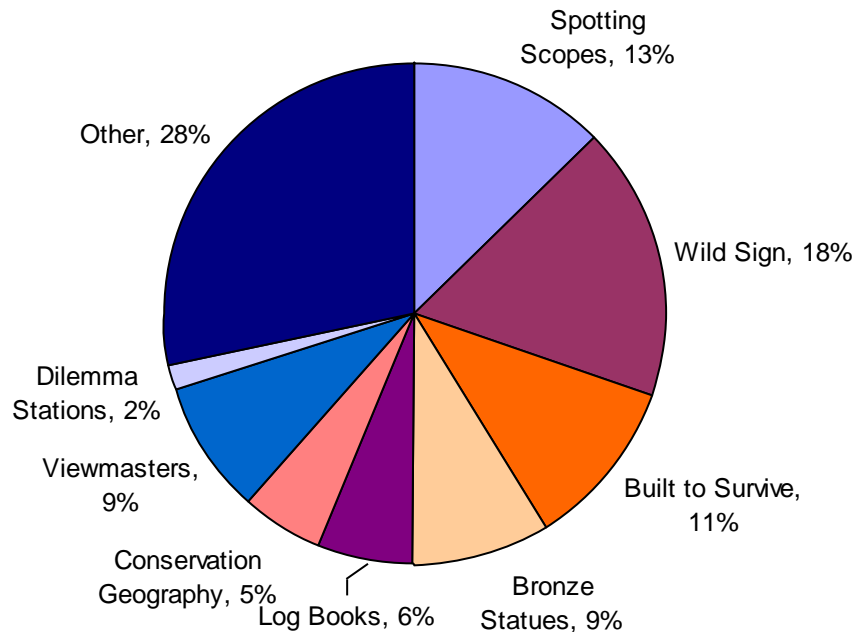


Using interactives: observed visitors spent 7% of their total time on the Trail stopped at interactives, which include elements intended to be touched, looked at/through, and/or read, such as the Curiosity Stations, Bronze Statues, Spotting Scopes, Log Books, What in the Wild Signs, Geography Maps (the light-up topographic maps), Decision/Dilemma Stations, What’s Next (in the Giant Panda House), Panda Growing Up (Giant Panda House), and Panda Science Station (Giant Panda House).

- The 77 observed visitors made a total of 376 stops at interactive elements (or 28% of the total stops made by observed visitors). On average, these 77 visitors made 5 stops at interactives, with a range of 1 to 28. Half the visitors made between 1 and 6 stops (see Exhibit 6 and 9).

- The 77 observed visitors who stopped at at least 1 interactive spent a total of 149 minutes at these elements, or 15% of their total time on stops on the Trail and 7% of their time on the Trail overall. On average, these 77 visitors spent 2 minutes at interactive elements. The least amount of time any observed visitor spent was 3 seconds, and the most was 11 minutes. Fifty percent of visitors spent between a half and 2 minutes (see Exhibits 4 and 7).

Exhibit 9: Stops at Asia Trail interactive elements (376)



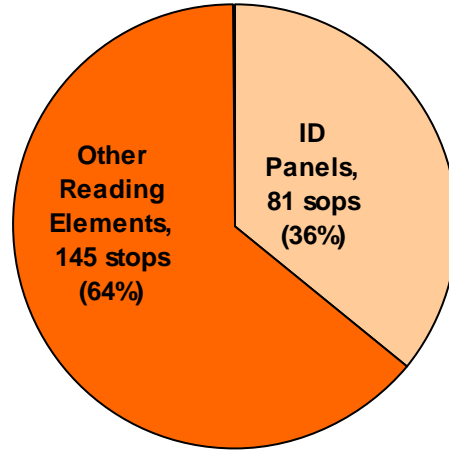
Note: Other includes interactives such as What's Next (Giant Panda House), Panda Growing Up (Giant Panda House), and Panda Science Station (Giant Panda House) etc..

Reading: 70 observed visitors spent 4% of their time on the Trail stopped at reading elements, such as text panels/labels (IDs, Check It Out, and Maps), stories and information panels in the Conservation Stations/Plazas, and text panels in the Bamboo Interpretation area and Giant Panda House.

- The total number of stops made by the 70 observed visitors who made at least 1 stop at the Reading Areas was 226. These accounted for 17% of the total 1,343 stops made by visitors. On average, visitors made 3 stops at reading elements, with a range of 1 to 12 stops; 50% of the visitors made between 1 and 4 stops at reading elements (see Exhibit 6 and 10).
- The 70 observed visitors spent 80 minutes stopped at reading elements, which accounted for 8% of the time visitors spent on stops (998 minutes) and 4% of the time visitors spent on the Trail overall (2,157 minutes). The 70 observed visitors spent, on average, 1 minute at reading elements. The least amount of time an observed visitor spent at reading element(s) was 2 seconds, while the longest was

6 minutes. Half the visitors spent between a half to over a minute stopped at reading elements (see Exhibits 4 and 7).

Exhibit 10: Stops at Asia Trail reading elements (226)



Note: Other includes exhibition elements that are intended to be read, including text panels/labels such as Check It Out, maps, stories and information panels in the Conservation Stations, and text panels in the Bamboo Interpretation area and Giant Panda House.

Use of *Asia Trail* Elements

Following are the study findings based on the use of exhibition elements by observed visitors—Animal IDs, Spotting Scopes, Find-It Signs, Built to Survive, Bronze Statues, Log Books, Geography Maps, Viewmasters, and Decision/Dilemma Stations—in order of the number of visitors who engaged with these elements (see Exhibits 9, 10, 11 and 12).

Animal ID panels (total of 31 ID panels, with at least 1 ID panel per exhibition section⁶): 44 observed visitors stopped, on average, at 2 Animal ID panels, with an average of 14 seconds per stop.

- Observed visitors made a total of 81 stops at Animal ID panels, which accounted for 36% of the total number of stops visitors made at reading elements (see Exhibit 10 and 11).
- The amount of time visitors spent reading the Animal ID panels was 19 minutes, which accounted for 24% of the total time visitors spent at reading elements (see Exhibit 12).

Spotting Scopes (6, with 2 at the Sloth Bear Trestle Bridge and 4 in the Lower Giant Panda sections): 33 observed visitors stopped, on average, at at least 1 Spotting Scope, with an average of 23 seconds per stop.

⁶ The 31 ID panels include the 5 in the Bamboo Identification Section.

- The total number of stops at Spotting Scopes was 48, which accounted for 13% of the total number of stops observed visitors made at interactives (see Exhibits 9 and 11).
- The total amount of time observed visitors spent at the Spotting Scopes was 18 minutes, accounting for 12% of the total time that the visitors spent at interactives (see Exhibit 12).

Find-It Signs (9, scattered throughout the Trail): 28 stopped at at least 2 Find-It Signs, with an average of 12 seconds per stop. This element was the most frequently used interactive.

- The total number of stops that observed visitors made at Find-It Signs was 66, which accounted for 18% of the total stops visitors made at interactives (see Exhibits 9 and 11).
- The total amount of time that visitors spent at the Find-It Signs was 13 minutes, which accounted for 9% of the total time that observed visitors spent at interactives (see Exhibit 12).

Built to Survive (7, one for each animal): on average, 25 observed visitors stopped at Built to Survive elements, spending 14 seconds per stop.

- The total number of stops that observed visitors made at Built to Survive elements was 41, which accounted for 11% of the total stops that they made at interactives (see Exhibits 9 and 11).
- The total amount of time that observed visitors spent at Built to Survive features was 9 minutes, which accounted 6% of the total time that they spent at interactives (see Exhibit 12).

Bronze Statues (6): on average, 24 observed visitors stopped at at least one Bronze Statue, spending 22 seconds per stop.

- The total number of stops at the Bronze Statues was 33, which accounted for 9% of the total stops that observed visitors made at interactives (see Exhibit 9 and 11).
- The total amount of time spent at the Bronze Statues was 12 minutes, which accounted for 8% of the total time that observed visitors spent at interactives (see Exhibit 12).

**Exhibit 11. Number of Stops on *Asia Trail* by Observed Visitors,
Overall and by Element**

<i>Stops on Asia Trail overall and by element</i>	<i># of visitors who made at least 1 stop</i>	<i>Total</i>	<i>Mean</i>	<i>Median</i>	<i>Minimum</i>	<i>Maximum</i>	<i>Percentile 25</i>	<i>Percentile 75</i>
Total stops on <i>Asia Trail</i>	99	1,343	14	11	1	48	7	18
Total stops by element								
Viewing only	97	685	7	6	1	17	4	10
IDs	44	81	2	1	1	5	1	3
Spotting Scopes	33	48	1	1	1	5	1	2
Wild Signs	28	66	2	1	1	8	1	3
Built to Survive	25	41	2	1	1	5	1	2
Bronze Statues	24	33	1	1	1	3	1	2
Log Books	19	23	1	1	1	3	1	1
Geography Maps	17	20	1	1	1	2	1	1
Viewmasters	16	32	2	2	1	5	1	3
Decision/Dilemma Stations	6	6	1	1	1	1	1	1

**Exhibit 12. Time Spent on Stops on *Asia Trail* by Observed Visitors,
Overall and by Element**

<i>Time spent on stops on Asia Trail overall and by element</i>	<i># of visitors who made at least 1 stop</i>	<i>Total</i>	<i>Mean</i>	<i>Median</i>	<i>Minimum</i>	<i>Maximum</i>	<i>Percentile 25</i>	<i>Percentile 75</i>
Total time on stops overall (seconds)	99	59,876	593	492	0	2,926	214	761
Total time on stops by element (seconds)								
Animal Viewing Areas	97	42,242	435	329	10	1,586	181	581
IDs	44	1,153	26	11	1	327	5	30
Spotting Scopes	33	1,087	33	28	2	98	8	54
Wild Signs	27	793	29	12	3	122	6	47
Built to Survive	25	560	22	15	3	106	10	35
Bronze Statues	24	726	30	15	3	195	5	35
Log Books	19	397	21	15	3	97	8	29
Geography Maps	17	845	50	24	3	409	6	39
Viewmasters	16	704	44	25	3	194	15	60
Decision/Dilemma Stations	6	256	43	28	6	150	10	35

Log Books (6): on average, 19 visitors stopped at least 1 Log Book, spending 17 seconds per stop.

- The total number of stops at the Log Books was 23, which accounted for 6% of the total stops that observed visitors made at interactives (see Exhibit 9 and 11).
- The total amount of time spent at the Log Books was 7 minutes, which accounted for 5% of the total time that observed visitors spent at interactives (see Exhibit 12).

Geography Maps (2): on average, 17 observed visitors stopped at least one of the Geography Maps, spending 42 seconds per stop. This makes the Geography Maps the feature at which observed visitors spent the third longest amount of time per stop.

- The total number of stops made at the Geography Maps was 20, which accounted for 5% of the total stops that observed visitors made at interactives (see Exhibit 9 and 11).
- The total amount of time spent at the Geography Maps was 14 minutes, which accounted for 9% of the total time that observed visitors spent at interactives (see Exhibit 12).

Viewmasters (6): on average, 16 observed visitors stopped at 2 Viewmasters, spending 22 seconds per stop.

- The total number of stops at Viewmasters was 32, which accounted for 9% of the total stops that observed visitors made at interactives (see Exhibit 9 and 11).
- The total amount of time visitors spent at the Viewmasters was 12 minutes, which accounted for 8% of the total time that visitors spent at interactives (see Exhibit 12).

Decision/Dilemma Stations (5 computer terminals): 6 visitors stopped at 1 Decision/Dilemma Station, spending, on average, 43 seconds per stop. This makes the Decision/Dilemma Stations the element at which visitors spent the longest amount of time per stop, other than the stops associated with the Viewing Areas.

- The total number of stops at Decision/Dilemma Stations was 6, which accounted for less than 2% of the total stops that observed visitors made at interactives (see Exhibit 9 and 11).
- The total amount of time spent at Decision/Dilemma Stations was 4 minutes, which accounted for 3% of the total time that observed visitors spent at interactives (see Exhibit 12).

The Relationship between Contextual Factors and the Time Spent by Visitors on Stops

Following is a summary of the study findings relative to the relationship between the amount of time visitors spent on stops on *Asia Trail* and the status of contextual elements as recorded by the observers (for a more detailed description of these findings see Appendix A).

Results from previous observation research conducted at zoos indicate that the visibility of animals and/or availability of interpreters or staff in exhibitions influence the amount of time visitors spent in the exhibition. Similarly, findings from previous research suggest that certain “comfort” factors, including crowding—the number of people in a section at the time the observed visitor passed through and weather might influence the amount of time visitors spent in the exhibition.

For this study, the observer recorded specific background information for each section of the exhibition in which the observed visitor entered:

- Status of the animals: visible, moving, or not out
- Availability of an interpreter: available, not available
- Weather—pleasant or not (e.g., very hot and humid or drizzly)
- Crowding—estimated number of people in the section as the visitor walked through.

To determine whether there is a relationship between the visibility and movement of the animals, availability of interpreters, number of visitors in a specific section, weather, and the amount of time spent by visitors on stops in a section, the study applied several analytical techniques such as analysis of variance, t-tests, and regression. The results of these analyses are summarized in Exhibit 13 and detailed in Appendix A.

Animal viewing: in 9 out of the 11 sections in which the relationship between the amount of time visitors spent on stops and the visibility of animals was analyzed, visitors were more likely to spend more time on stops when an animal was visible or moving than when one was not out.

Interpreters: the relationship between the availability of interpreters and the amount of time visitors spent on stops could be tested in only 4 section of the *Asia Trail*, as the number of visitors in some sections was too small or an interpreter was available in too few instances when the observed visitor walked by. The findings show that visitors were likely to spend a significantly larger amount of time on stops in a section where an interpreter was available to them than when one was not there.

Crowding: more often than not (for 6 out of 11 sections for which this analysis was conducted), there was a positive relationship between the amount of time visitors spent on stops and the number of visitors in the section.

Weather: in most instances (for 12 out of 13 sections for which this analysis was conducted) no relationship was found between weather and the amount of time spent on stops in the various sections of *Asia Trail*.

Exhibit 13. The relationship between the amount of time visitors spent on stops on *Asia Trail* sections and the status of contextual elements.

<i>Asia Trail</i> sections	Visibility of animals (visible or moving)	Availability of interpreters	Crowding (number of people in the section)	Pleasant weather
1. Sloth Bear Theatre	+	+	+	O
2. Sloth Bear Conservation Station	NA	NA	NA	O
3. Sloth Bear Trestle Bridge	+	+	+	O
4. Clouded Leopard	O	+	+	O
5. Fishing Cats	+	NA	+	+
6. Otters	+	NA	O	O
7. Upper Red Panda	+	NA	O	O
8. Upper Giant Panda	O	NA	+	O
9. Bamboo Interpretation	NA	NA	NA	NA
10. Lower Giant Panda	+	NA	O	O
11. Giant Panda Conservation Station	NA	NA	NA	NA
12. Lower Giant Panda 2	+	NA	+	O
13. Giant Japanese Salamander	NA	NA	O	O
14. Lower Red Panda	+	NA	O	O
15. Giant Panda House	+	O	O	O

+: indicates that, in this sample, visitors were more likely to spend a higher amount of time on stops when the condition pertained.

NA: indicates that the analysis could not be conducted either because the number of visitors in the section was too small or that the amount of variability in what was being measured was too low.

O: indicates that, in this sample, no relationship was found between the amount on time visitors spent on stops and the variable being tested.

Thoughts and Discussion

Asia Trail offered an environment in which visitors could freely explore the exhibition and its elements. As such, visitors' paths through the exhibition, their choice of engagement in various types of activities or interaction with various elements, as well as the amount of time they chose to spend overall and doing specific things, reflect the intersection between visitors' free choice among all the options available, the time they had available to spend on *Asia Trail*, and the appeal and effectiveness of the design of the Trail.

The data make clear that people are different and choose to engage with *Asia Trail* in different ways. In terms of number of stops, observed visitors engaged mainly in walking, viewing the animals and their habitats, using interactives, and reading—685 stops at viewing opportunities, 376 stops at interactives, and 226 at reading elements. In general, the time spent on stops showed the same pattern. It is important to note, however, that just because some elements might not have gotten a large number of stops and time spent does not mean they were unappreciated or ineffective. It simply means that they appealed to a smaller segment of observed visitors. This pattern of use bears out the importance of offering a range of alternatives to meet visitors' different styles of engaging with exhibitions.

The study team cannot make any inferences relating to the kind, type, and quality of information visitors absorbed. All the data in this study serve only as proxies for engagement and learning. Moreover, there are no benchmarks against which to compare the findings of this study. For example, the study team does not know how long it takes a visitor to complete a particular activity or read an information panel thoroughly (or whether their engagement resulted in the absorption of information). Such benchmarks might provide better context for interpreting the average time spent by visitors at exhibition features. For example, if it takes 20 seconds to read the typical *Asia Trail* ID panel carefully, the fact that the average observed visitor spent only 14 seconds might be telling. Other questions arise, such as, for the Trail as a whole, what is the relationship between the time visitors expect to spend or did spend, and the activities they could feasibly expect to complete, or did complete, in that amount of time? What the data can show, however, are which elements were most likely to lead a visitor to stop, and which elements tended to engage visitors the longest. Using that information, exhibition designers can focus on elements that seem most and least successful at engaging visitors and on understanding, through further studies of visitors, why that is so. That understanding might, in turn, be applied to enhancing the design of exhibition elements, whatever their type, and effective allocation of resources so that the Zoo maximizes its ability to communicate desired messages to more people.

Stops and Time Spent on *Asia Trail*

The study team wonders what the average visitor absorbs, or can absorb, within 21 minutes, the mean time that observed visitors spent on the Trail. This question is made more important by the fact that just walking occupied 54% of visitors' time, meaning that around 11 minutes were spent on stops, on average.⁷ About a third of that time on stops was spent viewing the animals and their habitats. (This pattern of use parallels what has been learned from other studies about visitors' main motivations for coming to the *Zoo/Asia Trail*: “just to walk around” and see animals or “enjoy a beautiful day.”) When time spent viewing animals is subtracted from the total time on stops, it leaves less than 5 minutes for all other elements. Interpreters proved popular with visitors, when measured by a higher than usual amount of time spent on these stops compared to others. Overall, observed visitors spent 7% of their time stopped at interactives.

When considering how observed visitors spent their time on the Trail and what seemed most engaging to them, the study team hypothesizes that increasing the visibility of the animals in their habitats and the availability of interpreters on the Trail would enhance visitor engagement and perhaps communication of Zoo messages. NZP might want to experiment with ways to maximize those two elements of the Trail. For example, it could experiment with videocams for other animals such as those available for the Giant Pandas, and with greater access to interpreters in person or remotely. Videos of the animals engaged in activities might also be useful—if they are of high quality and easy access (existing videos on the Trail received little attention from observed visitors).

At the other end of the spectrum are a number of elements that observed visitors rarely used. Comparatively few stops were made at the Conservation Stations/Plazas, and most of those were at the light-up Geography Maps. No visitors engaged with the Decision/Dilemma Stations in the Sloth Bear Conservation Plaza; only 1 of the 101 observed visitors stopped at a Curiosity Station in the Sloth Bear Theatre section. The Logs Books in the Lower Giant Panda Section got little use. If the Zoo considers these elements important to communicating its messages, it is important to know why these features were not popular with visitors and if they can be made more so. Is it a matter of location, design, time to use, or general lack of appeal of that type of interactive? Of particular concern to the study team was the low use of the Conservation Stations/Plazas, in that most of the stories about Zoo science are found there.

Some exhibition elements that did not get many stops still captured the attention of those visitors who did stop for relatively large amounts of time. The Geography Maps seemed to be especially engaging for those visitors who used them. Why did so few people stop at them, and what made them so engaging to those who did? Is it the design, the topic, the location, or the information provided? And once in the Conservation Stations/Plazas, why did more visitors not stop at the other elements found there? Perhaps the maps might,

⁷ The OP&A study team is assuming that stops are important because they offer the best opportunities to impart information. Thus, getting people to stop would be one goal of exhibition design.

with re-location or some other change, become hooks to draw visitors in and link more effectively to other nearby elements. For example, the maps could have lights that indicate where Zoo research takes place and a link from that to a nearby element highlighting the research.

Reading elements seem generally to be a focal point of museum and zoo exhibition design. While about 70 of the observed visitors stopped at reading elements featured on *Asia Trail*, few of them spent a lot of time at any particular reading element. Was that amount of time sufficient to get through and absorb the material? Put another way, are the reading elements the right length? Should they be shorter and more focused on key points that the Zoo wants to make? Relative to the number of stops and time spent viewing animals and engaging with interpreters, is allocation of resources to reading elements as effective as the Zoo intends, and the best place to allocate resources for exhibition elements? On the other hand, shortening the text must be weighed against the desirability of providing adequate information for those visitors who look for more extensive written material.

Given how much time observed visitors spent on *Asia Trail* and how they used it, what are the implications for learning? How much learning can the Zoo expect visitors to gain from the Trail?⁸ Two kinds of engagement and learning seem to pertain to *Asia Trail*. (Literature shows that learning does not occur in one setting, and these two kinds of learning are connected.) One is a more informal, intuitive learning that occurs from just watching an animal and its habitat, sometimes for the first time. Here visitors may learn that a particular animal exists, may see it in the flesh for the first time, and may see it engage in a particular activity, from all of which the visitor comes away with the experience of a new animal and/or a greater understanding and appreciation for the animal and the look and feel of its environment. This sort of engagement is what most visitors say they are expecting and at which they spend most of their time.

The second type of learning is more directed, deriving from elements (such as Geography Maps, ID labels, and interpreters) with which the Zoo formally tries to communicate information and messages important to it—the endangerment of species, the importance of animal conservation, and Zoo conservation science. To increase the likelihood of visitors engaging with these formal learning elements and coming away with what the NZP intends, the Zoo might consider:

- Maximizing those elements that seem to appeal to the greatest number of visitors, and incorporating key messages into them. This in turn may require more research into how and why visitors use different elements. For example, NZP might try to explain findings such
 - The relative numbers of visitors who engage with particular elements (why so many...or so few? is it the design's appeal...or lack of it? is it a matter of location, e.g., visibility?).

⁸ There is the additional point, raised in the summer 2007 survey and the interview study, about what seem to be the main motivations for coming to *Asia Trail*, and the implications for learning.

- How much time did visitors spend with an element and why (what is the optimal time/the benchmark for engagement and learning with a particular element)?
- Exploring missed opportunities or opportunities that could be expanded to greater effect. For example, it might study those elements that, while they did not receive a lot of visits, held those who did stop for relatively long periods of time. The Geography Maps are one example. If they were more visible/eye-catching, would more people choose to stop, and could they then be used to hook people toward other elements?
- Providing more access to interpreters on site, but also experimenting with other technologies like having remote interpreters answer live question through a phone or computer terminal.

The analysis of the findings included, as described in the Appendix, which presents findings by section, the possible effects of certain “comfort” factors, including crowding—the number of people in a section at the time the observed visitor passed through. It is hard to measure social behaviors and interactions through observation studies, but previous research done by OP&A on exhibitions at the Zoo and museums shows that social experiences are important to visitors. In the observed visitors to *Asia Trail*, only 2% came alone. Moreover, the data from the study show a positive correlation between the number of people in a section and the amount of time observed visitors spent on stops there. Are interpreters popular in part because they gather a crowd of people around them and can generate a group discussion of a sort? Would social activities increase visitors’ engagement with *Asia Trail* even more?

The three studies—the summer 2007 survey, the interviews, and the observations—all raise important questions about visitors’ reasons for coming to and use of *Asia Trail*. The results suggest that a strong program of visitor research, particularly formative studies in the early design phase, would be valuable in determining where best to invest in exhibition elements. In-depth understanding of visitors—for example, how individual visitors differ in expectations, interests, and knowledge, how they feel about the information the Zoo wants to transmit and what they might want or not want, what are the obstacles to providing, and acquiring, different kinds of information in different ways, and how visitors can be led to unexpected experiences—is the critical starting point in exhibition design.

Appendix: Findings by Asia Trail Section⁹

Sloth Bear Theater Section

Findings: 68 observed visitors passed through the Sloth Bear Theater section. 48 of them made at least 1 stop, with an average of 2 stops per visitor (see Exhibit A-1). Those 48 visitors spent at least 1 minute in the section, with an average time spent of 76 seconds.

**Exhibit A-1. Number of stops and time spent on stops
by observed visitors in the Sloth Bear Theater section**

<i>Sloth Bear Theater section</i>	<i># of observed visitors</i>	<i>Total number of stops and time spent on stops</i>						
		<i>Total</i>	<i>Mean</i>	<i>Median</i>	<i>Minimum</i>	<i>Maximum</i>	<i>Percentile 25</i>	<i>Percentile 75</i>
Total number of stops	48	75	2	1	1	3	1	2
Total time spent on stops (seconds)	48	3660	76	35	2	707	13	90

At least one observed visitor stopped at each element in the Sloth Bear Theater section.

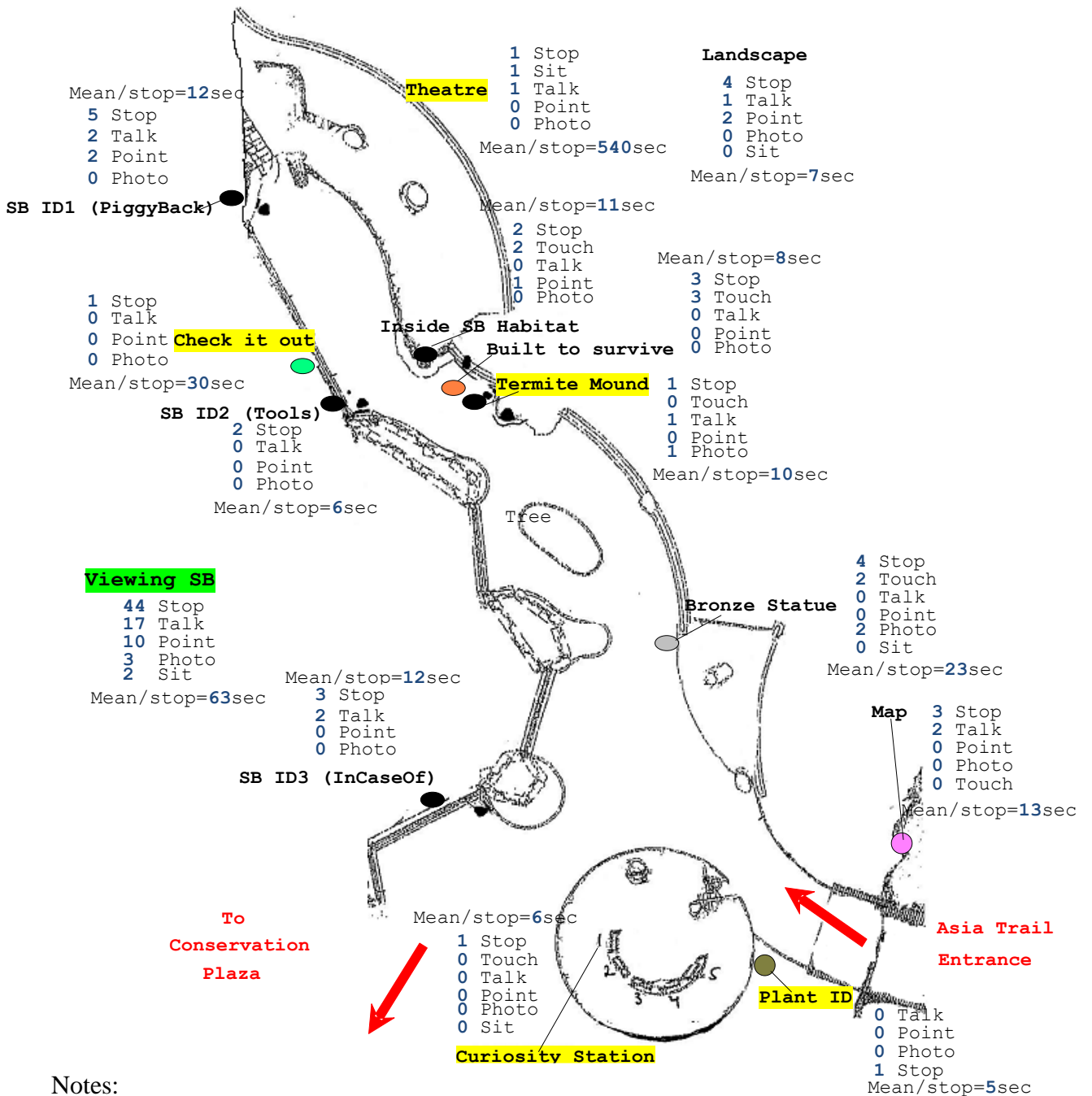
- The most popular stop—44 stops, or 59% of the total number of stops—was viewing the Sloth Bear(s) and their habitat at Viewing SB.
- Observed visitors spent the longest amount of time, overall and on average, at that stop—46 minutes overall, or 75% of the total time visitors spent on stops in the section, with a mean time per stop of 63 seconds.
- The least frequented elements were the Curiosity Stations, Plant ID, Termite Mound, Theater, and Check It Out—only one visitor stopped at each of these elements.
- Observed visitors spent the least amount of time at Sloth Bear ID2 (mean of 6 seconds per stop).

⁹ It should be noted that the sections of the Trail were not equal in terms of size, number of exhibition elements, and design. Rather, the OP&A study team divided the Trail into sections for ease of observation and recording of behaviors. Also note that the analysis presented in the appendix excludes the time visitors spent at Landscapes and Benches and any elements that received fewer than 2 stops.

Analysis:

- **Animal viewing**—visitors spent more time stopped in the section when a Sloth Bear was visible (mean of 48 seconds) and moving (mean of 147 seconds) than when one was not out (mean of 28 seconds).
- **Interpreter**—visitors spent more time on stops in the section when an interpreter was available (mean of 192 seconds) than when no interpreter was available (mean of 46 seconds.) The availability of an interpreter made it more likely that observed visitors spent more time on stops than otherwise.
- **Crowding**—observed visitors were more likely to spend more time on stops in the Sloth Bear Theater section when there were more people in the section.
- **Weather**—no relationship was found between the weather and time spent on stops in the section.

Sloth Bear *11 Visible 21 Moving 32 Not out
 Interpreter 12 Available 52 Not
 Weather 38 Pleasant 26 Not
 Crowding Mean=12 visitors



Notes:
 *Numbers reported represent observed visitors
 Green highlight: highest number of stops
 Yellow highlight: lowest number of stops
 Recorded behavior (talk, point, etc.) is associated with stops

Sloth Bear Conservation Plaza Section

Findings: 65 observed visitors passed through the Sloth Bear Conservation Plaza section. 21 of them made at least one stop in the section, with an average of 1 stop per visitor (see Exhibit A-2). Those 21 spent at least 1 minute in the section, which was also the average amount of time spent in the section per visitor.

**Exhibit A-2. Number of stops and time spent on stops
by observed visitors in the Sloth Bear Conservation Plaza section**

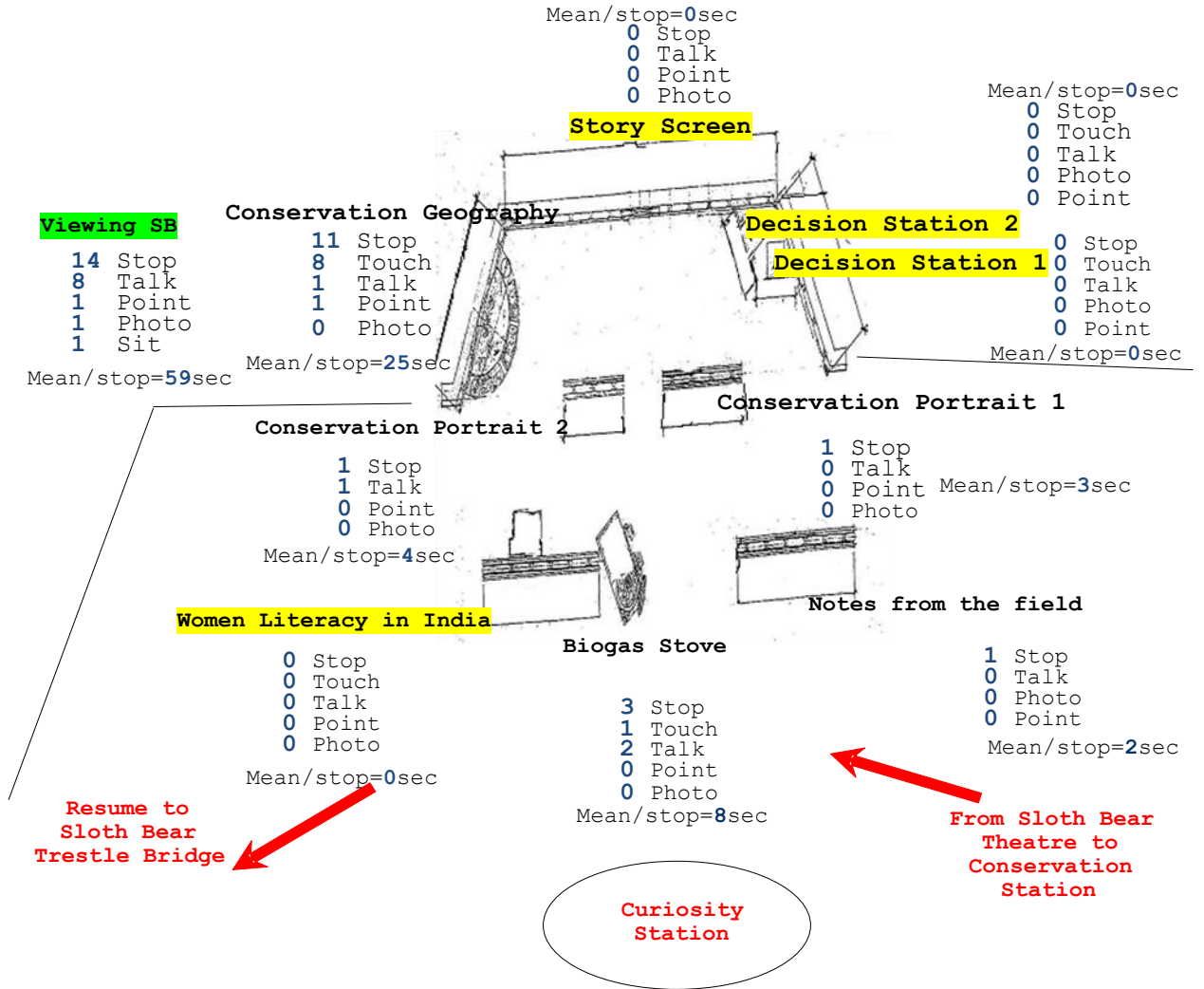
<i>Sloth Bear Conservation Plaza section</i>	<i># of observed visitors</i>	<i>Total number of stops and time spent on stops</i>						
		<i>Total</i>	<i>Mean</i>	<i>Median</i>	<i>Minimum</i>	<i>Maximum</i>	<i>Percentile 25</i>	<i>Percentile 75</i>
Total number of stops	21	31	1	1	1	3	1	2
Total time spent on stops (seconds)	21	1407	67	30	2	226	17	100

An observed visitor did not stop at every element in the Sloth Bear Conservation Plaza section.

- The most popular stop was viewing the Sloth Bear(s) and their habitat at Viewing SB (14 stops, or 45% of the total stops).
- Observed visitors spent the longest amount of time, overall and on average, viewing the animals and their habitat at Viewing SB—14 minutes overall, with a mean time per stop of 59 seconds, or 61% of the total time visitors spent on stops in this section.
- Observed visitors spent the least amount of time at the Biogas Stove element (mean time per stop of 8 seconds).
- No observed visitor stopped at the following elements: Story Screen, Decision Stations, and Women Literacy in India panel.

Analysis: Too few people stopped in this section to permit additional analysis of visitors' behavior.

Sloth Bear *10 Visible 18 Moving 26 Not out
 Interpreter 10 Available 44 Not
 Weather 21 Pleasant 33 Not
 Crowding Mean=9 visitors



Notes:

*Numbers reported represent observed visitors

Green highlight: highest number of stops

Yellow highlight: lowest number of stops

Recorded behavior (talk, point, etc.) is associated with stops

Sloth Bear Trestle Bridge Section

Findings: 65 observed visitors passed through the Sloth Bear Trestle Bridge section. 49 of them made at least 1 stop in this section, with a mean of 2 stops per visitor (see Exhibit A-3). Those 49 spent at least 1 minute in this section, with a mean time per visitor of 69 seconds.

Exhibit A-3. Number of stops and time spent on stops by observed visitors in the Sloth Bear Trestle Bridge section

<i>Sloth Bear Trestle Bridge section</i>	<i># observed visitors</i>	<i>Total number of stops and time spent on stops</i>						
		<i>Total</i>	<i>Mean</i>	<i>Median</i>	<i>Minimum</i>	<i>Maximum</i>	<i>Percentile 25</i>	<i>Percentile 75</i>
Total number of stops	49	99	2	2	1	5	1	3
Total time spent on stops (seconds)	49	3381	69	40	2	299	24	90

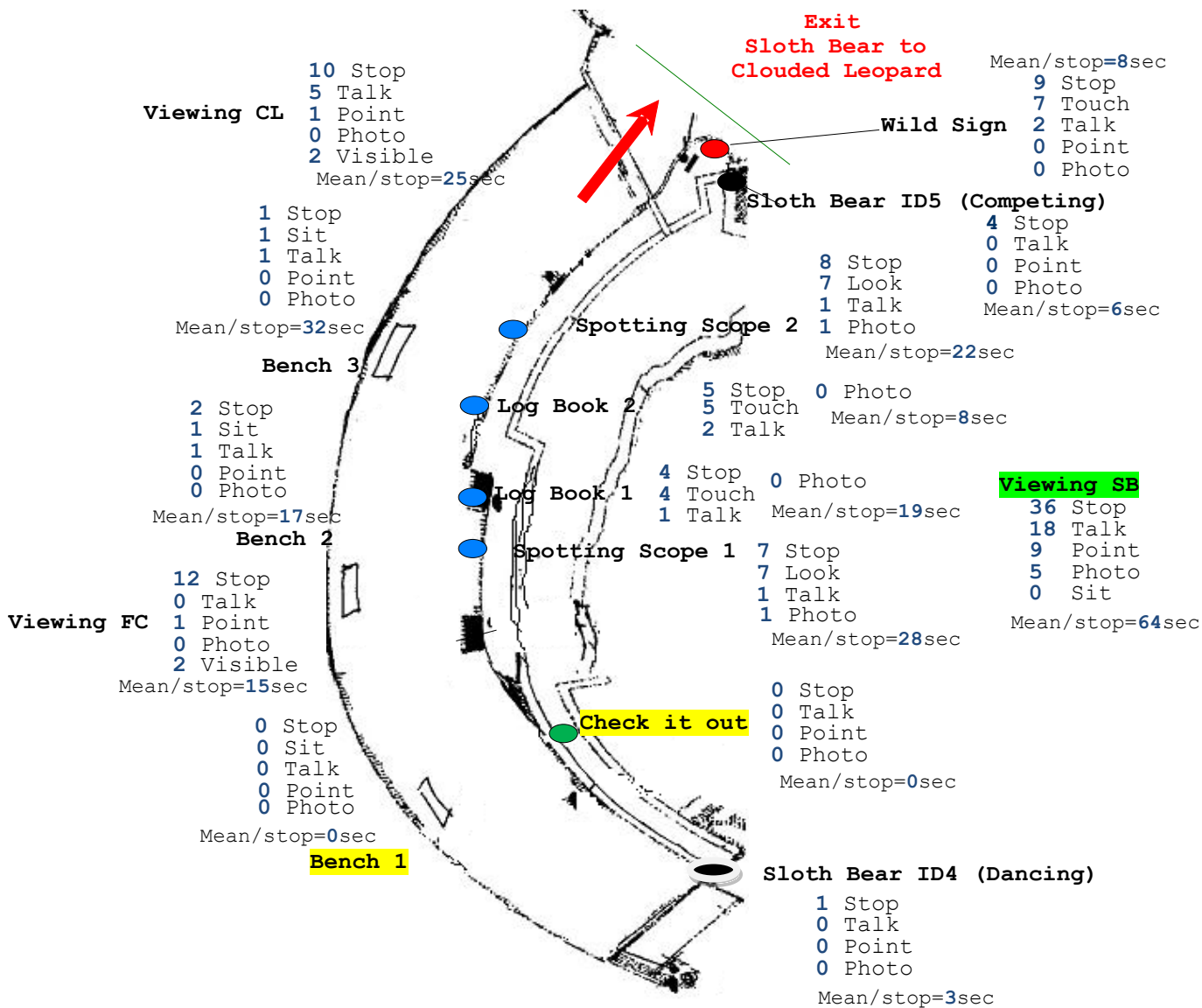
An observed visitor did not stop at every element in the Sloth Bear Trestle Bridge section.

- The most popular stop was viewing the Sloth Bear(s) and their habitat at Viewing SB—36 stops, or 36% of the total stops.
- Observed visitors spent the longest amount of time, overall and on average, viewing the animals and their habitat at Viewing SB—38 minutes overall, with a mean time per stop of 64 seconds, or 68% of the total time spent on stops.
- Observed visitors spent the least amount of time at the Sloth Bear ID5 (Competing) element, with a mean time per stop of 6 seconds.
- No observed visitor stopped at two elements—Check It Out and the Bench.

Analysis:

- **Animal viewing**—visitors were more likely to spend three times as much time on stops when a Sloth Bear was visible or moving (mean time of 101 seconds) than when one was not out (mean time of 30 seconds).
- **Interpreter**—visitors were likely to spend twice the amount of time on stops in the Sloth Bear Trestle Bridge section when an interpreter was available (mean time of 117 seconds) than when one was not there (mean time of 51 seconds).
- **Crowding**—there was a positive relationship between the amount of time visitors spent stopped in the Sloth Bear Trestle Bridge section and the number of visitors in the section.
- **Weather**—no relationship was found between weather and the amount of time spent on stops in the section.

Sloth Bear *5 Visible 29 Moving 31 Not out
 Interpreter 17 Available 47 Not
 Weather 40 Pleasant 25 Not
 Crowding Mean=14 visitors



Notes:
 *Numbers reported represent observed visitors
 Green highlight: highest number of stops
 Yellow highlight: lowest number of stops
 Recorded behavior (talk, point, etc.) is associated with stops

Clouded Leopard Section

Findings: 65 observed visitors passed through the Clouded Leopard section. 54 of them made at least 1 stop in the section, with a mean of 2 stops per visitor (see Exhibit A-4). The 54 spent at least 1 minute in the section, with a mean time spent of 65 seconds.

Exhibit A-4. Number of stops and time spent on stops (in seconds) by observed visitors in the Sloth Bear Clouded Leopard section

Clouded Leopard section	# of observed visitors	Total number of stops and time spent on stops						
		Total	Mean	Median	Minimum	Maximum	Percentile 25	Percentile 75
Total number of stops	54	94	2	2	1	4	1	2
Total time spent on stops (seconds)	54	3501	65	39	4	425	20	77

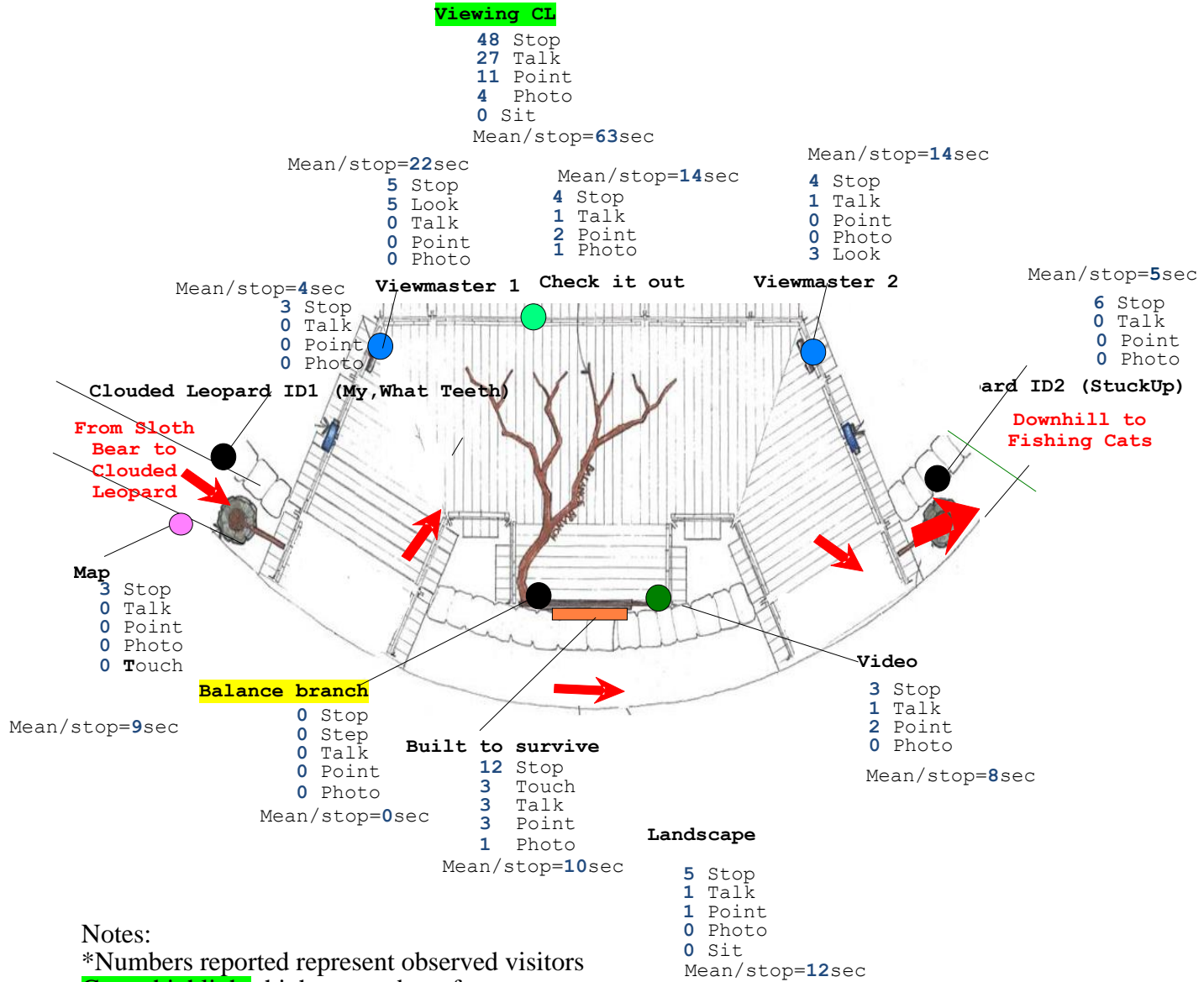
An observed visitor did not stop at every element in the Clouded Leopard section.

- The most popular stop was viewing the Clouded Leopard(s) and its habitat at Viewing CL—48 stops, or 51% of the total stops in the section.
- Observed visitors spent the longest amount of time, overall and on average, viewing the Clouded Leopard(s) and its habitat at Viewing CL—50 minutes overall, with a mean time per stop of 63 seconds, or 86% of the total time spent on stops.
- Observed visitors spent the least amount of time at the Clouded Leopard ID1 (My, What Teeth)—mean time per stop of 4 seconds.
- No observed visitor stopped at the Balance Branch.

Analysis:

- **Interpreter**—observed visitors spent more time when an interpreter was available (mean time per stop of 132 seconds) than when no interpreter was out (mean of 53 seconds).
- **Crowding**—there was a positive correlation between the amount of time people spent on stops in the section and the number of visitors in the section.
- **Weather and status of the Clouded Leopards**—no relationship was found between the weather and the status of the Clouded Leopards (visible, moving, or not visible) and the time spent on stops in the section.

Clouded Leopard 42 Visible 1 Moving 22 Not out
Interpreter 9 Available 56 Not
Weather 39 Pleasant 26 Not
Crowding Mean=10 visitors



Fishing Cats Section

Findings: 66 observed visitors passed through the Fishing Cats section. 50 of them made at least 1 stop in this section, with a mean time of 3 seconds per stop (see Exhibit A-5). The 50 spent at least 1 minute in the section, with a mean time per visitor of 77 seconds.

**Exhibit A-5. Number of stops and time spent on stops
by observed visitors in the Fishing Cats section**

<i>Fishing Cats section</i>	<i># of observed visitors</i>	<i>Total number of stops and time spent on stops</i>						
		<i>Total</i>	<i>Mean</i>	<i>Median</i>	<i>Minimum</i>	<i>Maximum</i>	<i>Percentile 25</i>	<i>Percentile 75</i>
Total number of stops	50	151	3	3	1	9	2	4
Total time spent on stops (seconds)	50	3852	77	63	3	217	38	111

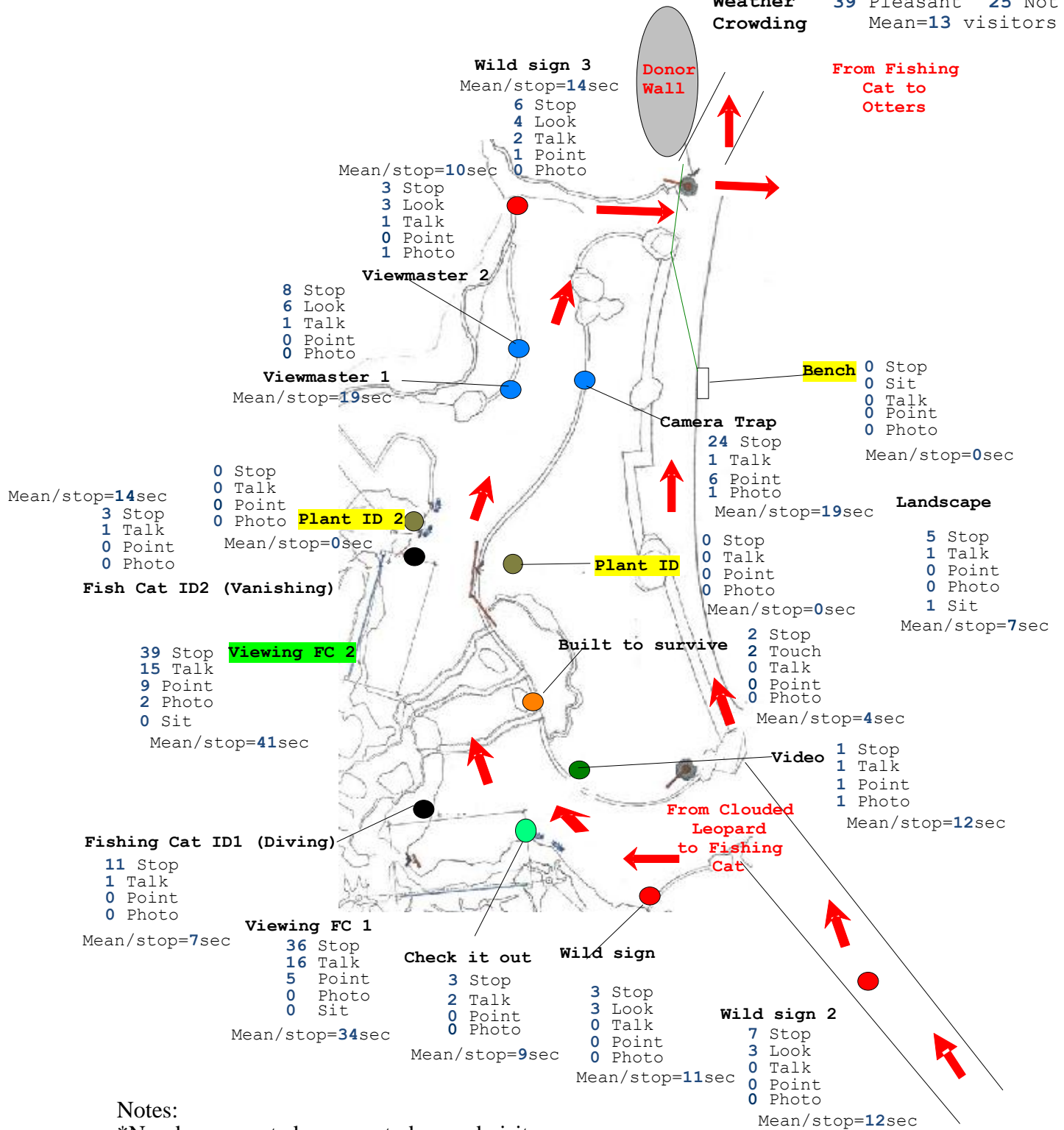
An observed visitor did not stop at every element in the Fishing Cats section.

- The most popular stop was viewing the Fishing Cats and their habitat at Viewing FC2—39 stops, or 26% of the total stops in the section.
- Observed visitors spent the longest amount of time, overall and on average, viewing the Fishing Cats and their habitat at Viewing FC2—27 minutes, with a mean time per stop of 41 seconds, or 42% of the total time spent on stops.
- Observed visitors spent the least amount of time at Built to Survive—a mean time per stop of 4 seconds.
- No observed visitor stopped at the Plant IDs.

Analysis:

- **Animal viewing**—observed visitors spent more time on stops when a Fishing Cat(s) was visible (mean time of 75 seconds) and when one was moving (98 seconds) than when one was not out (40 seconds). The status of the Fishing Cats (visible, moving, and not visible) was a significant predictor of time spent on stops.
- **Weather**—visitors spent more time in the Fishing Cats section when the weather was “pleasant” (mean time of 90 seconds) than when it was not “pleasant” (mean time of 55 seconds).
- **Crowding**—there was a positive correlation between the amount of time people spent in this section and the number of people in the section.
- **Interpreter**—the interpreter was available for too few visitors to conduct an analysis.

Sloth Bear *27 Visible 10 Moving 23 Not out
Interpreter 1 Available 59 Not
Weather 39 Pleasant 25 Not
Crowding Mean=13 visitors



Notes:
 *Numbers reported represent observed visitors
Green highlight: highest number of stops
Yellow highlight: lowest number of stops
 Recorded behavior (talk, point, etc.) is associated with stops

Otters Section

Findings: 66 observed visitors passed through the Otters section. 50 of them made at least 1 stop in this section, with a mean of 2 stops per visitors (see Exhibit A-6). The 50 spent at least 1 minute in the section, with a mean time per visitor of 58 seconds.

**Exhibit A-6. Number of stops and time spent on stops
by observed visitors in the Otters section**

<i>Otters section</i>	<i># of observed visitors</i>	<i>Total number of stops and time spent on stops</i>						
		<i>Total</i>	<i>Mean</i>	<i>Median</i>	<i>Minimum</i>	<i>Maximum</i>	<i>Percentile 25</i>	<i>Percentile 75</i>
Total number of stops	50	86	2	2	1	3	1	2
Total time spent on stops, (seconds)	50	2886	58	39	10	256	26	72

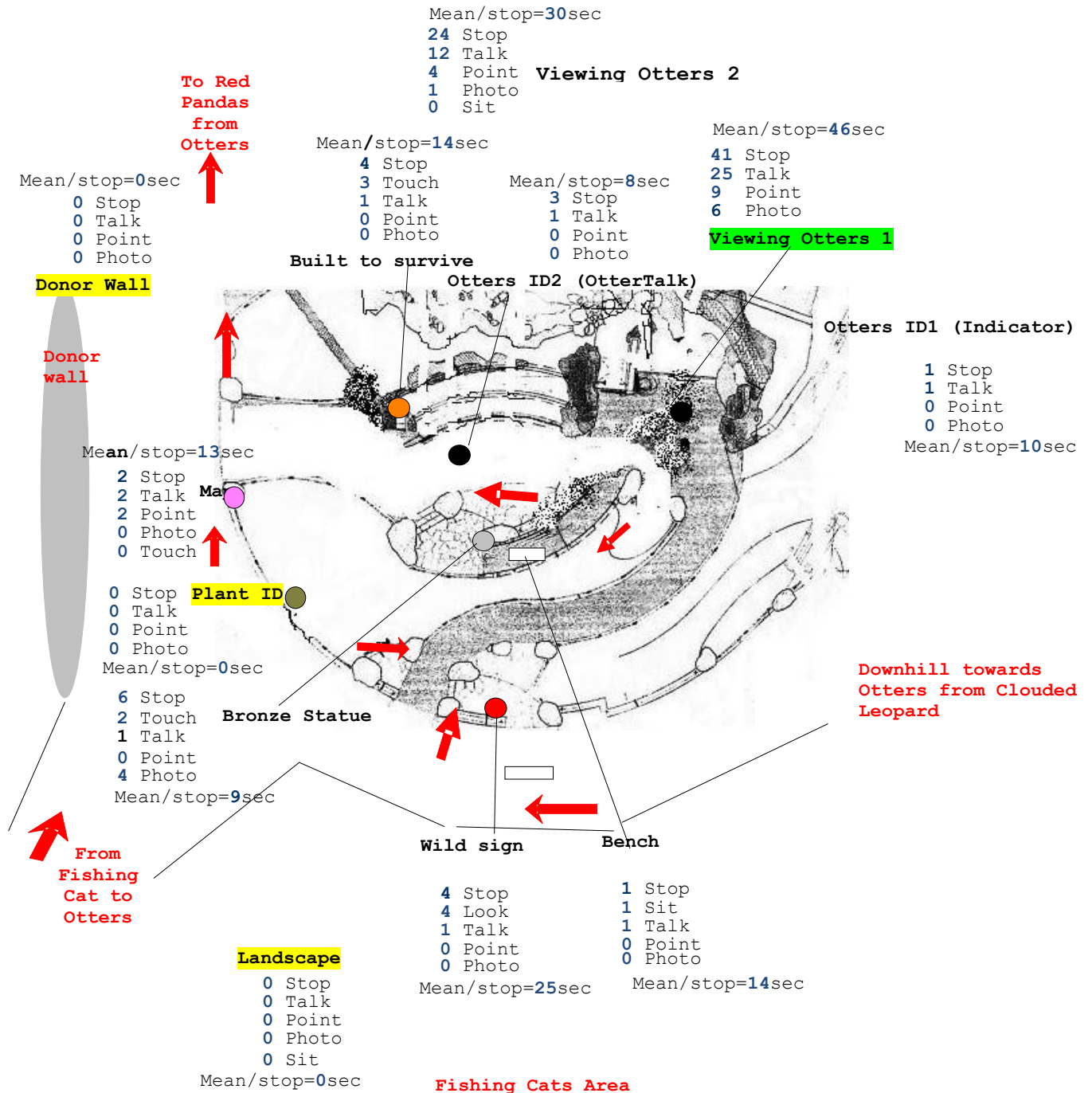
An observed visitor did not stop at every element in the Otters section.

- The most popular stop was viewing the Otters and their habitat at Viewing OT 1—41 stops, or 48% of the total stops in the section.
- Observed visitors spent the longest amount of time, overall and on average, viewing the Otters and their habitat at Viewing OT1—31 minutes, with a mean time per stop of 46 seconds, or 65% of the total time visitors spent on stops in this section.
- Observed visitors spent the least amount of time at the Otters ID2 (Otter Talk), with a mean time per stop of 8 seconds.
- No observed visitor stopped at the Plant ID and Donor Wall.

Analysis:

- **Weather, status of the animal, and crowding**—no correlation found between the amount of time spent by visitors on stops in the section and the status of the animal (visible, moving, or not visible), weather, and crowding.
- **Interpreter**—the interpreter was available for too few visitors to conduct an analysis.

Otters *14 Visible 30 Moving 16 Not out
 Interpreter 3 Available 58 Not
 Weather 39 Pleasant 25 Not
 Crowding Mean=11 visitors



Notes:

*Numbers reported represent observed visitors

Green highlight: highest number of stops

Yellow highlight: lowest number of stops

Recorded behavior (talk, point, etc.) is associated with stops

Upper Red Panda Section

Findings: 66 observed visitors passed through the Upper Red Panda section. 50 of them made at least 1 stop in this section, with a mean of 3 stops per visitor (see Exhibit A-7). The 50 spent at least 1 minute in the section, with a mean time per visitor of 68 seconds.

Exhibit A-7. Number of stops and time spent on stops by observed visitors in the Upper Red Panda section

<i>Upper Red Panda section</i>	<i># of observed visitors</i>	<i>Total number of stops and time spent on stops</i>						
		<i>Total</i>	<i>Mean</i>	<i>Median</i>	<i>Minimum</i>	<i>Maximum</i>	<i>Percentile 25</i>	<i>Percentile 75</i>
Total number of stops	50	126	3	2	1	8	1	3
Total time spent on stops (seconds)	50	3378	68	30	3	342	20	100

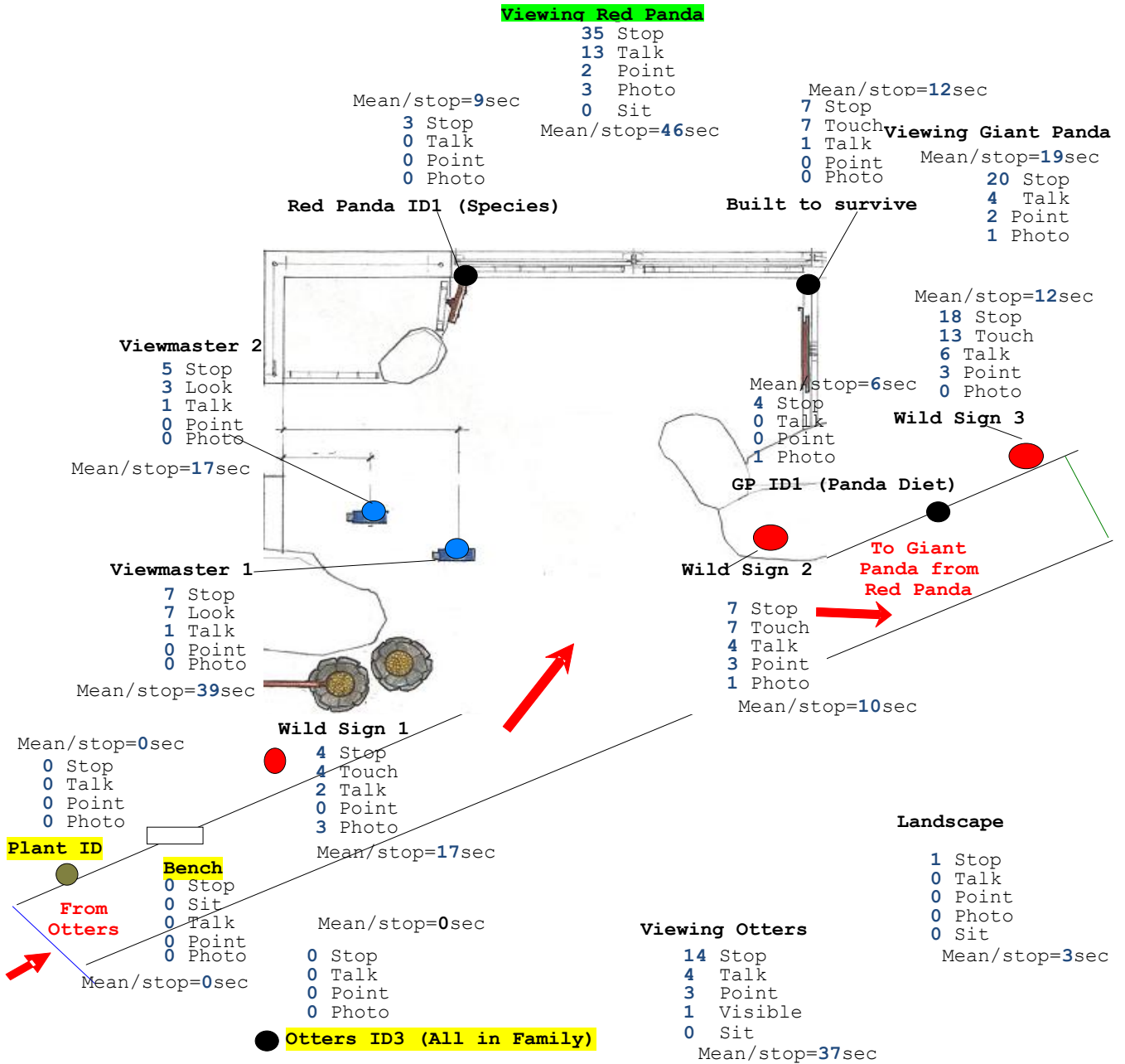
An observed visitor did not stop at every element in the Upper Red Panda section.

- The most popular stop was viewing the Red Pandas and their habitat—35 stops, or 28% of the total stops in the section.
- Observed visitors spent the longest amount of time, overall and on average, viewing the Red Pandas and their habitat—27 minutes, with a mean time per stop of 46 seconds, or 48% of the total time spent on stops in the section.
- Observed visitors spent the least amount of time at the Giant Panda ID1—Panda Diet, with a mean time per stop of 6 seconds.
- No observed visitor stopped at the Otter ID3 (All in Family,) Plant ID, and Bench elements in the section.

Analysis:

- **Animal viewing**—visitors were likely to spend twice as much time on stops in the Upper Red Panda section if an animal was visible or moving (mean time of 127 seconds) than when one was not out (mean time of 56 seconds).
- **Crowding**—no correlation found between crowding and the amount of time spent on stops in the section.
- **Interpreter**—because the low amount of time an interpreter was available in the section, no analysis was performed for this factor.
- **Weather**—no relationship was found between the weather and time spent on stops in the section.

Red Pandas *1 Visible 8 Moving 57 Not out
 Interpreter 2 Available 63 Not
 Weather 40 Pleasant 27 Not
 Crowding Mean=7 visitors



Notes:
 *Numbers reported represent observed visitors
Green highlight: highest number of stops
Yellow highlight: lowest number of stops
 Recorded behavior (talk, point, etc.) is associated with stops

Upper Giant Panda Section

Findings: 79 observed visitors passed through the Upper Giant Panda section. 64 of them visitors made at least 1 stop in this section, with a mean of 2 stops per visitor (see Exhibit A-8). The 64 spent at least 1 minute in this section, with a mean time per visitor of 77 seconds.

Exhibit A-8. Number of stops and time spent on stops by observed visitors in the Upper Giant Panda Section

Upper Giant Panda section	# of observed visitors	Total number of stops and time spent on stops						
		Total	Mean	Median	Minimum	Maximum	Percentile 25	Percentile 75
Total number of stops	64	128	2	2	1	5	1	3
Total time spent on stops (seconds)	64	4953	77	41	3	625	19	83

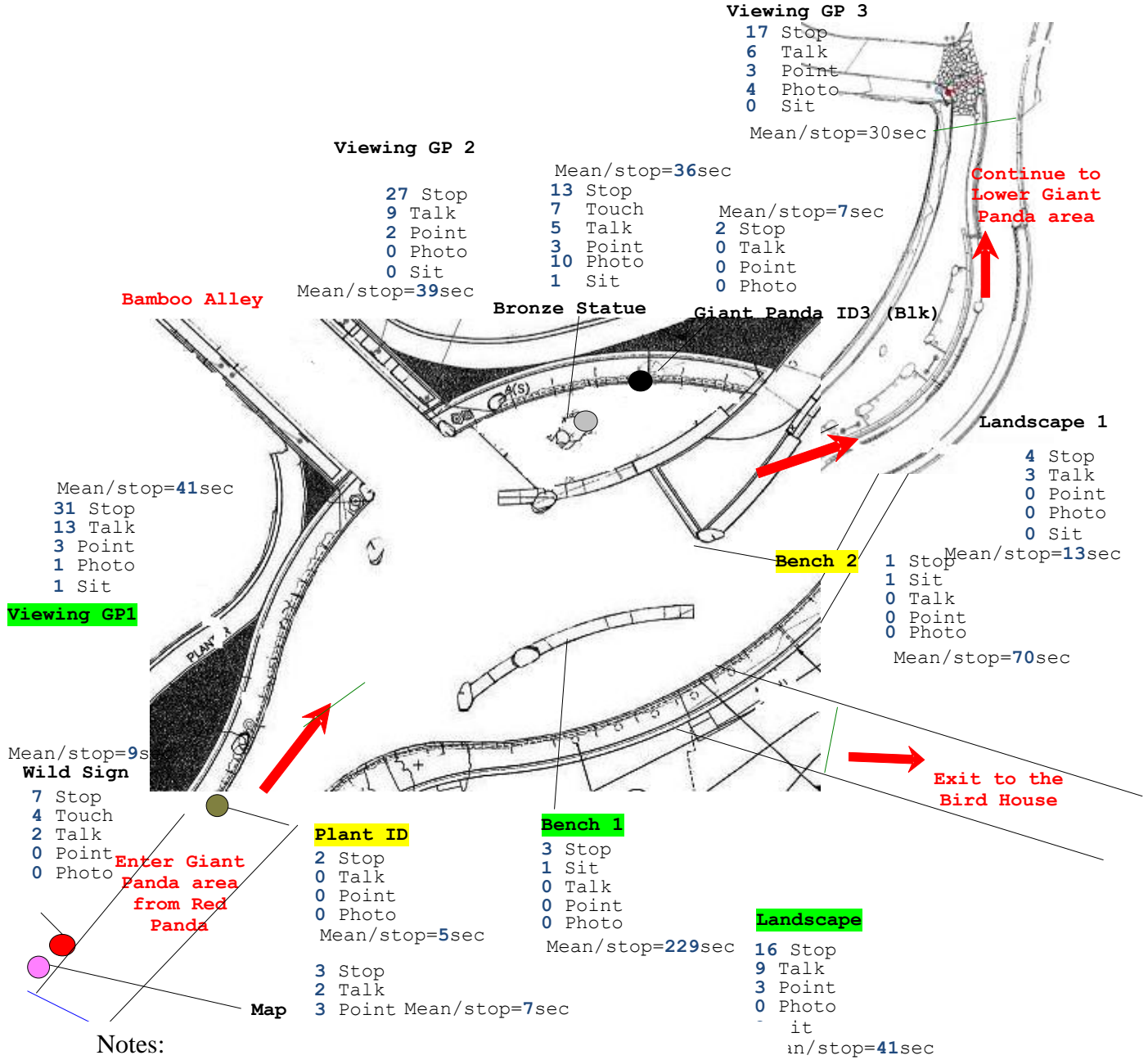
At least 1 visitor stopped at each element in the Upper Giant Panda section.

- The most popular stop was associated viewing the Giant Pandas and their habitat at Viewing GP1—31 stops, or 24% of the total stops in the section.
- Observed visitors spent the longest amount of time, overall and on average, viewing the Giant Pandas and their habitats at Viewing GP 1—22 minutes, with a mean per stop of 41 seconds, or 27% of the total time spent on stops in the section.
- The least frequented elements were Plant ID and Giant Panda ID3 (Blk), with two stops, and Bench 2, with one stop.
- Observed visitors spent the least amount of time at Plant ID, with a mean time per stop of 5 seconds.

Analysis:

- **Crowding**—there was a positive correlation between crowding and the amount of time people spent on stops in the section. Crowding was a significant predictor of time spent on stops in this section.
- **Weather and animal status**—no correlation found between weather and the status of the Giant Pandas (visible, moving, or not visible) and the amount of time spent on stops in this section.
- **Interpreter**—because the low amount of time an interpreter was available, no further analysis was performed.

Giant Panda *18 Visible 16 Moving 42 Not out
 Interpreter 1 Available 74 Not
 Weather 47 Pleasant 29 Not
 Crowding Mean=14 visitors



Notes:
 *Numbers reported represent observed visitors
 Green highlight: highest number of stops
 Yellow highlight: lowest number of stops
 Recorded behavior (talk, point, etc.) is associated with stops

Bamboo Interpretation Section

Findings: 14 observed visitors walked into the Bamboo Interpretation Section. 11 of them made at least 1 stop, with a mean of 2 stops per visitor (see Exhibit A-9). The 11 spent at least 1 minute in the section, with a mean time per visitor of 67 seconds.

Exhibit A-9. Number of stops and time spent on stops by observed visitors in the Bamboo Interpretation section

<i>Bamboo Interpretation section</i>	<i># of observed visitors</i>	<i>Total number of stops and time spent on stops</i>						
		<i>Total</i>	<i>Mean</i>	<i>Median</i>	<i>Minimum</i>	<i>Maximum</i>	<i>Percentile 25</i>	<i>Percentile 75</i>
Total number of stops	11	21	2	1	1	5	1	3
Total time spent on stops (seconds)	11	741	67	31	5	250	11	132

An observed visitor did not stop at every element in the Bamboo Interpretation section.

- The most popular stop was viewing the Giant Pandas and their habitat at Viewing GP2 -- 5 stops, or 24% of the total stops in the section.
- Observed visitors spent the longest amount of time, overall and on average, viewing the Giant Pandas and their habitats at Viewing GP2 – spent 8 minutes, with a mean per stop of 91 seconds, or 67% of the total time visitors spent on stops in this section.
- Observed visitors spent the least amount of time at Check It Out 1 with a mean time per stop of 7 seconds.
- No observed visitor stopped at the Yellow Bamboo ID3, Black Bamboo ID2, and Bissetii Bamboo ID5.

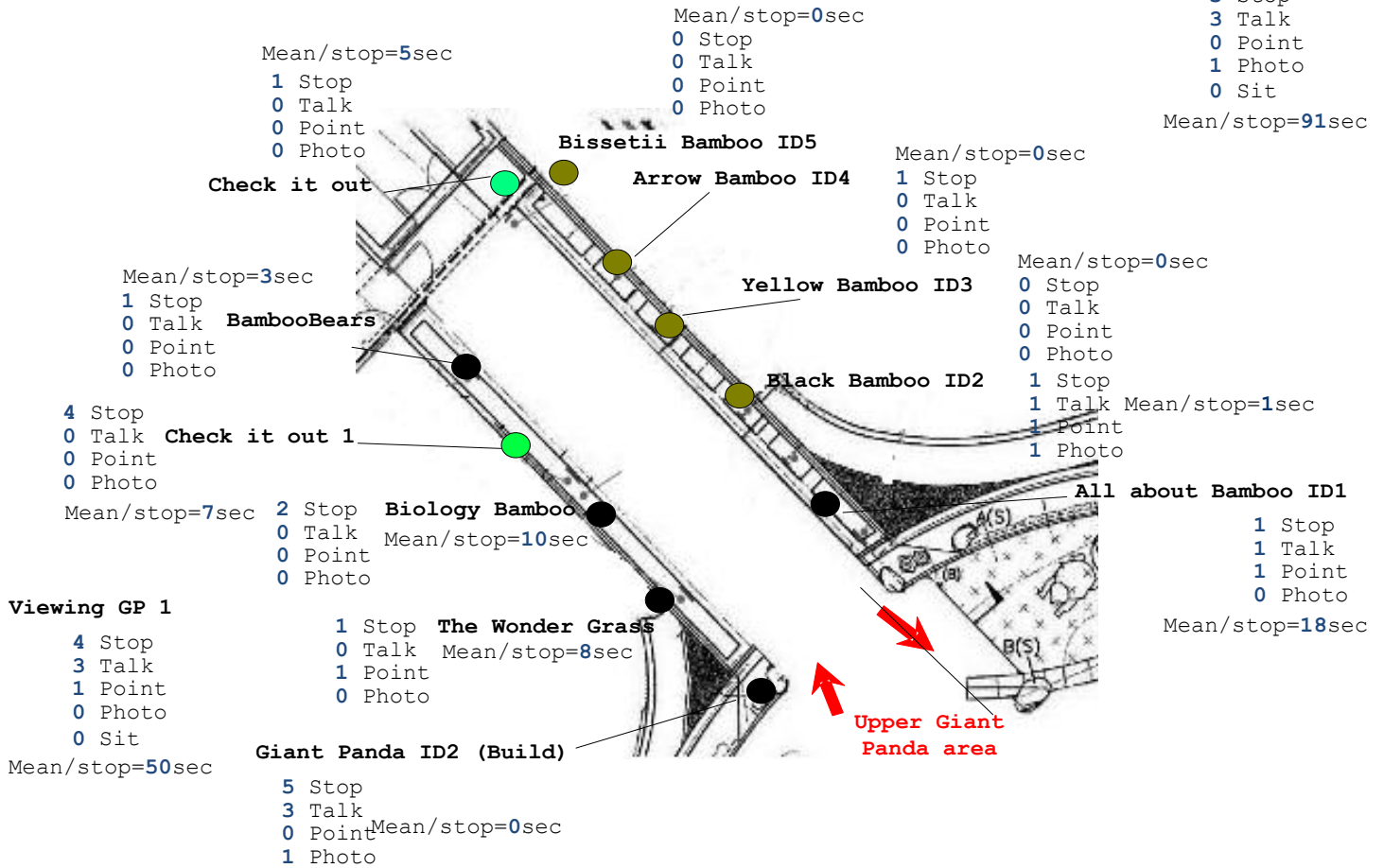
Analysis: Too few people stopped in this section to permit additional analysis of visitors' behavior.

Giant Panda *3 Visible 3 Moving 7 Not out
 Interpreter 0 Available 13 Not
 Weather 9 Pleasant 4 Not
 Crowding Mean=9 visitors

Viewing GP 2

5 Stop
 3 Talk
 0 Point
 1 Photo
 0 Sit

Mean/stop=91sec



Notes:

*Numbers reported represent observed visitors

Green highlight: highest number of stops

Yellow highlight: lowest number of stops

Recorded behavior (talk, point, etc.) is associated with stops

Lower Giant Panda 1 Section

Findings: 66 observed visitors passed through the Lower Giant Panda 1 section. 44 of them made at least 1 stop, with a mean of 2 stops per visitor (see Exhibit A-10). The 44 spent at least 1 minute in the section, with a mean time per visitor of 114 seconds.

Exhibit A-10. Number of stops and time spent on stops by observed visitors in the Lower Giant Panda section

Lower Giant Panda 1 section	# of observed visitors	Total number of stops and time spent on stops						
		Total	Mean	Median	Minimum	Maximum	Percentile 25	Percentile 75
Total number of stops	44	75	2	1	1	6	1	2
Total time spent on stops (seconds)	44	4999	114	43	5	1440	20	108

At least 1 visitor stopped at each element of the Lower Giant Panda 1 section.

- The most popular stop was viewing the Giant Pandas and their habitat at Viewing GP1—32 stops, or 43% of the total stops in the section.
- Observed visitors spent the longest amount of time, overall and on average, viewing the Giant Pandas and their habitats at Viewing GP 1—57 minutes, with a mean time per stop of 110 seconds, or 69% of the total time spent on stops in the section.
- The least frequented elements were Log Book 2 and the Bench, with one stop each.
- Observed visitors spent the least amount of time at Log Book 1—a mean time per stop of 4 seconds.

Analysis:

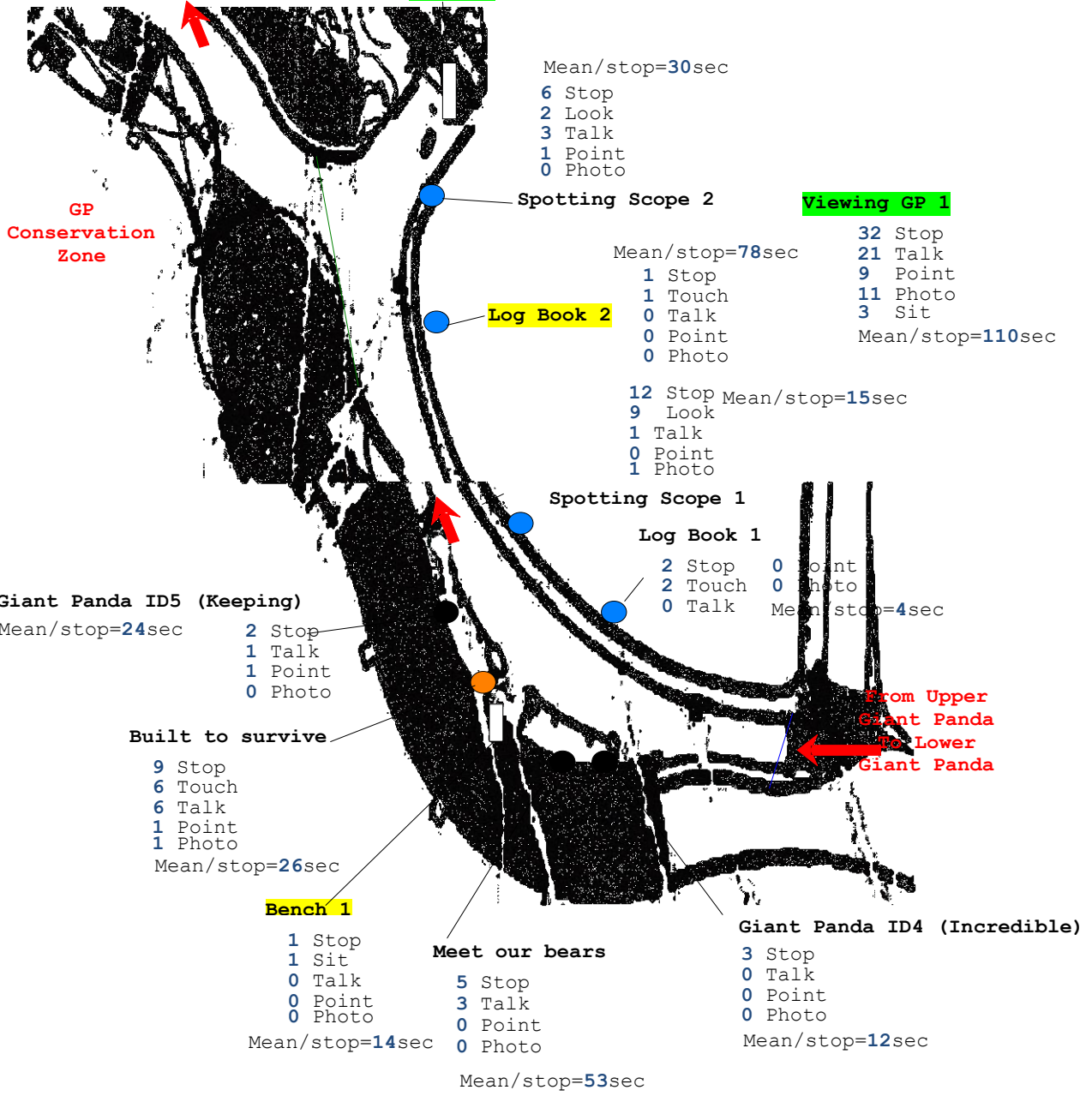
- **Animal viewing**—observed visitors spent more time when a Giant Panda was moving (mean time of 340 seconds) than when one was visible (100 seconds) or not out (mean time of 31 seconds).
- **Weather and crowding**—no relationship was found between weather and crowding and the time spent on stops.
- **Interpreter**—because of the low amount of time an interpreter was available, no further analysis was performed for this element.

Giant Panda *18 Visible 9 Moving 39 Not out
 Interpreter 4 Available 61 Not
 Weather 38 Pleasant 28 Not
 Crowding Mean=19 visitors

2 Stop
 1 Sit
 1 Talk
 1 Point
 2 Photo Mean/stop=223sec

Continue on
 Lower Giant
 Panda 2

Bench 2



Notes:
 *Numbers reported represent observed visitors
Green highlight: highest number of stops
Yellow highlight: lowest number of stops
 Recorded behavior (talk, point, etc.) is associated with stops

Giant Panda Conservation Station Section

Findings: 21 observed visitors passed through the Giant Panda Conservation Station section. 11 of them made at least 1 stop in the section, with a mean of 2 stops per visitor (see Exhibit A-11). The 11 spent at least 1 minute in the section, with a mean time per visitor of 89 seconds.

**Exhibit A-11. Number of stops and time spent on stops
by observed visitors in the Giant Panda Conservation Station section**

<i>Giant Panda Conservation Station section</i>	<i># of observed visitors</i>	<i>Total number of stops and time spent on stops</i>						
		<i>Total</i>	<i>Mean</i>	<i>Median</i>	<i>Minimum</i>	<i>Maximum</i>	<i>Percentile 25</i>	<i>Percentile 75</i>
Total number of stops	11	23	2	2	1	5	1	2
Total time spent on stops (seconds)	11	977	89	50	20	322	32	126

An observed visitor did not stop at every element in the Giant Panda Conservation section.

- The most popular stop was Conservation Geography 9 stops, or 39% of the total stops in the section.
- Observed visitors spent the longest amount of time, overall and on average, at Conservation Geography—10 minutes, with a mean per stop of 64 seconds, or 63% of the total time spent on stops in the section.
- Observed visitors spent the least amount of time at Notes from the Field, with a mean time per stop of 17 seconds.
- No observed visitor stopped at the Story Screen element.

Analysis: Too few people made stops in the Giant Panda Conservation Station section to permit additional analysis.

Interpreter 1 Available 22 Not
 Weather 12 Pleasant 10 Not
 Crowding Mean=6 visitors

Mean/stop=17sec
 3 Stop
 1 Talk
 0 Point
 0 Photo

Mean/stop=18sec
 2 Stop
 2 Touch
 0 Talk
 0 Photo
 0 Point

Exit Conservation
 Station to Lower
 Giant Panda

Notes from the field
 Dilemma Station 1

9 Stop
 7 Touch
 4 Talk
 3 Point
 0 Photo
 Mean/stop=64s

Conservation Geograph

Mean/stop=25sec
 1 Stop
 1 Touch
 20 Talk
 0 Photo
 0 Point

1 Stop
 0 Talk
 0 Point
 0 Photo
 Mean/stop=5s

EcoTour

Station 3

3 Stop
 1 Touch
 1 Talk
 0 Photo
 0 Point
 Mean/stop=65sec

Beekeeping

3 Stop
 3 Touch
 0 Talk
 0 Point
 0 Photo
 Mean/stop=20sec

Story Screen

0 Stop
 0 Talk
 0 Point
 0 Photo

Mean/stop=14sec

Back in business

1 Stop
 1 Touch
 0 Talk
 0 Point
 0 Photo

From Lower
 Giant Panda Enter
 Conservation Station

Notes:

*Numbers reported represent observed visitors

Green highlight: highest number of stops

Yellow highlight: lowest number of stops

Recorded behavior (talk, point, etc.) is associated with stops

Lower Giant Panda 2 Section

Findings: 63 observed visitors passed through the Lower Giant Panda 2 section. 42 of them made at least 1 stop in this section, with a mean of 2 stops per visitor (see Exhibit A-12). The 42 spent at least 1 minute in this section, with a mean time per visitor of 91 seconds.

Exhibit A-12. Number of stops and time spent on stops by observed visitors in the Lower Giant Panda section

<i>Lower Giant Panda section</i>	<i># of observed visitors</i>	<i>Total time spent (in seconds) and number of stops (bottom row)</i>						
		<i>Total</i>	<i>Mean</i>	<i>Median</i>	<i>Minimum</i>	<i>Maximum</i>	<i>Percentile 25</i>	<i>Percentile 75</i>
Total number of stops	42	72	2	2	1	4	1	2
Total time spent on stops (seconds)	42	3828	91	38	1	1211	17	89

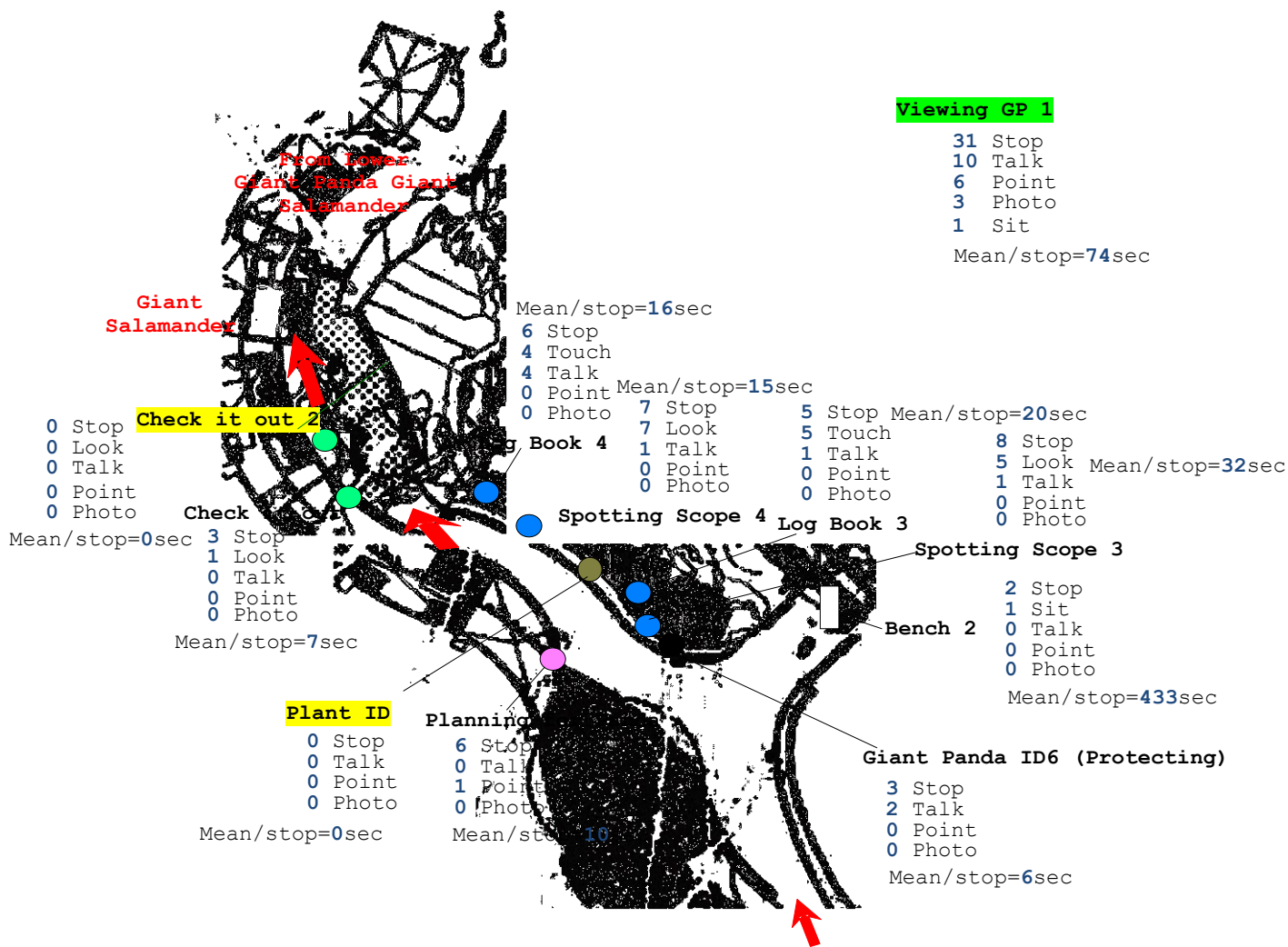
An observed visitor did not stop at every element in the Lower Giant Panda 2 section.

- The most popular stop was viewing the Giant Pandas and their habitat at Viewing GP1—31 stops, or 43% of the total stops in the section.
- Observed visitors spent the longest amount of time, overall and on average, viewing the Giant Pandas and their habitat at Viewing GP1—38 minutes, with a mean time per stop of 74 seconds, or 59% of the total time spent on stops in the section.
- Observed visitors spent the least amount of time at Giant Panda ID 6 (Protecting), with a mean time per stop of 6 seconds.
- No observed visitor stopped at Check It Out 2 and Plant ID.

Analysis:

- **Animal Viewing**—visitors were more likely to spend three times as much time on stops when a Giant Panda was visible or moving (mean time per stop of 237 seconds) than when one was not out (mean time per stop of 47 seconds). The status of the animal (visible, moving, or not visible) was a significant predictor of time spent on stops in this section.
- **Crowding**—there was a positive correlation between the number of people in the section and the amount of time people spent on stops.
- **Weather**—no correlation was found between the weather and the amount of time spent on stops in this section.
- **Interpreter**—because of the low amount of the time an interpreter was available, no further analysis was performed for this element.

Giant Panda *5 Visible 6 Moving 49 Not out
 Interpreter 3 Available 55 Not
 Weather 32 Pleasant 25 Not
 Crowding Mean=17 visitors



Notes:

*Numbers reported represent observed visitors

Green highlight: highest number of stops

Yellow highlight: lowest number of stops

Recorded behavior (talk, point, etc.) is associated with stops

From Conservation Station Continue on Lower Giant Panda

Giant Japanese Salamander section

Note: the Giant Japanese Salamander was not on view during the period of the study.

Findings: 60 observed visitors passed through the Giant Japanese Salamander section. 31 of them made at least 1 stop, with a mean of 1 stop per visitor (see Exhibit A-13). 31 of them spent at least 1 minute in this section, with a mean time per visitor of 13 seconds.

**Exhibit A-13. Number of stops and time spent on stops
by observed visitors in the Giant Japanese Salamander section**

<i>Giant Japanese Salamander Section</i>	<i># of observed visitors</i>	<i>Total number of stops and time spent on stops</i>						
		<i>Total</i>	<i>Mean</i>	<i>Median</i>	<i>Minimum</i>	<i>Maximum</i>	<i>Percentile 25</i>	<i>Percentile 75</i>
Total number of stops	31	38	1	1	1	2	1	1
Total time spent on stops (seconds)	31	410	13	7	3	62	5	16

An observed visitor did not stop at every element in the Lower Giant Panda 2 section.

- The most popular stop was viewing the Giant Japanese Salamander habitat at Viewing GJS—11 stops, or 29% of the total stops in the section.
- Observed visitors spent the longest amount of time, overall and on average, viewing at the Salamander Sculpture—2 minutes, with a mean time per stop of 15 seconds, or 29% of the total time spent on stops.
- Observed visitors spent the least amount of time at Giant Panda ID7 (Counting), with a mean time per stop of 4 seconds.
- No observed visitor stopped at the Plant ID element.

Analysis:

- **Weather and crowding**—no correlation was found between the weather and crowding and the amount of time visitors spent in the Giant Japanese Salamander section.
- **Status of the animal and interpreter**—because the Giant Japanese Salamander was not on view during the period of the study, no further analysis was performed for the status of the animal and interpreter.

Giant Japanese Salamander *0 Visible 0 Moving 60 Not out
 Interpreter 0 Available 59 Not
 Weather 25 Pleasant 34 Not
 Crowding Mean=8 visitors

Viewing GP 1

Mean/stop=15sec

7 Stop
 1 Talk
 0 Point
 0 Photo
 0 Sit

Mean/stop=4sec

2 Stop
 0 Talk
 0 Point
 0 Photo

Mean/stop=0sec

0 Stop
 0 Talk
 0 Point
 0 Photo

Giant Panda ID7 (Counting)

From Lower
 Giant Panda
 to Giant
 Salamander

Giant Panda ID8 (Huggable)

Mean/stop=6sec

5 Stop
 0 Talk
 0 Point
 0 Photo

Plant ID

Exit toward
 Giant Panda
 House

4 Stop
 3 Touch
 1 Talk
 1 Point
 0 Photo

Built to survive

Mean/stop=11sec

Salamander sculpture

7 Stop
 5 Touch
 2 Talk
 3 Point
 1 Photo
 0 Sit

Mean/stop=15sec

Giant Japanese Salamander ID

2 Stop
 0 Talk
 0 Point
 0 Photo

Mean/stop=12sec

Viewing GJS

11 Stop Mean/stop=9sec
 3 Talk
 2 Point
 2 Photo
 0 Sit

Notes:

*Numbers reported represent observed visitors

Green highlight: highest number of stops

Yellow highlight: lowest number of stops

Recorded behavior (talk, point, etc.) is associated with stops

Lower Red Panda Section

Findings: 59 observed visitors passed through the Lower Red Panda section. 34 of them made at least 1 stop in the section, with a mean of 1 stop per visitor (see Exhibit A-14). The 34 spent at least 1 minute in the section, with a mean time per visitor of 72 seconds.

Exhibit A-14. Number of stops and time spent on stops by observed visitors in the Lower Red Panda section

<i>Lower Red Panda section</i>	<i># of observed visitors</i>	<i>Total number of stops and time spent on stops</i>						
		<i>Total</i>	<i>Mean</i>	<i>Median</i>	<i>Minimum</i>	<i>Maximum</i>	<i>Percentile 25</i>	<i>Percentile 75</i>
Total number of stops	34	44	1	1	1	2	1	2
Total time spent on stops (seconds)	34	2462	72	40	2	273	10	120

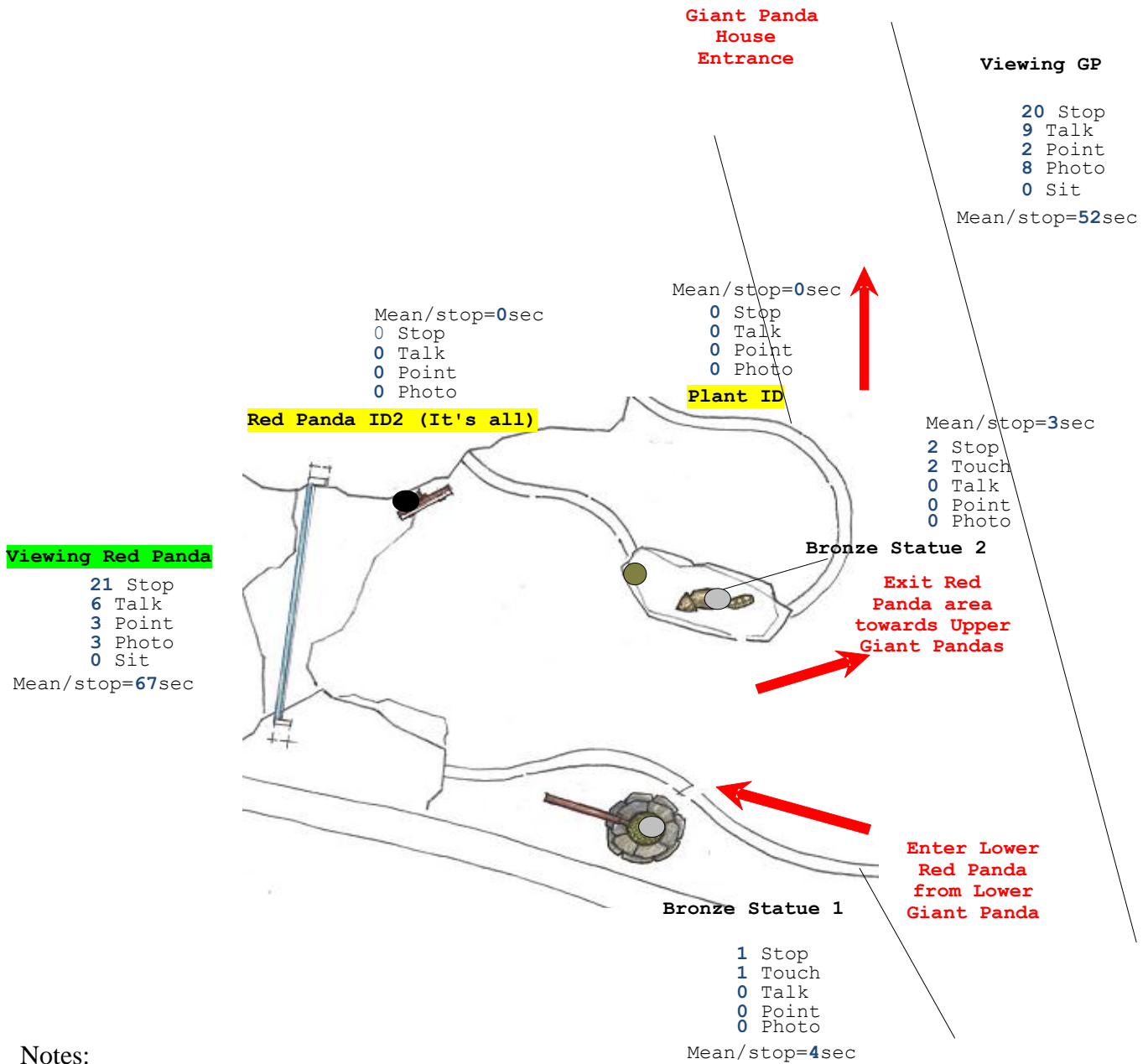
An observed visitor did not stop at every element in the Upper Red Panda section.

- The most popular stop was viewing the Red Pandas and their habitat at Viewing Red Panda—21 stops, or 48% of the total stops in the section.
- Observed visitors spent the longest amount of time, overall and on average, viewing the Red Pandas and their habitat at Viewing Red Panda—23 minutes, with a mean time per stop of 67 seconds, or 57% of the total time visitors spent on stops in this section.
- Observed visitors spent the least amount of time at Bronze Statue 2, with a mean time per stop of 3 seconds.
- No observed visitor stopped at the Red Panda ID2 (It's All) and Plant ID elements.

Analysis:

- **Animal viewing**—visitors spent more time when a Red Panda was visible (mean time of 68 seconds) than when one was not out (mean time of 46 seconds); further, visitors spent more time in the Lower Red Panda section when an animal was moving (mean time of 148 seconds) than when one was not out (mean time of 28 seconds).
- **Weather and crowding**—no correlation found between weather and crowding, and the amount of time spent on stops in the section.
- **Interpreter**—the interpreter was available for too few visitors to conduct an analysis.

Red Panda *6 Visible 9 Moving 45 Not out
 Interpreter 4 Available 55 Not
 Weather 33 Pleasant 26 Not
 Crowding Mean=12 visitors



Notes:

*Numbers reported represent observed visitors

Green highlight: highest number of stops

Yellow highlight: lowest number of stops

Recorded behavior (talk, point, etc.) is associated with stops

Giant Panda House Section

Findings: 60 observed visitors passed through the Giant Panda House section. 57 of them spent at least 1 minute in this section (see Exhibit A-15). By most measures, this section of *Asia Trail* was the most popular one. It had the highest proportion of people who stopped among those who walked by—57 of the 60 visitors, or 95%, with a mean of 5 stops per visitor; and the 57 spent the longest amount of time in this section, with a mean time per visitor of 6 minutes, or 341 seconds.

Exhibit A-15. Number of stops and time spent on stops by observed visitors in the Giant Panda House section

Giant Panda House section	# of observed visitors	Total number of stops and time spent on stops						
		Total	Mean	Median	Minimum	Maximum	Percentile 25	Percentile 75
Total number of stops	57	280	5	4	1	12	3	7
Total time spent on stops (seconds)	57	19441	341	234	5	1339	105	536

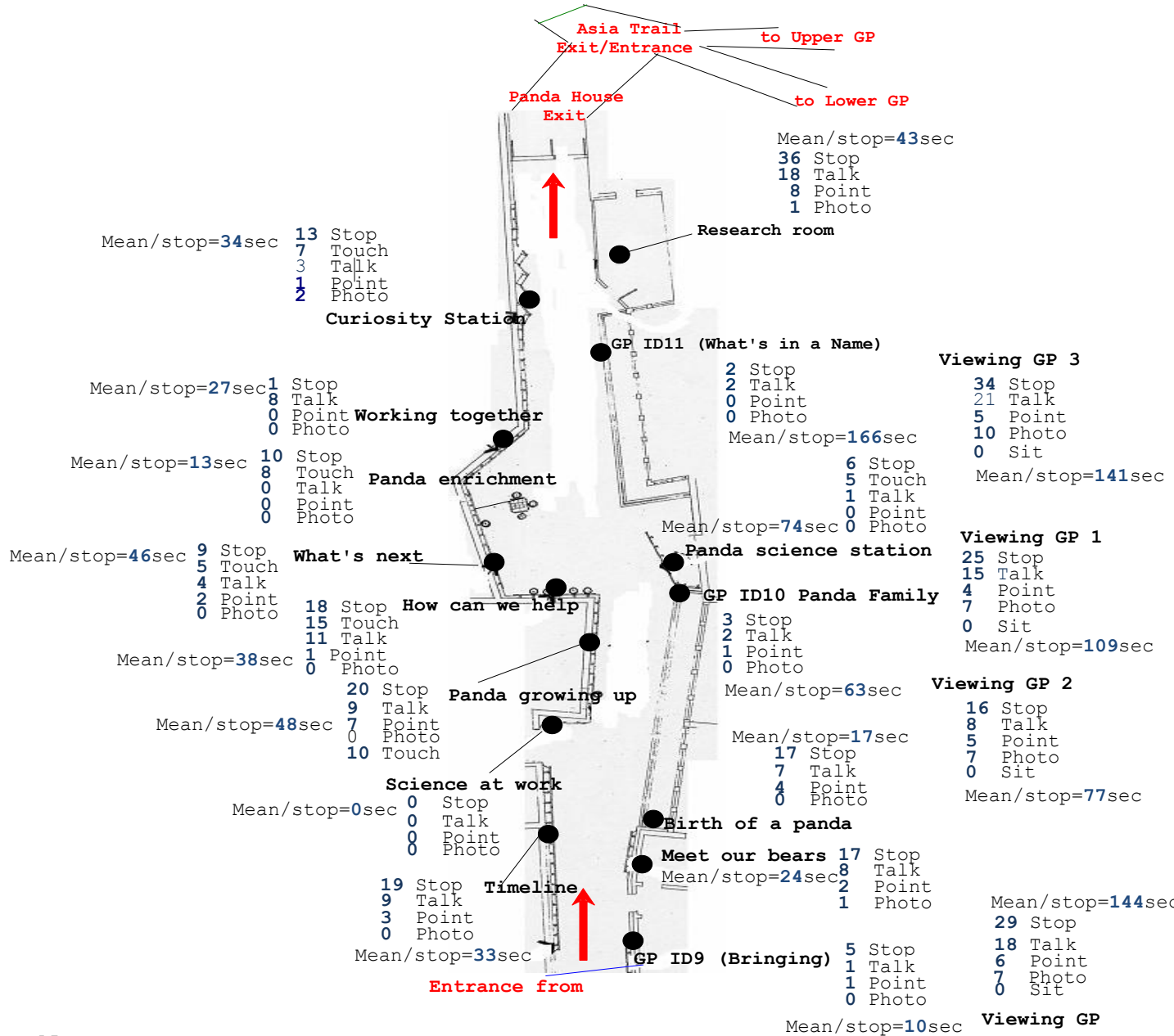
An observed visitor did not stop at every element in the Giant Panda House section.

- The most popular stop was viewing the Giant Pandas and their habitat at Viewing Giant Panda 3—34 stops, or 12% of the total stops in this section.
- Observed visitors spent the longest amount of time, overall and on average, viewing the Giant Pandas and their habitat at Viewing Giant Panda 3—80 minutes, with a mean time per stop of 141 seconds, or 25% of the total time visitors spent on stops in this section.
- Observed visitors spent the least amount of time at Giant Panda ID9 (Bringing), with a mean time per stop of 10 seconds.
- No observed visitor stopped at the Science at Work element.

Analysis:

- **Animal viewing**—observed visitors spent more time in the Giant Panda House when a Giant Panda was visible (mean time of 321 seconds) and even more time when one was moving (mean time of 404 seconds) than when one was not out (mean time of 117 seconds).
- **Weather, crowding, and interpreter**—no correlation was found between the weather, availability of an interpreter, and crowding and the amount of time spent on stops in the section.

Giant Panda *19 Visible 32 Moving 9 Not out
 Interpreter 23 Available 37 Not
 Weather 37 Pleasant 26 Not
 Crowding Mean=45 visitors



Notes:

*Numbers reported represent observed visitors

Green highlight: highest number of stops

Yellow highlight: lowest number of stops

Recorded behavior (talk, point, etc.) is associated with stops