**Wildlife Reserves Singapore**

WRS Project ID: \_\_\_\_\_\_\_\_\_\_\_\_\_\_

**WRS Staff Research Proposal Form**  Date:

MAIN APPLICANT DETAILS (PROJECT LEADER)

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| --- | --- | --- | --- |
| Name: | Tiara Sophia B M Nasir | Signature: |  |
| WRS Park: | Singapore Zoo | | |
| Position: | Animal Care Officer | Section  (if relevant): | Primate 2 , Primate 4 |
| Email Address: | Tiara.sophia@mandai.com | | |
| Contact Number: | 96260204 | | |

WRS LINE SUPERVISOR / STAFF MANAGER DETAILS

|  |  |
| --- | --- |
| Name: | Lua Boon Kong |
| WRS Park: | Singapore Zoo / Mandai Wildlife Group |
| Position: | Assistant Curator |
| Informed: | Yes / No (please underline one) |

PROJECT DETAILS

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| --- | --- |
| Title: | Browse Selection in Captive Proboscis Monkeys |
| Project Topic: | Please tick:  **Area 1: Behaviour, Enrichment & Welfare**  **Area 2: Dietary and Nutrition**  **Area 3: Veterinary Medicine, Health and Disease Management**  **Area 4: Population Management (Biology, Reproduction and Genetics)**  **Area 5: Conservation Communication, Education and Social Sciences**  **Area 6:** **Wildlife Ecology, Environmental and Conservation Biology** |
| Project Aim(s): | 1. To better understand the selection of different browse species in a family of captive Proboscis monkeys (*Nasalis lavartus*). 2. To also examine the influence of a varied browse diet on their activity levels and spatial use patterns of an outdoor habitat (or enclosure) 3. To address food wastages as well as enhance animal husbandry management through the newly gained information.   To see if it has any correlation to nutrient density / quality vs taste (is it healthy or junk food?)  By examining their preference, browse provided could be revised to provide a healthier diet with less wastage  Study could be expanded to a comparison between wild and captive proboscis monkeys and their browse preference |
| Timeframe: | 2022  Design planning: Mar – May  Data collection: May – Jul Lit review: Aug Analysis: Aug – Nov Write-up: Nov – Feb Review: Feb – Mar Presentation: Nov // Feb-Mar  Specify that Research Interns are doing the data collection from May-July  Discuss the use of increased desk time from August onwards? |
| Co-Investigators:  (Names/Affiliations/Roles) | Po Han Chou (WNC; Manager)  Da Jun Wang (ACI; Assistant Manager) |
| Project Description: | Primarily subsisting on leaves, wild colobines can be subjected to various *in-situ* conditions (e.g., habitat degradation, seasonality) that contribute to a poor selection of browse availability. This contrasts against the *ad libitum* availability of food sources provided to animals under captive care as a relatively wide variety of commercially available browse species are curated to meet for the variegated dietary requirements of animals within our collection.  Do captive Proboscis monkeys choose browse primarily to meet their nutritional needs (digestibility, micronutrients, self-medication)? Or do they follow their palate, knowing that food is always readily available to them? How is their browse choice affected when their captive diet is supplemented by food items such as vegetables, pulse mix and pellets?  Problems:   1. What and why are certain browse types preferred? 2. Are nutritional needs met? 3. Food wastage   As part of a larger project aimed at understanding the nutritional composition of commercially available browse in the Singapore Zoo, this component aims to examine the browse preferences in a harem of leaf-eating monkeys, the Proboscis monkeys (*Nasalis lavartus*). |
| Methodology: | **Study species and site:**  The harem of five adults and two juveniles (*Nasalis larvatus*) that are currently on display at Singapore Zoo entrance are chosen for this study. They have access to browse (species and amount dependent on what is provided by supplier) in the exhibit enclosure twice a day – once in the morning (hung the evening before) and at 1400 h. Two types of browse bundles will be offered (Ketapang only and mixed species), at five different feeding points within the exhibit. As part of their routine feeding regime, vegetable diet and cooked pulse-mix are offered to them at  1130 h.  **Sampling regime**:  *Cafeteria-style feeding trials*  *Ethogram*   1. Travelling 2. Grooming (by and with who?) 3. Interaction (by and with who?) 4. Feeding (what?) 5. Resting (eyes open, relaxed) 6. Vigilance (eyes open, alert, responsive) 7. Sleeping (eyes closed)   *Focal behavioural observation*   1. Feeding session: 0830 –1030 h and 1400 –1600 h 2. 10 (20?) mins per individual 3. 3 – 4 individuals per hour   *Notes*   * Only one observer will be doing the behavioural observation for this study. * Observer will need training to a) recognise browse species and individuals, and b) be proficient with ZooMonitor. * The observer will need to ensure that they are not recognizable by the animals so as to reduce observer effect (e.g., change of clothes, hats, etc). * Given the above, each studied individual will accrue \_\_ hours of observation.   *Browse preference*   1. Picking and not eating 2. Picking and eating 3. Counts of feeding bouts (e.g., how many times a leave is picked and consumed)   Note  Measurable characteristics are:   * Type and number of browse * Amount / abundance of offered browse * Age and quality of leaves.   *Environmental parameters*  Ambient temperature and humidity, as well as weather data, will be logged on a 15 / 30 / 60 min basis. This allows us to examine how temperature & humidity affects the **activity levels (budget)** and **enclosure use** of these animals.  *Analysis*:  Analyses designed for examining activity levels and enclosure use will be conducted in this study.  Nutritional data of each browse species can be used to see if there is any discernable pattern to the browse preference (consider temperature influencing browse selection; I.e., moisture content% versus temperature). |
| Budget Required:  (If yes, please justify) |  |
| Expected Results/Outcomes: | Please tick:  Peer-reviewed publication **(Y)**  Case report **(Y)**  Presentation (congress/conference/seminar/symposium/forum) **(Y)**  Poster (congress/conference/seminar/symposium/forum)**(Y)**  Conservation communication / public outreach materials**(Y)**  WOW-talk / Staff capacity building through presentation**(Y)**  Others (please specify): |
| Significance of Project: | *Describe in 1-2 sentences the direct impact this project has on the enhancement of health, welfare and care of wildlife species in captivity and/or the improvement of the long-term survivability of wildlife species in their native habitats*  *The project aims to enhance the health of captive proboscis monkeys and reduce wastage of resources* |

TO BE COMPLETED BY WRS (REVIEWED BY C&R)

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| --- | --- | --- | --- |
| Name: |  | | |
| Position: |  | | |
| Project Attachment: (Underline one) | Coordinator / Supervisor (please underline one) | | |
| Email Address: |  | | |
| Signature & Stamp: |  | Date: |  |

TO BE COMPLETED BY WRS LINE SUPERVISOR / STAFF SUPERVISOR

Provide a statement supporting or objecting the request. Please comment upon your staff’s capacity to undertake the work, the resources available to do the work and your assessment of the quality of the proposed project.

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| Name: |  | | |
| WRS Park: |  | Position: |  |
| I support this project: | Yes / No (please underline one) | | |
| Reasons/Comments: |  | | |
| Date: |  | Signature: |  |

RESOLUTION SECTION: TO BE COMPLETED BY WRS HEAD OF DEPARTMENT/DIRECTOR (WHEN APPLICABLE)

|  |  |  |  |
| --- | --- | --- | --- |
| Name: |  | | |
| Department: |  | Position: |  |
| Has matters pertaining to the dispute(s) been discussed with: | 1. Main Applicant Yes / No   (please underline one)   1. Line/Staff Supervisor Yes / No   (please underline one) | | |
| Details of the dispute(s): |  | | |
| Has the dispute been resolved? Please provide details of resolution. If not, please describe the plan to address the dispute. | Yes / No (please underline one) | | |
| Date: |  | Signature: |  |

Dispute(s) arising from the application as a result of the WRS line or staff supervisor refusing support of the project may be addressed with the Head of Department and completion of this section of the form.

**For Administrative Purpose:**

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| **Project Approved?** | **Research Panel Member** | **Approval (Signature OR Email)** |
| Yes / No | Dr Cheng Wen-Haur, CLSO |  |
| Yes / No | Dr Sonja Luz, Director C&R |  |
| Yes / No | Dr Luis Carlos Neves, Director Zoology |  |
| Yes / No | Dr Serena Oh, A-Director, Veterinary |  |
| Yes / No | Dr Jessica Lee, Research Manager C&R |  |

Reading materials

1. [Factors Affecting Leaf Selection by Foregut-fermenting Proboscis Monkeys: New Insight from in vitro Digestibility and Toughness of Leaves | Scientific Reports (nature.com)](https://www.nature.com/articles/srep42774)
2. [Behaviour and browse species selectivity of heifers grazing in a temperate silvopastoral system | SpringerLink](https://link.springer.com/article/10.1007/s10457-016-0041-x)
3. [LD5655.V855\_1982.T572.pdf (vt.edu)](https://vtechworks.lib.vt.edu/bitstream/handle/10919/82656/LD5655.V855_1982.T572.pdf)
4. [Frontiers | Fecal Nutrients Suggest Diets of Higher Fiber Levels in Free-Ranging than in Captive Proboscis Monkeys (Nasalis larvatus) | Veterinary Science (frontiersin.org)](https://www.frontiersin.org/articles/10.3389/fvets.2017.00246/full)
5. [Leaf Selection by Two Bornean Colobine Monkeys in Relation to Plant Chemistry and Abundance | Scientific Reports (nature.com)](https://www.nature.com/articles/srep01873)