Species Recovery Plan Workshop for Burmese roof turtle, *Kachuga trivittata*

Star tortoise, *Geochelone platynota*, Management Plan

Developing an Integrative Strategy for Handling Confiscated Turtles in Myanmar

Needs Assessment for Captive Chelonian Facilities

Myanmar, 5-21 January 2009

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WILDLIFE CONSERVATION SOCIETY

TSA
turtle survival alliance

Executive Summary

From 7 – 10 January 2009 the Turtle Survival Alliance (TSA) and Wildlife Conservation Society (WCS), in conjunction with the Myanmar Forestry Department, conducted two workshops in Mandalay. A Species Recovery Plan (SRP) workshop for the Myanmar roof turtle, *Kachuga (Batagur) trivittata*, was followed by a comprehensive trade workshop entitled *Developing an Integrative Strategy for Handling Confiscated Turtles in Myanmar*. Around 50 people participated in the four day workshop including the Director General of the Forestry Department and representatives from universities, wildlife sanctuaries and captive chelonian facilities in Myanmar. A multinational contingent including nine representatives from TSA, Conservation International (CI) and WCS also participated. The workshop produced documents on potential release sites for confiscated chelonians, release strategies, prioritized list of species for assurance colonies and special handling, recommended sites for assurance colonies and rescue facilities, captive and wild management strategies for Myanmar roof turtles and captive management of star tortoises. Concurrent with the general workshop, a half day training workshop on identification, husbandry and medical management of chelonians rescued from the trade was conducted at Yadanobon Zoo. A post conference facility assessment tour was conducted 11 – 20 January 2009 with site visits to at least eight sites that either maintain captive chelonians or have the potential to do so.

Myanmar Roof Turtle Recovery Plan

The endemic Myanmar roof turtle, *Kachuga trivittata*, ranks as one of the most critically endangered turtles in the world, and faces almost certain extinction in nature without serious conservation efforts. The *K. trivittata* SRP workshop consisted of two working groups that focused on the management of both the Wild and Captive Populations.

The **Wild Population Management Group** recommended new river surveys at eight sites ranked in order of priority with the most urgent being the Myitnge / lower Dokhthawady followed by the Sittaung and Salween. Various options for the management of wild hatchling *K. trivittata* at the upper Chindwin were reviewed with a consensus recommendation that 10 - 15% of hatchlings (higher once the captive holding reach desired numbers) be released upon hatching where the eggs were laid. A reintroduction program involving larger turtles was recommended for maximum survivorship. Nest monitoring, egg collection and initial headstarting should continue at Chindwin/Htamanthi WS with long-term rearing at Yadanabon Zoo.

An active K. trivittata nest site on the upper Chindwin River

Fishing-free zones (fish sanctuaries) on the upper Chindwin, both upstream and downstream of nesting and release sites, were recommended with perhaps all out fishing bans in limited areas. Certain fishing gear (set nets) should be restricted in priority zones, and seasonal fishing restrictions should be considered. A 6 mile stretch of river near Linpa is a high priority for additional protective measures. Lack of Protected Areas make enforcement difficult, and the overlapping jurisdiction between Forestry and Fisheries Departments is a complicated issue but cooperation is needed. Finally the need for public outreach and awareness and buy-in from the local community will be necessary in order to implement any of these recommendations. A number of research priorities were identified including temperature dependent sex determination (TSD) during egg incubation, sex ratios of future nests hatched on the Chindwin, movements of remaining wild turtles (tracking). With less than 10 nesting females remaining, aspects of the nesting ecology should be studied while the opportunity still exists. With dam construction on the Chindwin still looming in the future, there is a sense of urgency to this work. The fact that two infertile clutches are being laid at the northernmost and southernmost extremes of the nesting cluster suggest that males may be in short supply. The captive colony can be an important source for new males to introduce to these areas.

The **Captive Population Management Group** identified important factors necessary for maintenance of *K. trivittata* in captivity in perpetuity, and to serve as a hedge against extinction of the wild population. Currently the single captive population is at Yadanabon Zoo and is 6 adults and 167 juveniles in three age classes (2006 – 2008 hatches), all hatched on the upper Chindwin River. A first captive breeding was documented in 2008 with the discovery of one yearling in the breeding pond; others have been observed. Husbandry and health were determined to be very important in captive maintenance and nutrition is the single-most important factor that most likely impacts health. Detailed dietary analyses on the captive population were recommended and local

The adult breeding pond with nesting area (top right) and basking platform (left) was completed in 2006 and the first captive-bred offspring was hatched in 2008.

University students may be able to do this in collaboration with a U.S. zoo-based Nutritionist. Reducing competition for pelleted food in the breeding pond was considered a high priority and steps to remove fish were recommended including introducing endemic softshell turtles (*Chitra vandijki*). Quarantine and preventative medicine were addressed, and protocols need to be documented and recorded. New captive facilities are critical to the success of the captive program as Yadanobon Zoo is at capacity. Another concern is having only a single population at one location so there is a critical need to build additional facilities.

The juvenile rearing facility at Yadanabon Zoo is nearing maximum capacity with 163wild-hatched juveniles from 2006 – 2008. New facilities to accommodate this growing population are necessary.

A second facility was recommended for Yadanabon Zoo; other possible sites are Homelin – Htamanthi WS (#1) and Hlawga Park (#2). Selection criteria include availability of qualified personnel, security, proper environmental conditions, and accessibility. Target population size is 25 adult breeding pairs and 400 juveniles in the assurance colony, spread over multiple locations. Record keeping was considered a high priority and the following should be maintained: individual specimen IDs, movements between enclosures, and growth monitoring. Necessary steps include using standardized ID techniques (shell notch, microchip, paint mark), providing the zoo with a computer and an industry standard animal records keeping program (ARKS for ex) and provide training for keepers on record keeping. Various research needs were highlighted and training of personnel and keeper staff was considered a priority need. Staff could visit other similar facilities in Asia and learn enclosure design and management, how to create natural environments, feeding, water quality and incubation. Captive Assurance colony management plans, captive husbandry procedures and Re-introduction considerations will be included in the final document.

Myanmar Star Tortoise Recovery Plan

The endemic Myanmar star tortoise, *Geochelone platynota*, is one of the most highly endangered tortoises in the world, and the wild population is considered functionally extinct, decimated by years of unsustainable collection. This species' survival now depends entirely on well-managed captive stocks, and the eventual repatriation of tortoises to protected areas. A reintroduction of captive star tortoises was attempted at Minsontaung in 2008 but was unsuccessful for various reasons, primarily lack of enforcement capacity. In order to encourage improved results in the future, a workshop was held to review guidelines and considerations for reintroduction of this species. Also, through a series of five captive facility reviews throughout Myanmar – including Minsontaung WS, Shwesettaw WS, Lawkananda WS, Yadanabon Zoo, and the private facility of Griffin Enterprise – a set of recommendations was made that will improve the likelihood that this species survives. These facilities should be managed as a single population assurance colony, with the goal of maintaining a disease free and genetically diverse captive population. This assurance colony will ensure available stock for future reintroduction to former habitat and where adequate protection exists.

Recommendations include:

Captive Population Management

- In order to maintain a high degree of genetic diversity in the captive population, the number of potential founders (presumably unrelated, wild-caught animals) in the four government facilities should be increased to 200 adult breeders, or 100 pairs.
- Additional founders can be acquired opportunistically through confiscations, or by reducing the disproportionate number of wild caught adult breeders (founders) held privately by Griffin Enterprises for commercial use.
- The inequity and disparity between both the number and condition of star tortoises being returned to the government should be resolved. Currently only 20% are returned and these are often in poor shape with shell deformities.
- The government's allotment of tortoises should be selected by government/WCS/TSA biologists in order to avoid future selection of culls by Griffin Enterprises. This selection should be made once yearly from newborn tortoises, and as soon as the hatching season has ended.

- To ensure accurate records and proper reporting by Griffin Enterprises, their facilities and books should be reviewed regularly by government/WCS/TSA biologists. A complete inventory of tortoises and their IDs should be maintained, and losses through deaths and thefts accounted for. New specimens entering the population must also be accounted for to avoid further depleting wild populations should any exist.

Over 100 wild-caught adult star tortoises are concentrated at the private Griffin Enterprises operation, more that all the four government-run facilities combined. The breeding potential of these genetically important founders should be maximized for the long-term survival of this critically endangered species, now functionally extinct in nature.

Captive Facilities

Minsontaung WS and Yadanabon Zoo have recently opened new and improved TSA- funded star tortoise facilities. Shwesettaw WS and Lawkananda Park facilities should be expanded and improved. Griffin Enterprises has adequate space at this time. The following are site specific recommendations and rough plans have been drawn up for new construction. The next step is to acquire detailed diagrams and construction bids:

- Minsontaung – create a quarantine facility and institute sterile foot baths to avoid cross contamination; increase security by adding barriers (wire, broken glass) across the top of the perimeter wall.
- Yadanabon Zoo – add quarantine facility, remote from existing facility
- Shwesettaw – construct new larger tortoise facility adjacent to existing facility, incorporating wooded hillside.

- Lawkananda – expand facility with a large addition to the rear of the existing facility; use part of existing facility for quarantine, the rest for juvenile rearing
- All facilities: increase security guard presence and improve physical barriers to prevent break-in and theft. The use of guard dogs should be considered. Solar powered lights and motion sensors should be considered.

New juvenile rearing facilities for star tortoises at Minsontaung WS. Designed to be both theft and predator (rat) proof, this is a model enclosure that can be used in other locations.

This new star tortoise facility at Yadanabon Zoo in Mandalay incorporates a natural hillside that provides improved nesting conditions and exercise opportunities for the adult tortoises.

Husbandry

The following recommendations for facility and husbandry improvements are easily implemented and can have a highly beneficial effect on the health and well-being of the captive population.

- Ensure that all tortoises have easy access to natural sunlight as the heat and ultraviolet light is critically important for health and growth. Most facilities are heavily shaded with non-deciduous trees and shrubs. These should be maintained (pruned/trimmed) to allow passage of sunlight. New facilities should be planted with deciduous trees and shrubs to provide access to sunlight during the cooler dry season. Some low evergreen shrubs can be provided for seclusion and year round shade, especially for juvenile specimens.
- The practice of daily sweeping should be halted and leaf debris allowed to accumulate to provide a more natural environment.
- Incorporate leaning palm leaves for shade structures, and hay/straw piles for seclusion and shade.
- It is apparent that most juvenile mortality is during the cool winter months. To remedy this, juvenile tortoises should not become overly chilled. Ensure that sufficient leaf litter, rice hulls or straw is available for hatchlings and juveniles to better insulate from the cold bare ground.
- Stop the practice of carrying tortoises to and from a secured enclosure for nightly lock-up, as is currently done at Lawkananda, which creates undue stress on the tortoises. Increased security should be implemented to make this practice unnecessary.
- Diets should be analyzed for nutritional content and standardized for all facilities. Include varied, high quality green vegetables. Providing protein in the form of dead animals and human food scraps should be minimized, as this will increase the risk of nutritional disease and poor growth, especially in juveniles. Provide calcium supplementation, in the form of broken egg shells or cuttlefish bone, especially for juveniles and breeding females. Ensure that animals have adequate access to clean drinking water.
- Ensure that all hatchlings and juveniles are maintained in secure enclosures which are also predator and particularly rat proof. This will also provide additional security from theft.

This hatchling and juvenile rearing unit at Minsontaung provides important cover for the young tortoises and helps protect them during cool weather.

Juvenile star tortoises at Lawkananda feeding on a mixed diet of Ipomea and greens.

Marking and Record Keeping

- All captive animals should be implanted with pit tags, including those at Griffin Enterprises. This is an essential process that will eliminate misidentification and aid in law enforcement.
- A complete and up-to-date record of all tortoises and their corresponding pit tag numbers should be maintained by the Forestry Department.
- All new founders brought into the captive population should be immediately pit tagged and the numbers reported to Forestry.
- Juveniles can be safely pit tagged by an experienced veterinarian at approximately one year of age, or at a minimum of 50 grams body weight.
- All animals scheduled for export, or for transport to another facility within Myanmar should have their pit tag number reported to Forestry. **No star tortoise should ever leave Myanmar without a pit tag implanted and recorded**.
- Any captive star tortoises encountered without pit tag implants would then constitute a violation of Myanmar law because it would automatically identify an illegally collected or illegally traded tortoise.
- A standardized, non-repeating notching system should be instituted for redundancy and quick identification by participating facilities. Juvenile tortoises should have their notch code painted on marginal scutes until they are large enough to be safely notched
- A standardized record keeping system should be adopted by all tortoise facilities and all specimens should be assigned an individual accession number

Health Considerations

The Myanmar star tortoise assurance colony should remain healthy and with minimal disease risk. Recommendations include:

- All incoming tortoises should be quarantined
- Hatchlings and juveniles should be housed separately from adults and tortoise caretakers should take precautions against spreading pathogens between enclosures within the facility. Disinfectant footbaths should be used.
- All facilities should have a separate, preferably remote, quarantine area and all new animals should be isolated here for a minimum of 30 days upon arrival.
- Disease outbreaks must be quickly identified and treatment started promptly.
- Fecal exams should be performed on all adults at least annually

Reintroduction Guidelines and Considerations

For priority species such as the star tortoise, the reintroduction process should be a deliberate and carefully planned process in order to improve the chances for success. The following factors should be evaluated:

Releasing a star tortoise at Minsontaung in June 2008

Release site selection –

- estimate carrying capacity for tortoises
- evaluate environment – vegetation, browse and food plant availability, climate, human impact, optimal release conditions (season), shelter and retreats
- assess potential threats and risks such as fire, cattle, hunting pressure
- must be accessible for monitoring, but secure from poachers and intruders
- assess resident population – density, genetic profile

Health -

- Pre release health screening by qualified veterinarians to avoid disease transmission to resident population

Selecting tortoises for release - considerations

- Health
- Age and sex ratio
- Captive bred vs. wild-caught: wild caught adult breeders are important to maintain the assurance colonies and should not be released. F1 captive hatched that have been headstarted for several years are better candidates.

Seasonality

- Release at beginning of rainy season when food is abundant – May, June
- Release early morning

Pre-release conditioning

- Tortoises should be held in fenced conditioning enclosures for up to 6 months prior to release within natural habitat. This will encourage site fidelity and get tortoises used to foraging on natural vegetation. Site fidelity is important so that tortoises don't roam out of the protected area.

Pre-release data collection

- Age, individual ID – both internal (PIT tag) and external (paint, shell notch), sex, weight, length, origin
- Use standardized datasheets

Post-release actions

- Monitoring and patrols to ensure protection
- Establish informant network
- Data collection and observations on activity and survival of released tortoises
- Radio telemetry, dogs if safe
- Continued enforcement
- Continued awareness and outreach to local community

Placement of Confiscated Turtles in Myanmar

Trade Workshop Rationale and Objectives

Bordering five nations, and with porous borders lacking adequate enforcement capacity, Myanmar has become a prime trade route for illegal wildlife going into China, particularly chelonians. And though the composition of turtles offered for sale in China markets reflects a shift towards farm raised species, the wild-caught species that *are* offered are primarily Myanmar endemics. A May 2007 survey of the infamous Qing Ping Market in Guangzhou revealed high numbers of Myanmar species including two – *Kachuga trivittata* and *Heosemys depressa* – ranked critically endangered by the IUCN Red List. The presence of 80 *H. depressa* was particularly disturbing as was the high number of *Manouria emys (100) and M. impressa* (90) – both rare in Myanmar (though these could have come from neighboring Thailand, India/Assam or Bangladesh).

Seizures of shipments of illegal turtles heading for the China border are becoming more commonplace in Myanmar, evidence that some level of regulatory capacity exists. However these confiscations likely represent only a small percentage of those actually getting through. While the compositions of most of these shipments are predominantly the same common species – *Indotestudo elongata, Lissemys scutata* and *Morenia petersii* - there have been several recent seizures that involved species that should have been treated as high priority. Unfortunately due to lack of adequate facilities or holding capacity, groups of both *H. depressa* and *M. emys* were released that should have been retained for captive assurance colonies. Fortunately a second group of *M. emys* was deposited at the Yadanabon Zoo in August 2007 and processed properly.

Currently the process by which confiscated chelonians are handled can be vastly improved. Typically turtles and tortoises are deposited at the Yadanabon Zoo for triage and treatment, and then picked up at some point by Forestry Department staff and taken out and released. And though both Zoo and Wildlife Officers are Forestry Department employees, there is room to improve communications between the two groups. Large wildlife confiscations represent a major drain on zoo resources – both financial and personnel – and space is lacking to adequately house and maintain turtles, especially those in need of critical care.

Given this scenario zoo staff are generally not sorry to see these turtles leave. It is difficult to understand how release sites are selected for confiscated turtles. For example large numbers of yellow tortoises (*Indotestudo*) have been transported to Minsontaung Wildlife Sanctuary and released over the years. Those not collected again for the trade may experience low survival rates, and the recent discovery of a number of shell from deceased tortoises there lends credence to this prediction. Clearly this process can be improved to address the following deficiencies:

1) turtles being released into inappropriate habitats;
2) turtles being released that may be sick or carrying potentially contagious diseases that pose a risk to native populations;
3) turtles being released into areas where they are easily poached again;
4) mishandling of high priority species that should be retained for captive management and assurance colony development;
5) placement of turtles in facilities unsuitable for their health and survival

The purpose of the January 2009 workshop is to develop a collaborative plan for processing seizures of turtles from the illegal trade; it will focus less on enforcement but moreover what happens to turtles after they are confiscated**.**

The workshop deliverables envisaged were:

A **flow chart or decision tree** that clearly outlines the steps that should be taken for each species (step by step procedure);

A **prioritized list of turtle species** that are important for "special" care and treatment, and that are important for incorporation into 'assurance colonies'

An **identification guide to turtles** likely to be encountered by frontline enforcement staff (a guide already exists for neighboring countries and can possibly be reprinted in the Burmese language for distribution; WKK's book may also be appropriate)

A **Needs Assessment** of each of the Forestry Department (FD) facilities* that maintains chelonians, that describes their strengths and weaknesses and outlines what is needed in terms of staff, budget and enclosures to enable them to function as 'turtle conservation centers'. This will include an environmental profile at each facility along with a list of species that are best suited to be maintained and bred there.

* currently four of the five FD facilities are in the central dry zone. Wet-zone climate facilities with moderate temperatures are urgently needed, and developing them in the Rakhine State is a leading priority. There are several high profile taxa that are in need of 'assurance colonies' that would be well suited to this region.

A **Training Workshop** that will cover veterinary care, rapid health assessments and triage processes, initial processing of confiscated turtles (rehydration, wound treatment, housing requirements). Transport and handling considerations will also be covered as well as basic husbandry considerations (temperature, sun exposure, etc)

A **job description** for a position that would oversee and manage turtle confiscations in Myanmar and that is responsible for ensuring that the process works

A **model or blueprint** for handling confiscated turtle shipments that can be used throughout the region. Such a process is urgently needed and we are contacted frequently with requests for training or information on similar topics that will be covered in this workshop.

A **list of suitable release locations** for turtles, that takes into account their habitat requirements, potential to survive and potential to cause harm to existing turtle populations.

Release site selection and reintroduction of freshwater turtles and tortoises in Myanmar

Enormous numbers of freshwater turtles and tortoises are being illegally harvested and traded in Myanmar, and the majority of these are shipped to food, medicinal, and pet markets in southern China. This illegal commerce appears to be centered on Mandalay where wildlife traders are known to operate. After assembling a sufficiently large number of turtles, these are shipped north along two well-defined trade routes to either Lashio or Myitkina, and thence across the frontier into southern China. In an effort to stem the flow of illegally harvested wildlife, Myanmar authorities stop and search cargo leaving the country at border checkpoints. Occasionally large numbers of turtles and tortoises are seized by authorities. For example, in 2008 there were 22 confiscations at the border numbering more than 6,000 turtles. These confiscated animals are typically returned to Mandalay and temporarily housed at the Yadanabon Zoological Gardens, which lacks both staff and facilities to adequately handle the sudden influx of large numbers of turtles. Furthermore, housing confiscated turtles at the zoological gardens is risky owing to the possibility of diseases being transmitted from confiscated turtles to captive breeding groups of *Geochelone platynota* and *Kachuga trivittata* maintained at the zoo. Therefore, an urgent need exists to establish rescue centers specifically designed to house and rehabilitate confiscated turtles and tortoises prior to returning them to the wild.

We propose a two-tiered strategy for handling turtles and tortoises that are confiscated at the Myanmar-China border. The initial tier consists of first response centers designed to hold and care for turtles in the immediate aftermath of confiscations. These centers should be located astride the major trade routes into China where the majority of past confiscations have occurred. Because there is a delay between seizure, and unpacking and treating confiscated turtles, which can result in increased mortality among already stressed turtles, it is imperative to construct the first response centers in close proximity to sites where future seizures are expected. Also, first response centers should be located at sites accessible to foreign technical advisers involved with the project.

General requirements include:

- Should be on Forestry Department owned land
- Need to accommodate both aquatic and terrestrial species
- Must be able to handle 1000 – 2000 chelonians
- Needs to have source of water and water storage
- Water storage facility should be elevated, black and in the sun for warmth
- Frames for shade
- Easily cleanable water features
- Gentle slope to pools – 1' rise in 3' length
- Ability to separate species
- Ability to separate ill from healthy animals
- Area for food prep

- Area for treatment and holding some animals in individual tubs for treatment
- Area for record keeping
- Security - Perimeter fence 10 feet high solid with 3' footers with heavy gauge wire and razor wire or barbed wire at top
- Security lights – solar powered
- Guard post – elevated

Aquatic areas:

- large pool size – 6'X 12' to 4 feet deep
- large pool size – 6'X 12' to 2 feet deep
- Drain so they can be dumped and filled
- Rounded corners
- No land area – have concrete haul out at end of pools
- Total size of pool enclosures 6 X 15' when allowing for haul out at end of pool
- Can place planks over tops of pools with tubs on top to increase holding areas.
- Walkway between pools - lower than the walls between. Pools drains to walkway with gutters beneath.

Terrestrial area:

- Substrate
    1. Bamboo mats (can discard and burn)
    2. Concrete not ideal – make it smooth; consider tile or epoxy
    3. Dirt – gets contaminated

- Size of enclosures 6' X 15" X 2-3'
- Dividing walls between enclosures, can be further subdivided
- Plastic tubs for individual animals

- Concrete pad with slight slope to place plastic tubs on
- All enclosures are divided by 2 foot walls
- All pools are dump and fill – can be drained and cleaned
- Light frame work for shade structure (netting, palms etc)
- Gentle slope with very smooth finish

- Walkway- 6' wide with 2 ft walls on either side, covered
- Use for food prep, treatment and holding small aquatics

A diagram of a prototype design will be featured here.

Two first response rescue centers and one long term rehab center were recommended:

Lashio

- Lies along the southeast China border crossing and is the capital of the Shan State. Forestry staff are available through the Chatthin Wildlife Sanctuary but they would require extensive training in turtle husbandry and veterinary care. Additional staff would need to be hired.
- Lashio is accessible to foreigners with a tourist visa, and is only half day drive from Yangon or Mandalay; flights are also available.
- Climatic conditions – cooler than Mandalay and not suitable for some species long term.
- Over last four months of 2008 Lashio was the site of six confiscations of >4,000 chelonians.
- Facility should be capable of handling a diversity of species, of varying sizes. Rough diagrams of model facilities have been sketched out.

Myitkyina

- Lies along major northeast trade route to China and is the capital of the Kachin State.
- Forestry staff are available but would need to be trained and have salary supplemented; no need to hire new staff.
- Facility should be capable of handling a diversity of species, of varying sizes. Rough diagrams of model facilities have been sketched out.

Mandalay

- Facility would allow for longer term care and rehabilitation of species not suitable for quick release, and for species that will be moved into assurance colonies
- Provides easy access to foreigners; airport nearby
- Climate suitable for most species
- Veterinary support available from Yadanabon Zoo which has history of treating confiscated chelonians
- New facility will be required; location to be determined; should be on Forestry Department land
- Staff training and salary supplementation needed

Potential release sites for confiscated turtles

A list of potential release sites for confiscated turtles was compiled using the best available data on the known geographic distribution of turtles in Myanmar (**Table ?**). Release sites were selected on the basis of the following criterion: 1) site must be within the known or assumed geographic range of the species; 2) suitable habitat is available at the release site; 3) release sites are adequately protected from harvesting; 4) sites must be relatively accessible from the proposed rescue centers. It is important to note that the geographic distribution and habitat requirements of many species of turtles in Myanmar are imperfectly known; therefore our list should be considered tentative and subject to revision pending new information.

The release sites listed in **Table ?** are for the most part landscape-scale habitats, most of which already have formal protected area status. In addition to these sites, we also recommend investigating the potential of other sites that may prove uniquely suitable for conservation at the local level. For example, monks at the Shein Ma Garr Monastery on the Ayeyarwady River north of Mandalay have established a very effective local conservation program for Golden deer in the forest surrounding monastery. Because monastery lands are considered sacred for religious reasons, animals inhabiting these areas are unlikely to be molested. Shein Ma Garr probably offers suitable habitat for *Indotestudo elongata* and possibly *Geochelone platynota*. The international airport near Mandalay is another place worthy of consideration as a release site for rehabilitated turtles. For security reasons the airport is surrounded by an extensive buffer zone surrounded by a security fence where public access is prohibited. A cursory examination of the security buffer suggests this may prove suitable habitat for both *Indotestudo elongata* and *Geochelone platynota*. Undoubtedly, many other examples of small-scale, well protected sites exist in Myanmar where rescued turtles might be released after appropriate arrangements are made with those responsible for these properties.

Table 1. Potential release sites for rehabilitated turtles. Question mark (?) denotes problematic sites, i.e., it is unclear if these sites are within the historic geographic distribution of the indicated species and additional data is needed for clarification.

	Location							
Species	Alaungdakatha paw National Park	Inlay Lake Wildlife Sanctuary	Indawgyii Lake	Kyaikhi tiyo Wildlife Sanct.	Minzonta ung Wildlife Sanctuary	Mount Popa Wildlife Sanctuary	Shwe U Daung Wildlife Sanct	Rakhine Yoma Elephant Range
Amyda cartilaginea		●					●	
Chitra vandijkii			●					
Lissemys scutata		●			●	●	●	
Nilsonia formosa		●	●					
Geochelone platynota	?				●		?	
Indotestudo elongata	●	?	●	●	●	●	●	●
Manouria emys	●						●	●
Manouria impressa								●
Cuora mouhotii			?					
Heosemys depressa								●
Melanochelys trijuga			●		●	●		●
Platysternon megacephalum				●				

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animals inhabiting these areas are unlikely to be molested. Shein Ma Garr probably offers suitable habitat for *Indotestudo elongata* and possibly *Geochelone platynota*. The international airport near Mandalay is another place worthy of consideration as a release site for rehabilitated turtles. For security reasons the airport is surrounded by an extensive buffer zone surrounded by a security fence where public access is prohibited. A cursory examination of the security buffer suggests this may prove suitable habitat for both *Indotestudo elongata* and *Geochelone platynota*. Undoubtedly, many other examples of small-scale, well protected sites exist in Myanmar where rescued turtles might be released after appropriate arrangements are made with those responsible for these properties.

Release locations for turtles not selected for stocking assurance colonies

Morenia ocellata and *Lissemys scutata*

Owing to the large number of *Morenia ocellata* and *Lissemys scutata* confiscated from traders, the potential for these two species to overwhelm rescue facilities, the expense and logistic difficulties involved in repatriating large numbers of turtles to suitable natural habitats, and the high likelihood that neither species is at present endangered in the wild, we recommend releasing these species into semi-protected habitats where they stand a reasonable chance of surviving. Although we have yet to develop a list of specific release sites, areas such as irrigation reservoirs, urban lakes, and other similar habitats should be evaluated as potential release sites. For instance, urban lakes in Yangon and its suburbs (e.g., near Mingaladon Airport) which experience little fishing pressure might prove suitable as release sites. Likewise, the large moat surrounding the Palace in Mandalay warrants investigation. We also recommend releasing both species as soon as possible after being confiscated. This is especially important with regards to *M. ocellata*, which decline rapidly in captivity and are extremely difficult to maintain in good health for any length of time.

Cyclemys spp.

The appropriate protocol for handling confiscated *Cyclemys* spp. remains unresolved. At least two species of *Cyclemys* probably occur in Myanmar, and because the origin of confiscated turtles can rarely be determined with any degree of certainty, releasing confiscated *Cyclemys* into the wild is considered inadvisable owing to the risk of genetically contaminating local populations. Adding to the dilemma, the two species of *Cyclemys* are morphologically near-identical and genetic screening is required for positive identification. Finally, even if reliable identification can be achieved, the geographic distribution of the two *Cyclemys* in Myanmar is poorly defined, making selection of appropriate release sites difficult. Therefore, we recommend holding confiscated *Cyclemys* at the long-term rehabilitation center pending resolution of these issues.

In order for these concepts to move closer to reality, three important next steps must occur:

1. **Facility designs and cost estimates**: meet with architects and builders to discuss layout and specific design features, and get cost estimates. A TSA team plans to visit in August 2009 to move this process forward. **Timeline – August 2009**

2. **Training**: needs to occur at multiple levels including enforcement, turtle husbandry and first response veterinary care and triage. Planning for the training workshops can begin once a full time **Turtle Conservation Coordinator (TCC)** is in place.

3. **Staff:** a full time **Turtle Conservation Coordinator (TCC)** will need to be hired through the WCS Myanmar office in Yangon. **Timeline – 2010**. The TCC's primary responsibilities will be to:

- Oversee and coordinate all aspects of chelonian confiscations and will work closely with the Forestry Department to ensure that they are handled responsibly and humanely.
- Oversee the three facilities and ensure that they are adequately staffed and functioning properly.
- Plan and implement a series of workshops (see above) for training on enforcement and chelonian husbandry, emergency rescue procedures and medical management.
- Work closely with both local and international veterinarians to ensure adequate medical treatment
- Arrange transport of turtles between the various rescue facilities and assurance colonies
- Work with the Forestry Department to determine the outcome of various species, i.e. which will be released immediately and where, which will be held for long term treatment and rehab, and which will be retained for assurance colony management.
- Evaluate the suitability of both new and suggested release sites for species that can be returned to the wild with minimal risk
- Evaluate "semi natural" sites for placement of turtles deemed not suitable for return to the wild.

Justification for a full time veterinarian dedicated to turtle and tortoise issues

A full time veterinarian devoted to turtle conservation will also need to be hired though the WCS office. This person will work closely with the TCC and their primary responsibility will be to help manage the medical needs of confiscated chelonians, and essentially be on call at all times. Having a locally-based veterinarian available is important for a number of reasons:

1) available on short notice to travel to confiscation sites and begin quickly mobilizing support, administering medical treatment and making husbandry decisions;

2) speaks the local language and can communicate effectively with Forestry Department enforcement staff and those directly involved in handling animals;

3) can mobilize faster and much more economically than bringing in foreign veterinarians;

Assurance Colonies

The following species were designated for captive assurance colony development:

Kachuga trivittata – endemic; see Species Recovery Plan above

- Underway at Yadanabon Zoo but requires expansion there and several additional sites

Geochelone platynota – endemic; see Species Management Plan above

- underway at five facilities,
- facility improvements recommended
- comprehensive captive management plan should be implemented to include ALL star tortoise assurance colonies, both private (1) and government-run (4)

Heosemys depressa – endemic

- small groups at Gwa, RYER, Yadanabon Zoo and Shwesettaw – facilities need expansion and improvements
- new facilities specially designed for this species needs should be built, in zones that provide proper climatic conditions.
- private facility at Kyein Ta Li may offer the suitable conditions that we saw

Nilssonia formosa – endemic

- Hlawga Park offered the best lake opportunity that we saw
- Other suggested sites need to be inspected
- Semi-natural lakes with non-intensive management practices may be the best option at present.

Manouria emys

- Lower montane species that prefers cool and moist conditions
- Need to determine limits of range in Myanmar
- Large captive group at Yadanabon (65) that should be split up and moved to other sites
- Private facility at Kyeintali may be able to provide proper conditions
- Shwesettaw WS and Lawkananda Park may be suitable though they are in the central dry zone, so special provisions would have to be made; SWS has 2 long term captives; facilities in mid montane areas with moist conditions are preferable
- Other sites require further inspection such as Popa Mountain.

Chitra vandijki – endemic

- May be suitable for *K. trivittata* breeding pond at Yadanabon Zoo
- Hlawga Park may offer some adequate ponds; other sites require further evaluation

Platysternon megacephalum

- Difficult to maintain in captivity due to aggressiveness and specialized requirements – need cool flowing water; found in mountain streams
- Releases have been done at Kyaikhtiyo WS where they appears to be adequate protection
- Other northern wildlife sanctuaries (Lashio, Huakang Tiger Reserve) are possibilities

Manouria impressa

- Difficult to maintain in captivity; specialized mushroom feeders that prefer cool, montane conditions
- Northern site evaluations should be conducted

Melanochelys trijuga edeniana

- Endemic subspecies of wide ranging species in Asia
- Not difficult to maintain in captivity and groups should be selected from trade seizures for assurance colonies.
- Various lowland and central dry zone sites should be appropriate

Others include *Cuora mouhotii*, *Batagur baska*, and *Indotestudo elongat*a.

Most suitable locations to develop assurance colonies:

1. **Rakhine Yoma Elephant Range (RYER**) – 5 species considered with *H. depressa* and *M. emys* the most likely candidates. Adequate site here has yet to be identified

2. **Hlawga Park** – near Yangon. *Nilssonia formosa, Chitra vandiji* and *Melanochelys* may be best candidates; possibly *K. trivittata*. A large island with boggy humid areas should tested for suitability for *M. emys*.

3. **Minsontaung WS** – hot central dry zone; already managing *G. platynota* and *Indotestudo*; other possible candidates include *Nilssonia* and *Melanochelys*

4. **Htamanthi WS, Homelin** – *K. trivittata* and *Nilssonia* best candidates

5. **Kyaikhtiyow** – cool climate species would be best here such as *M. emys, M. impressa, Platysternon, C. mouhotii*

6. **Huakang Tiger Reserve** – suggested for a reintroduction facility; cool climate species as above

7. **Lashio** – cool climate species as above

8. **Yadanabon Zoo** – due to staff experience, a number of priority species (*K. trivittata, G. platynota, Indotestudo*) are being maintained here as assurance colonies and others are recommended including *Melanochelys, C. vandijki, B. baska* and *H. depressa*.

9. **Shwesettaw Wildlife Sanctuary** – already breeding *G. platynota* and have experienced staff; may be appropriate also for *M. emys* and *H. depressa*, both of which are currently maintained there.

10. **Lawkananda Wildlife Sanctuary** – large captive breeding group of *G. platynota*, very successful with experienced staff; shady enclosures may be appropriate for *M. emys* and *H. depressa.*

A written protocol outlining recommendations for the successful maintenance of captive assurance colonies will be included here.

Release Sites for species not selected for assurance colonies

Two types of release sites are needed:

1) Natural sites that allow the species to return to the wild and mix with natural populations;

2) Semi-natural sites that are segregated and somewhat protected, but do not allow turtles to mix with or pose disease risks to wild populations. Such sites might include monastery lands (tortoises), various lakes and zoo ponds, municipal lakes and moats, and land near the Mandalay airport (tortoises). Species sent to such areas would be fairly common species such as *Morenia and Lissemys*, and possibly *Indotestudo*, and healthy enough to survive without further treatment. Primarily southern species such as *Morenia* and *Lissemys* should be returned to Mandalay before considering release options.

The primary areas where confiscations occur are Shan State, Kachin State and Mandalay. Various rivers and other protected areas have been summarized where releases could occur.

A set of written protocols will included here for triage and captive maintenance of chelonians in rescue facilities

A summary of potential release sites and the species best suited for those locations is in preparation by Steve and Kalyar Platt.

Post workshop Facility Assessments

Hlawga Park

Located near Yangon, this large 881 acre park contains 11 man made lakes and various other facilities that could be converted to house chelonians. There is a 62 acre zoo that is fenced and 150 staff work within the Park. Climate is monsoonal with high humidity and temps ranging from highs of 37C in March to May to 18C in November to February. Hlawga Park was recommended as a potential site for a number of turtle assurance colonies including *K. trivittata, Nilssonia, C. vandijki* and possibly *M. emys* and *Indotestudo*. The number of lakes here make it an attractive option for developing some low maintenance assurance colonies, or providing release sites for species that cannot be returned to the wild. However, there appears to be minimal staff experience so extensive training would need to be done before turtles and tortoises could be managed here. However some ponds offer semi-natural conditions such that intensive care and management would not be necessary, perhaps just some supplemental feeding.

Recommendations:

1) Development of a small turtle facility within the zoo. The crocodile pond would be suitable for *K. trivittata* with minimal work, and Lake 6 (a 3 acre man made lake with sandbanks and no public access) might be suitable for semi wild populations of *C. vandijki and Nilssonia*

2) On Lake 2 with the islands, the southern area has potential for a facility for *K. trivittata*, while the islands could be used for *M. emys* and *I. elongata* all managed from a nearby existing building.

3) With minimal inputs, groups of *M. emys or I. elongata* could be placed on the two larger islands and provided supplemental feeding. This could be done almost immediately and would provide initial experience/incentive for staff to work with turtles and give a chance to assess their abilities.

Griffin Enterprises

This privately run facility is owned by a Japanese company and is a commercial breeding operation for Myanmar star tortoises, *Geochelone platynota*, and started in 2001. Located in near Bagan (Nyaung Ou Township), this center has the largest adult breeding population – 51 males and 60 females – in Myanmar, more than the combined number of adults at all four government-run facilities. They produce ~300 hatchlings per year, 20% of which are supposed to be returned to the Myanmar Forestry Department, and are received by Lawkananda WS nearby. 30% of hatchlings stay at the farm and 50% are sold to Japan. The staff reports that females produce about 12 offspring per female, or 800 hatchlings per year total. Due to the disproportionate number of wild-caught adults at this facility, and the important genetic diversity that they represent to the population, this colony should be integrated into the overall assurance colony for this species. Efforts to maximize the genetic potential of all founder adults (wild-caught breeders) should be made by subdividing the group into smaller breeding groups. Progeny from as many founder lines as possible should be transferred to the government for future breeding stock. This process will necessitate improved record keeping and using permanent identification – microchips - on all adults and progeny.

Star tortoise yards at the Griffin Enterprises commercial facility near Bagan.

The juvenile star tortoise rearing unit at Griffin Enterprises

Lawkananda Wildlife Sanctuary

Located near Bagan (Nyaung Ou Township), Lawkananda was established in 1996 and is a 108 acre park. It is situated within dry teak forest habitat. One of their goals is to conserve the endemic star tortoise and there is a 5,000 sq foot breeding facility that is roughly 66 ft x 88 ft. and was built in 2001. There are about 40 (27.12) adult breeders here and over 120 juveniles though these numbers vary widely from those reported at the workshop (49.34.106) Since 2005 they have received over 100 young captive hatched tortoises from the Griffon Enterprises commercial facility nearby, and 20% of progeny produced there are said to come to Lawkananda after two years. Egg laying had already begun and a number of clutches were in the ground, marked. Feeding appeared to be adequate and all animals appeared healthy and active. Lay Lay Khaing is the primary caretaker and has considerable experience in the management of tortoises in captivity. In 2006 there was a major theft and 33 tortoises were stolen. Goals are to improve security so that juvenile tortoises don't have to be moved to a locked secure area at night, improve husbandry through better nesting areas and access to natural sunlight, have a separate quarantine area for new arrivals, and become a showcase facility for educating visitors through graphics and public viewing.

Recommendations:

1) **Construct a new 60ft x 60 ft. tortoise facility** onto the back of the existing facility. Remove the large evergreen trees and open up the canopy to natural sunlight, and replace with Acacia and deciduous trees that will allow sunlight to penetrate during the cool season. Add shrubs for cover. Overall three types of enclosures will be required: adult breeding, juvenile rearing and quarantine:

- Juvenile facilities – would be in the center of the adult facility, and measure 30 ft x 30 ft (900 sq ft); 8 ft high walls with covered mesh roof; walls with concrete footers with wire

mesh above; dual mesh (strong + fine) for rodent proof; divided into 3 units (10 x 30 ft); shade structures (palm leaves, etc).

- Adult enclosure – surrounds juvenile unit and is divided into quadrants with 2 ft high semi-permanent walls and gates; these can be further divided using bamboo or other fencing.
- Quarantine – should be designated using part of the existing facility and should provide space for any new animals arriving from Griffon Enterprise; these should remain here for 2 – 3 months after arrival

This area behind the existing tortoise compound at Lawkananda – being measured here - is suitable for a new breeding enclosure. Trees should be thinned out to permit additional sunlight.

Low shrubs such as this provide important retreats for star tortoises at the Lawkananda facility

2) **Improve security with 3 m high perimeter fence**: replace with new barrier that has concrete or brick footers with strong wire above that can't be cut with wire cutters. Use barbed or razor wire on the top, or other deterrent. Consider solar powered security lights. Erect guard tower outside fence at left corner. Have alarm or bell that can be sounded when there are intrusions.

3) **Improve husbandry**: allow for better penetration of additional sunlight by thinning out tree canopy, and replacing with deciduous trees that will shed their leaves in cool months. Increase the number of retreats with dead fall, palm thatch and by not sweeping leaf little. Provide a calcium source especially to egg-laying females. Remove soil from the night holding areas at least two times per year to reduce parasite load. Once the new secure facility is built, these night areas will not be necessary. More detailed husbandry recommendations can be found in the star tortoise management section.

At Lawkananda WS, egg-laying is concentrated in areas that are least prone to flooding. Designs for future star tortoise facilities should include hillsides or elevated dirt mounds to encourage nesting behavior and provide safe egg-laying sites.

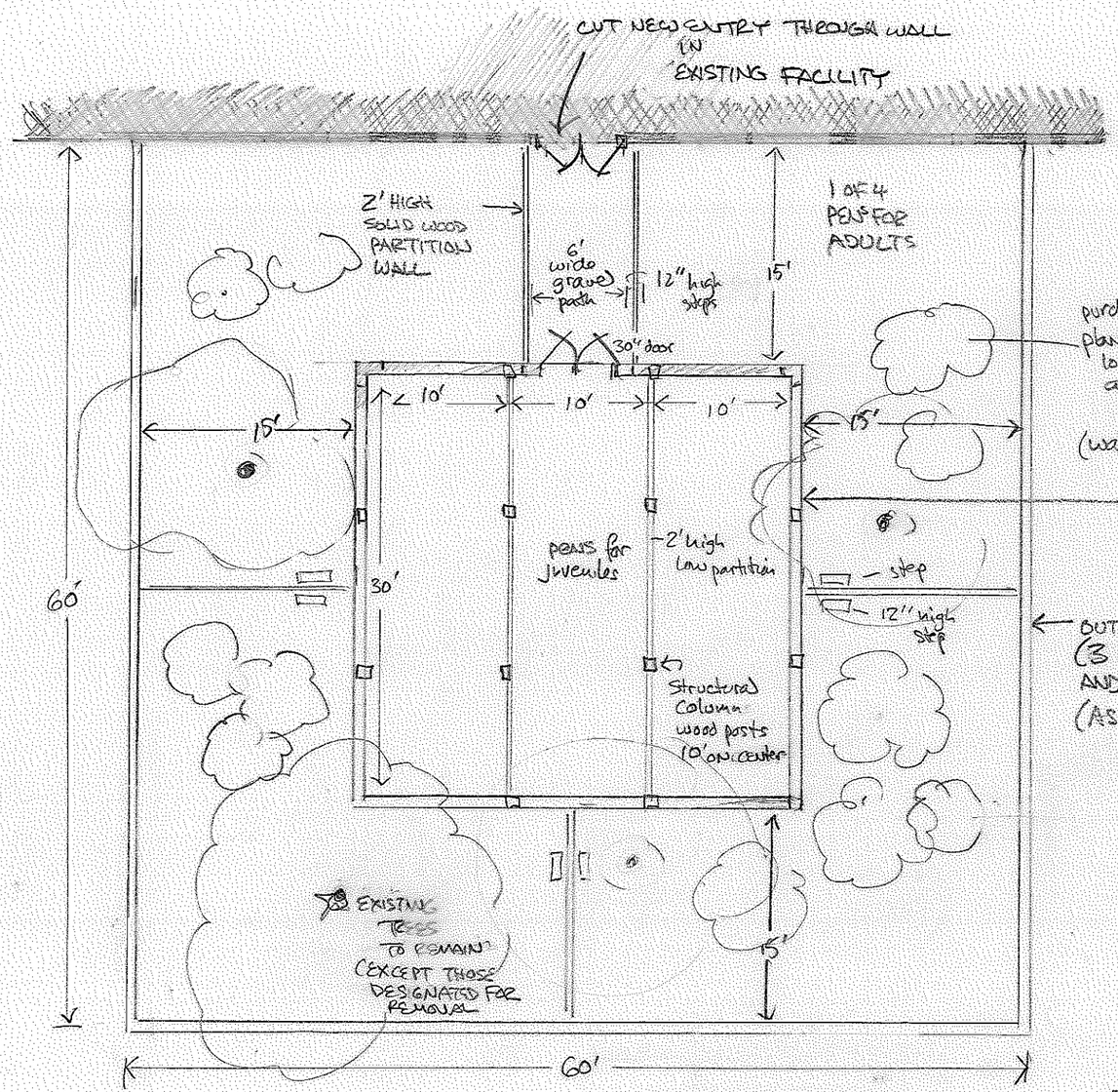
STAR TORTOISE PROPAGATION CENTRE #2

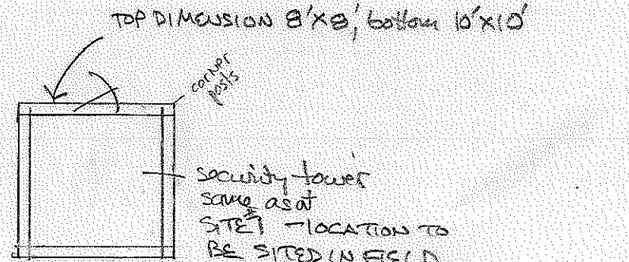
LAUKANDA

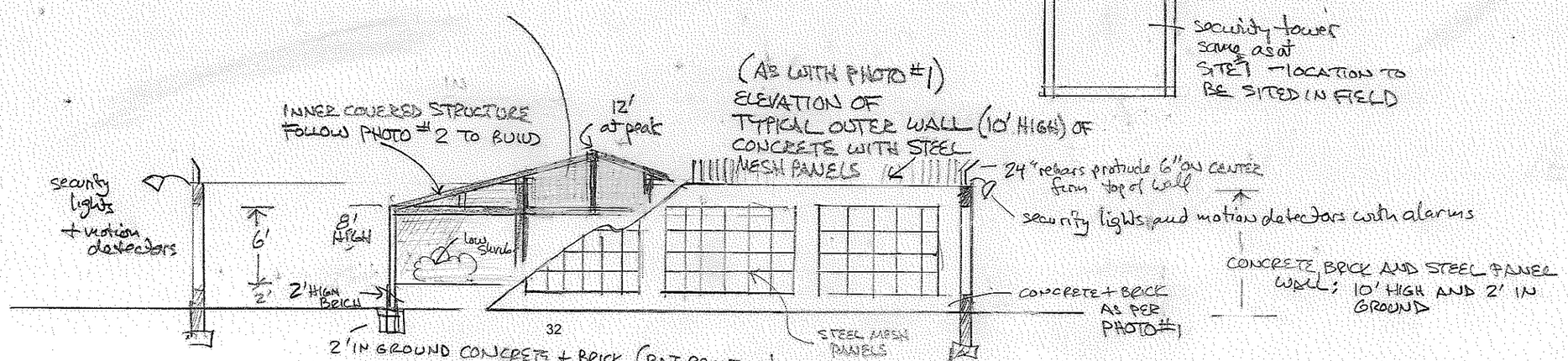
WCS JULY 2009

SCALE 1" = 10' OR METRIC EQUIVALENT

← PLAN VIEW





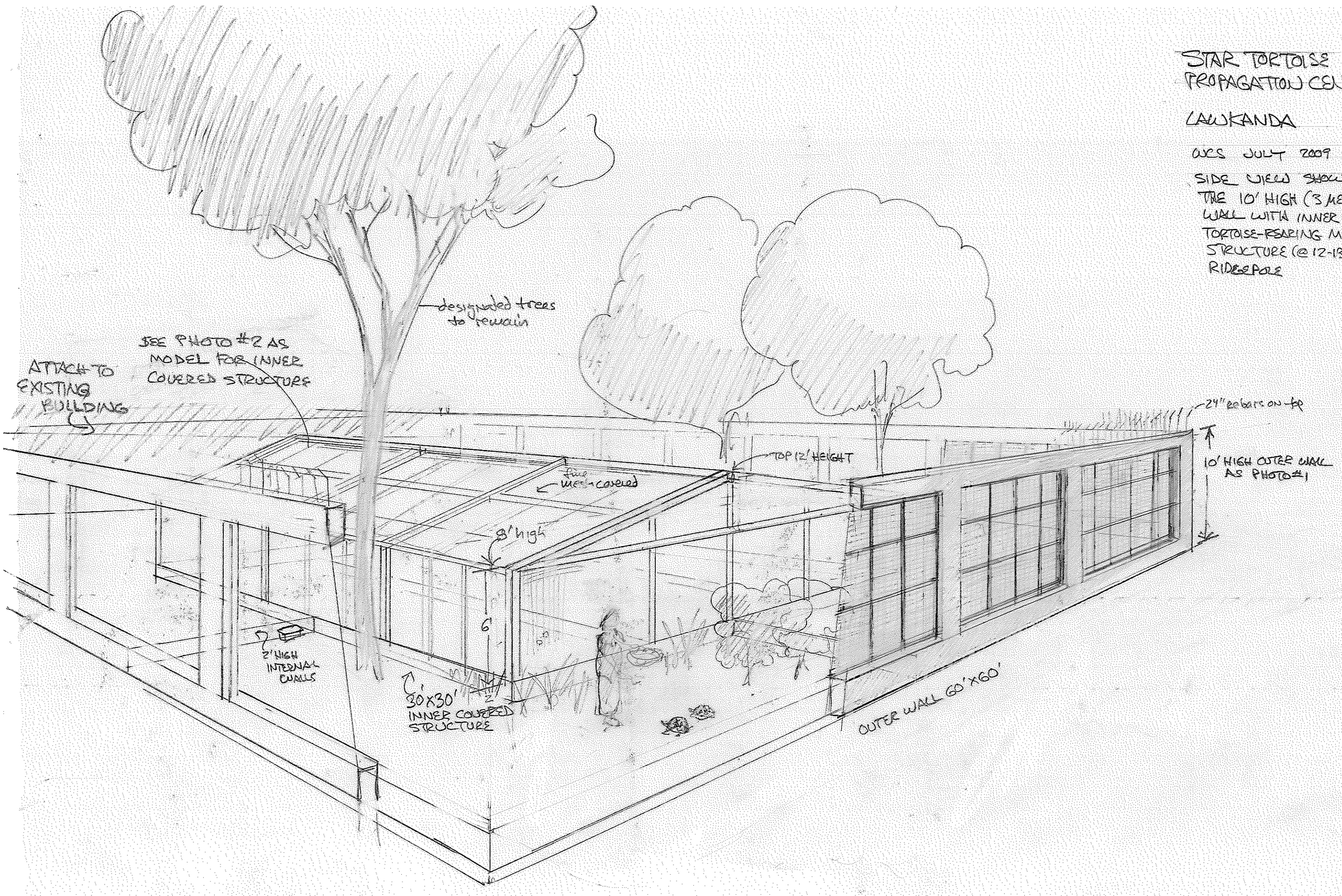


STAR TORTOISE PROPAGATION CENTER #2

LAUKANDA

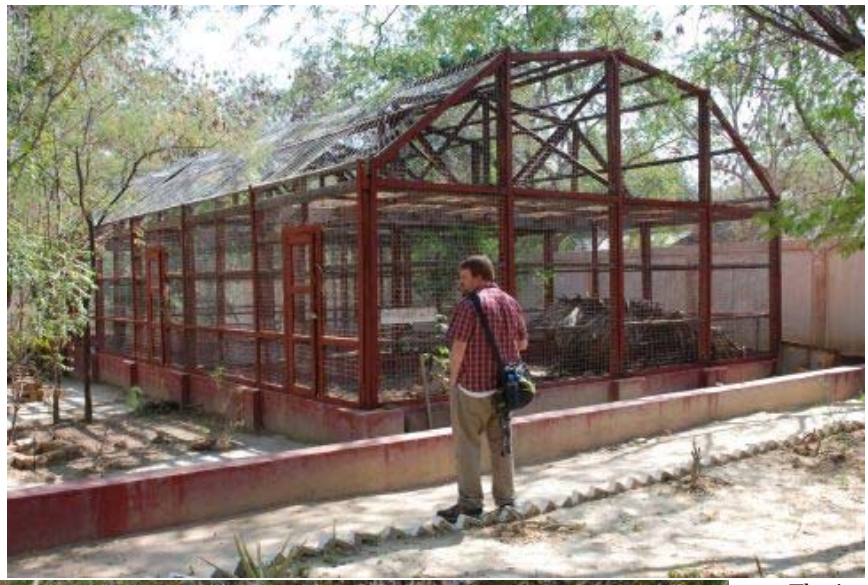
OCS JULY 2009

SIDE VIEW SHOWING (PART) THE 10' HIGH (3 METER) OUTER WALL WITH INNER 30'x30' TORTOISE-BEARING MESH-COVERED STRUCTURE (@ 12-13' HIGH AT CENTER RIDGEPOLE



Minsontaung Wildlife Sanctuary

Located in Nwa Htoe Gyi Township, Myingyan District, Mandalay Division, the Minsontaung Wildlife Sanctuary is 5,584 acres of dry forests and is part of the natural range of *G. platynota*. The star tortoise captive program was established in 2001 with 12 adults. Successful captive breeding commenced in 2003 and currently there are 194 tortoises at the facility (4 males, 6 females and 184 captive hatched juveniles). However thefts of tortoises have occurred on several occasions and improved security measures were needed to prevent this again. The Turtle Survival Alliance (TSA), with support from the EAZA Shellshock campaign and the Batchelor Foundation, and working through WCS's Myanmar Program office in Yangon, provided funding for the construction of a new and expanded facility. The new facility provides a large juvenile area that is separate from the adults and is secure against both theft and rodent predation. In the past some there has been some high mortality in juveniles during the cool winter months and we noted that some retreat areas (with rice chaff for insulation) had been provided that would buffer the juveniles from low temperatures. Finally 50 star tortoises from Lawkananda, both wild-caught and captive hatched, were moved to Minsontaung and released in June 2008. Six of the tortoises were tracked with radio transmitters, but due to lack of security within the Sanctuary, this reintroduction attempt was unsuccessful.



The juvenile star tortoise rearing units at Minsontaungprovide secure and predator - proof fencing.

Recommendations:

1) Install coiled barb or razor wire, or broken glass, around the top of the wall to deter illegal entry;

These walls and gates at the Minsontaung star tortoise facility provide a secure barrier but could be improved with razor wire along the top of the walls.

2) Designate a separate quarantine area;

3) Improve record keeping system and have individual ID and record for each specimen;

4) Improve diet by adding wild / natural food plants; provide calcium supplementation (cuttlebone) especially to females and growing juveniles.

5) Allow build up of leaf litter on floor of enclosure, i.e. stop daily sweeping.

Popa Mountain Park

Located in the Mandalay Division this Park is 45 – 50 km southeast of Bagan, and is a 49 sq km area, that is 45,000 acres including the buffer zone. There are 16 guard posts and 14 villages within the Park. There is an old volcanic crater and the rim is collapsed on the north side with a reservoir at the southwest edge of the buffer zone. Strong spiritual beliefs by local people have minimized impact on the forest. The focus here is on medicinal plants and the park is famous for its orchids. Five different forest types are present and natural water features provide water for surrounding areas. About 20 streams originate on the flanks of Popa Mountain, some of which are permanent. 175 bird species are found here, three of them endemic. This is essentially a green oasis within the central dry zone.

Park officials said that Elongated tortoises occur in the park, and some freshwater turtle may occur in the streams. Based on location and habitat, *Cyclemys* and/or *Melanochelys* might occur in the streams on the outer flanks, *Cyclemys* (and a remote chance of *Platysternon* and *Cuora mouhotii*) in any streams within the crater, while the evergreen forests inside the crater have a slight chance of supporting *Manouria emys* and/or *M. impressa*.

Due to the diversity of habitats, both aquatic and terrestrial, Popa Mountain has great potential as a release site, but the current status of its tortoise and possible turtle populations need much more clarification. An initial interview survey and habitat survey should occur (ideally before the rainy season starts in May 2009), focusing on the status / distribution / abundance of *I. elongata* populations as well as trying to understand what other turtle species might occur or have occurred naturally. This should be followed by an intensive, international expert survey to strengthen the data on *I. elongata* status as well as intensive surveys of the streams inside and outside the crater, and tortoise surveys of the evergreen forests inside the crater. These latter would almost certainly be overnight camping surveys. The reservoir is worth evaluating as a release site for confiscated *Lissemys* and possibly other species. The following questions need to be resolved**:** *What species occur in the park, and what species could be placed in the park?*

Recommendations:

1) Survey the whole park in either May or June
   - 80% of the work could be done within several weeks
   - Obtain detailed info on Popa Mtn: environment, maps, species lists, past survey info.
   - Determine what waterways are permanent
   - Survey the outer portion as potential site for turtle release sites (but not return to wild)
   - Survey in the crater for *Manouria* and *Platysternon* – do not add any new animals if there is evidence of existing animals.

- Outside the crater is potential site for *Melanochelys*
- Survey for *Indotestudo elongata* – *Elongata* will not be genetically distinct so putting more in the buffer zone won't dilute gene pool.

2) Popa Mountain should not be considered for captive chelonian facilities at this time because there is no expertise at present.

3) Identify person to do survey work in May-June 2009

- Interview surveys – must be done correctly – ensure Myanmar team has been appropriately trained.
- Cambodia turtle team may be the most appropriate to do the surveys.

4) Identify Myanmar student(s) to work with survey team

Rakhine Yoma Elephant Range, Gwa

This is 667 sq mi wildlife sanctuary consisting of tropical evergreen and bamboo forests. The park headquarters lies within lowland coastal forest on the western border. There are 17 staff with an additional 20 Forest Department based at four checkpoints around the Sanctuary and staff rotate between headquarters and checkpoints. The site was evaluated for developing captive facilities (assurance colonies) for both *Heosemys depressa* and *Manouria emys*. The land around headquarters is dry and poor quality habitat, backing onto a salt marsh which inundates low areas at high tide, and appears to be unsuitable for *M. emys*. A few shade trees are available but it is still hot and dry. Water must be pumped from a well to a storage tank, and is slightly salty. Further evaluations throughout the Sanctuary should be conducted (ranger stations, elephant facility) to determine if more suitable locations (climate) can be found for developing turtle and tortoise facilities.

This small turtle and tortoise facility at the ranger station of the Rakhine Yoma Elephant Range Wildlife Sanctuary requires expansion to provide husbandry for Heosemys depressa, an endemic species targeted for an assurance colony here.

The existing turtle facility is small - 3 x 4 m - roofed and shaded with bamboo panel walls with corrugated aluminum flashing at bottom. Small shelters and water bowls sit on a dirt floor. The diet is pumpkin/gourd and bokchoy. Species include 6 (3. 3) *Heosemys depressa*, 5 *Cyclemys* and 2 *Indotestudo elongata*. There is minimal exposure to natural sunlight and several health issues were apparent. Dehydration is a concern and turtles placed in water pans drank for long periods of time.

Recommendations:

Expand existing facility and improve husbandry: build a 10 x 10 m facility around the existing facility with that to remain as a shade structure with the walls opened up. A small pond should be build with smoothed concrete, 1 x 2 m with gentle slope to 30 cm depth; water hyacinth or other aquatic vegetation should be added to improve the environment. Shade plants should be added such as palm, banana or bamboo, with additional large trees planted for shade. Substrate should be leaf litter that is hosed down 2 – 3 times per week to maintain high humidity.

Build new quarantine facility: a 10 x 10 m unit, subdivided into four areas for quarantine and holding of new animals, each with its own shelter and pool.

Training workshops: the turtle keeper staff will require additional training in captive management, husbandry, veterinary care and record keeping.

Rakhine Coastal Region Conservation Association

Located at Kyeintali, in the Rakhine State, and 5 miles from the Yoma Elephant Range, the RCRCA is a government recognized NGO that has operated for 20 years. Managed by a private individual – Dr. Maung Mayng Kyi – they have 70 acres of secondary forest located on the Bay of Bengal, 20 in rice production and 50 as good forest. Hornbill and muntjac have returned which is a good sign of minimal disturbance. Over the past 15 years the RCRCA has received and released over ~250 turtles including *Indotestudo elongata, Heosemys depressa* and *Lissemys*. This area was evaluated for potential assurance colony development for both *H. depressa* and *Manouria emys*. One area in particular – a streamside forest bordering a rice production area – appeared to offer suitable conditions for M. emys. A hillside forest bordering a stream with ample shade and retreats looked promising. The challenge would be constructing barriers that would contain the tortoises (fencing across the steam would be difficult) and maintaining adequate security to prevent thefts.

This heavily forested streamside habitat may be suitable for a large group of Manouria emys if a secure and escape-proof perimeter fence can be maintained.

Shwesettaw Wildlife Sanctuary

Established in 1940 in Minbu District, Magway Division, this Sanctuary is home to both star tortoises and Golden deer. The star tortoise program began in 2000 with six pairs of adult tortoises; that number has grown to 71 tortoises (9 males, 16 females and 46 captive hatched juveniles) in 2008. Reproduction began in 2001 and has occurred every year since then. The existing tortoise facility is approximately 8 m x 16 m and houses at least three additional species including *M. emys* (2) and *H. depressa* (2), both of which arrived two years ago.

Recommendations:

1) **Convert existing tortoise facility** so as to provide better husbandry conditions for the *M. emys* and *H. depressa* to include:

- Fix the large concrete pond so that it drains and can be cleaned and filled
- Subdivide the area at far left end (NW corner) with 3 ft high permanent fence that has 3 ft long x 3 in tall gaps to allow the *H. depressa* to enter but not the *M. emys*. This creates a crawl through space for *H. drepressa* but keeps the *M. emys* contained. The area can be blocked off to contain *depressa* if needed.
- Soil is heavily compacted and difficult to nest in
- To increase humidity, fill the enclosure with 6 in of leaf litter and compost, and plant heavily with low shrubs, shade plants or bamboo.
- Plant low shrubs on *H. depressa* side and install sprinkler system. Will require water storage tank and diesel pump.
- Decrease or cease feeding animal protein (chicken parts).

This single tortoise unit houses at mixture of least four species including M. emys, G. platynota, H. depressa and Melanochelys t. edeniana.

2) **Build new star tortoise facility that is**

- situated roughly 10 ft from the perimeter fence
- enclosure should have 10 ft high fence with razor or barbed wire at top; brick or stone footers would be preferable; wire should be strong that cannot be cut with wire cutters
- Solar powered security lights should be installed
- An elevated guard tower should be built
- included 4,900 sq ft for hatchlings and juveniles and 5,100 sq ft for adults/subadults (10,000 sq ft total, or 100 ft x 100 ft).
- Target numbers are 12 breeding pairs and 450 juvenile to sub-adults and improved breeding success should be noted soon with better nesting areas (elevated); this will require that a release strategy be developed within the next two years.
- **Juvenile facility** should be in the center (same as Lawkananda and Minsontaung model) and measure 70 ft x 70 ft, built of dual mesh (strong plus fine for rodent proofing); covered with wire mesh
- Divided into 8 large units (17 x 17 ft) divided by 2 ft concrete walls: can be further subdivided with bamboo panels.
- Shade structures can be temporary and added after completion.
- **Adult enclosures are** along the perimeter and is divided into quadrants with 2 ft high semi-permanent walls and gates; these can be further subdivided with bamboo if needed.
- Will provide elevated nesting areas and a mixture of sun and shade; deciduous trees are present.
- Shelters are lean-tos with palm thatch or shade cloth, not permanent
- Water is provided by shallow concrete basins that can be swept clean, or sunken removable pans
- Develop a separate quarantine area by isolating one corner of the facility with higher fences to prevent foot traffic and cross contamination with the rest of the tortoise herd.

Site of a proposed new 10,000 sq ft star tortoise facility at Shwesettaw WS that will include elevated areas such as this for nesting.

STAR TORTOISE
PROPAGATION CENTRE #1
SHWESETAW

UCS JULY 2009

SCALE 1" = 100' OR METRIC EQUIVALENT AS NOTED

PLAN VIEW

OUTSIDE DIMENSION 100'

100'

19' | 29' | 29' | 19'

11'

perimeter 12 breeding pens

low partitions (2' high) temporary wood wall

5' | 19' | 11' | 29' | 4' | 29' | 4' | 5'

69.5' DIMENSION OF COVERED STRUCTURE

× motion detector

WALKWAY FOR PEOPLE

4' GRAVEL PATH

4' path

23' | 23' | 23' | 23'

VERTICAL POSTS ON CENTER

23' ON CENTER

23'

open pen for juveniles

open pen for 1-4 yearolds

open pen for ready larger babies

CONCRETE BASE

(ROOF CENTER LINE ABOVE)

69'×69' mesh-covered central structure - as per photo #2

optional vertical posts (11.5' oc) if needed

20 shrubs of deposited species

INNER COVERED STRUCTURE (SEE PHOTO #2) with 2' HIGH CONCRETE BASE AND 2' CONCRETE BELOW GRADE, WOOD AND MESH STRUCTURE ABOVE

ONE ENTRY

STRUCTURAL POSTS 23' ON Center N/S and East/West

CONCRETE BASE TO WALL

29'

11'

19'

29'

30" 30" Inner Door with motion detectors inside + out

19' | 25.5 | 6' entry path

30" 30" OUTER DOOR

100'

41

← OUTER WALL

2' tall steel reinforcing bars on top, 6" on center bent out to discourage entry

(3 METERS)

10' HIGH CONCRETE + STEEL MESH OUTER WALL SEE PHOTO #1

- 3' HIGH WITH BENT OUTER REINFORCING BARS 2' HIGH AT TOP
- CONCRETE STRUCTURE WITH REINFORCED BURIED CONCRETE FOOTING 2' IN GROUND AND INSET STEEL PANELS (AS PER PHOTO #1) WITH MESH 4"×4"×6×22 covered in ½" mesh to prevent rodents.

8' wide at top

10' wide at bottom

access panel

solar panels on roof

light

I 40'

Level 4 3

2½' rails

32' →

water tanks

Narrow steep stairs

Level 3 22'

Level 2-12'

solid door

Solid wood walls at bottom (one)

Level 2'

40' TALL GUARD TOWER - 3' narrow stair on one side, 3 levels with solar panels on roof, water tank on 3rd level

10'

10'

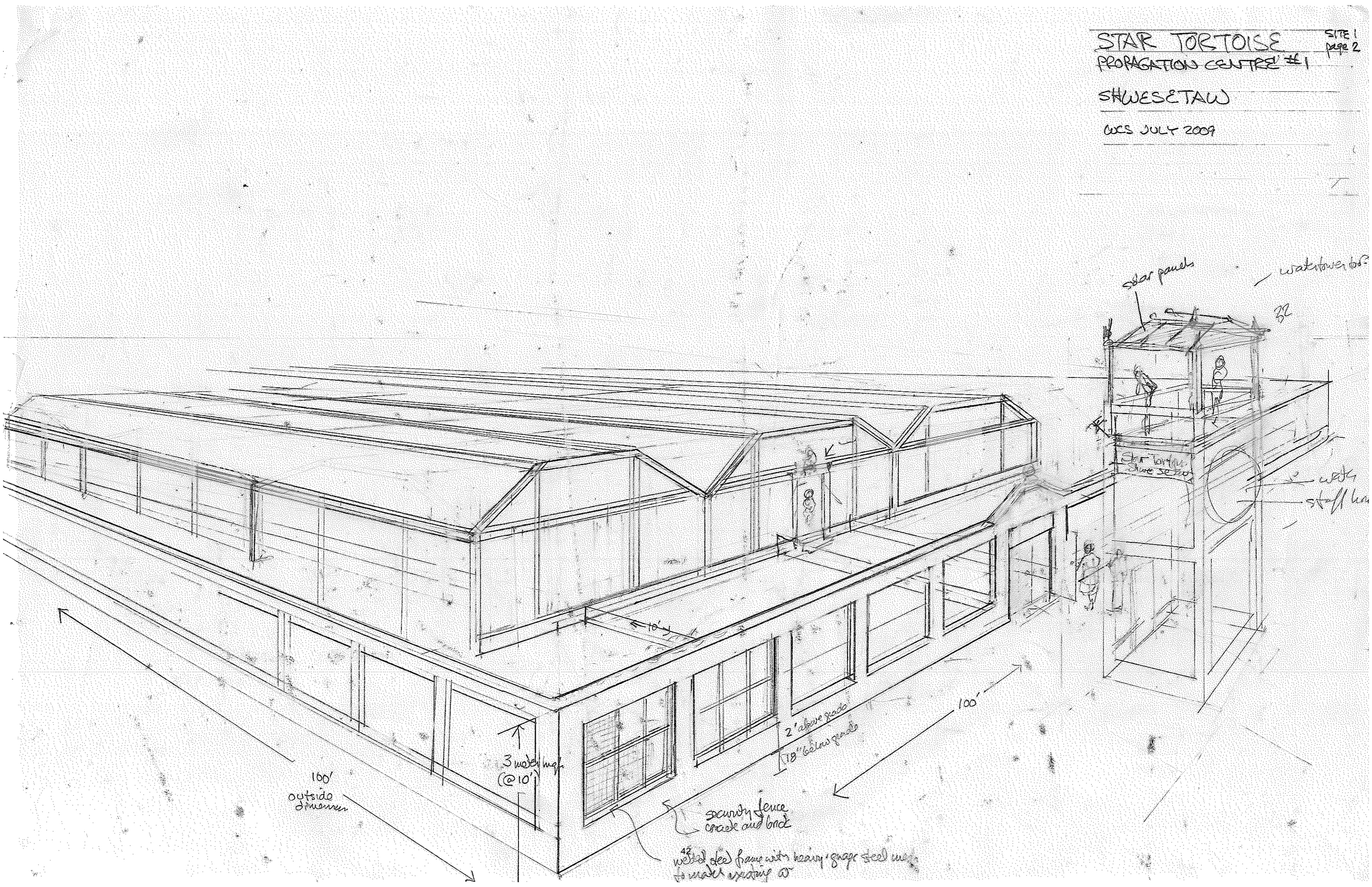
plan

Final location to be sited in the field.

STAR TORTOISE
PROPAGATION CENTRE #1

SHWESETAW

OCS JULY 2009



Yadanabon Zoo

Located in Mandalay, this government-run Zoo maintains the only worldwide captive assurance colony for the critically endangered Myanmar roof turtle, *K. trivittata*, and has a successful breeding program for the star tortoise, *G. platynota*. The TSA and other groups have invested heavily here since 2006 to build new facilities for these two priority species and the first ever captive breeding for *K. trivittata* occurred here in 2008. However with 163 wild-hatched Kachuga from 2006 – 2008 already occupying the new grow-out enclosures, the facility is already nearing capacity and requires expansion. Over the years the Yadanabon Zoo has frequently been the recipient of large turtle and tortoise confiscations that are brought here for treatment and holding while decisions are made for their placement and disposition. Large number of *Lissemys scutata, Morenia ocellata* and *Indotestudo elongata* generally dominate the shipments but other priority species turn up from time to time including *Nilssonia, C. vandijki* and most recently *Manouria emys*. In August 2007 the TSA helped the Zoo and Forestry Department staff with treating and processing a group of 76 adult *M. emys*. This is a highly important group of tortoises and they should be maintained as a captive assurance colony in order to preserve the genetics of this northern population which are becoming increasingly rare and endangered.

Recommendations:

1) **Expand *K. trivittata* management area**: should at least double the number of enclosures for rearing hatchlings, juveniles and sub-adults

2) **Provide area for growing *K. trivittata* to adult size**: Install a dividing fence across the narrow portions of the filter pond (the water hyacinth-filled pool adjacent to the management area from

which the water is pumped.) to create two separate areas for turtles and plants. One side can be used to raise large sub-adult *K. trivittata* to adult size.

This water hyacinth-filled pond supplies water for the K. trivittata rearing facility nearby and could be subdivided to provide an area where turtles can be grown to adult size

3) **Develop separate quarantine area for star tortoises** that is separate from the breeding and rearing enclosure.

Yadanabon Zoo veterinarian Tint Lwin points to a cluster of star tortoise nests in the new facility, all laid at the highest point of ground available.

This star tortoise rearing unit is designed to provide dry, secure and rodent proof conditions for hatchlings.

4) **Improve husbandry for large group of *Manouria emys*:** an existing enclosure was modified to hold this group of 70+ *M. emys* that is inadequate for the number of specimens held here, now numbering in the 60s due to some mortality in the past year. A pond was dug to provide drinking water and soaking opportunities in hot weather.

However this was meant to be only temporary and $3,000 was sent by TSA to fund a complete renovation of this enclosure. A smooth concrete pool with a drain should be installed, and dividing walls built; extensive shade structures should be installed and a misting system added if possible. These measures are necessary to improve the conditions for this cool moist forest dweller during the hot summers in Mandalay.

5) **Expand *M. emys* assurance colonies**: the Zoo wants to maintain only eight specimens and wants to disperse the rest to other assurance colonies. We recommend that tortoises be sent to several locations including possibly Shweettaw WS, Lawkananda WS and a private facility at Kyeintali near Gwa, in the Rakhine State. Though these facilities do not offer the optimal climatic conditions that *M. emys* prefers, they should be adequate due to their experienced staff and natural forest (Kyeintali).

It is important that this large group of Manouria emys at Yadanabon Zoo be managed as an assurance colony. However this group must be divided among several locations to reduce disease risk and over-crowding.

OUTLINE FOR COMPLETE REPORT

Executive Summary	Rick Hudson
Introduction, Rationale and Objectives	Edit existing doc
***Kachuga trivittata* Recovery Program**	**Lead: Kuchling**
• Introduction to the species [name change]	
• Wild population and Habitat management aspects	
• Captive Assurance colony management plan	
• Captive husbandry procedures	
• Re-introduction considerations	Brian
***Geochelone platynota* Recovery Program**	**Leads: Hudson & McCormack**
• Wild population and Habitat management aspects	Tim
• Captive Assurance colony management plan	Rick
• Captive husbandry procedures	Bill
• Re-introduction considerations and guidelines	Tim
Placement of Confiscated Turtles in Myanmar	**Lead: Hudson**
• Overview/introduction	Peter Paul & Rick
• Establishment of First-response rescue Centers	Rick, Steve, Kalyar
• Protocols for triage and maintenance at rescue centers.	Tim, Bonnie, Bill
• Selection of species for assurance colonies	Edit WS notes
• Locations of assurance colonies for various species	Edit WS notes
• Protocols for captive management in assurance colonies	Tim, Bonnie, Bill
• Locations for release of animals not selected for assurance colonies by location, by species	Peter Paul, Steve, Kalyar
• General protocols for release of turtles (reintroduction, disposal and placement guidelines)	Tim, Bonnie, Bill

Appendices:

Working Group reports

• K. trivittata wild & captive mgmt	done
• Release site selection	done
• Star tortoise re-intro	done
• Hypothetical Turtle Confiscation	done
• Facility Assessments	
• Need for a dedicated turtle conservation coordinator (vet?)	Rick
• Need for a husbandry training workshop	Rick
• Model record-keeping sheets	Tim
• Summary of turtle ecosystem benefits	Peter Paul
• Work Plan of recommended activities	Report Editor
• List of workshop participants and contacts	Than Myint

SUMMARY OF KEY RECOMMENDATIONS

Kachuga trivittata Species Recovery Plan

1) Begin releasing 15% of *K. trivittata* hatchlings at the site where the nest was laid;

2) Begin releasing larger headstarted *K. trivittata* that have an improved chance of survival; males especially should be released in areas where females are laying infertile clutches;

3) Continue river surveys to search for surviving populations;

4) Establish fishing free or restricted zones within the core 6 mile stretch of the upper Chindwin River where nesting in concentrated;

5) Initiate studies of the wild nesting ecology while the opportunity still exists. This is critical to understanding the sex determining temperature relationships;

6) Expand the carrying capacity of the captive population to 25 breeding pairs and 400 juveniles;

7) Expand the captive management facilities for rearing juveniles at Yadanabon Zoo, and build two new facilities in different locations, the first priority being the Htamanthi Wildlife Sanctuary - Homelin.

Geochelone platynota Species Recovery Plan

1) Integrate all five of the Myanmar start tortoise breeding facilities – four government-run and one private – such that they are managed cooperatively and as a single assurance colony, with the goal of maintaining a disease free and genetically diverse captive population for the long-term survival of the species;

2) Increase the number of potential founders (presumably unrelated, wild-caught animals) in the four government facilities ~200 adult breeders, or 100 pairs. This will require that the disproportionate number of genetically valuable wild-caught founders at Griffin Enterprises be distributed more evenly among all facilities;

3) Improve record keeping in all facilities and individually identify all star tortoises with a PIT tag (microchip). A complete inventory of ALL captive star tortoises and their IDs should be maintained. No star tortoise should be moved out of the country without an ID;

4) Resolve the disparity in the process by which star tortoises are selected and transferred from the private Griffin Enterprises to the government. Improve colony management, record keeping and specimen accountability at Griffin Enterprises;

5) New and expanded star tortoise breeding facilities should be constructed at both Shwesettaw and Lawkananda Wildlife Sanctuaries;

6) Quarantine areas should be designated for the new facilities at both Yadanabon Zoo and Minsontaung Wildlife Sanctuary;

7) Improvements to tortoise husbandry should be implemented at all facilities including better access to sunlight, improved nutrition, better nesting areas, provision of bedding materials to protect juveniles from cool weather, and provision of retreats and shade structures for adults;

8) Improving security measures at all facilities should become a high priority, such that the practice of moving tortoises to secure night enclosures will not be necessary;

9) All future releases of star tortoises should be carefully planned with respect to specimen selection (age, sex, parentage/genetics, value to captive program), identification, release site selection, follow up monitoring, protection and enforcement capacity at release site and pre-release health screening.

Placement of Confiscated Turtles

1) Two first response turtle rescue centers should be constructed in Lashio and Myitkyina, both of which are situated along major trade routes into China. These facilities are where confiscated chelonians would be brought immediately following seizure for initial triage and treatment until decisions can be made regarding their disposition and placement. These facilities should be located on Forestry Department land, and staffed by Wildlife Sanctuary personnel;

2) A long term turtle rehabilitation and treatment center should be built in Mandalay where priority species can receive extended care, prior to integration into assurance colonies, or release;

3) The process of obtaining facility designs and cost estimates should get underway in August 2009. A team from TSA should visit Myanmar to meet with architects and builders to discuss layout and specific design features;

4) For an effective process to be implemented for handling confiscated chelonians, an extensive training process will need to occur - at multiple levels - including enforcement, turtle husbandry and first response veterinary care and triage;

5) Hiring a full time Turtle Conservation Coordinator (TCC) will be necessary in order to implement an effective process for handling trade seizures. This position can be hired through the WCS Myanmar office in Yangon;

6) A full time veterinarian should be hired and committed to the turtle confiscation and placement process. This position could also be hired through the WCS Myanmar office and supported by the TSA;

Assurance Colonies

1) The following eight species were recommended for captive assurance colony development: *Kachuga trivittata, Geochelone platynota, Nilssonia formosa, Chitra vandijki, Heosemys depressa, Manouria emys, M. impressa, Platysternon megacephalum and Melanochelys t. edeniana* (endemic subspecies). Others include *Cuora mouhotii, Batagur baska, and Indotestudo elongata*. Specific recommendations for each species have been made.

2) Ten locations that are considered appropriate for assurance colonies including Hlawga Park, Rakhine Yoma Elephant Range, Htamanthi WS - Homelin, Minsontaung WS, Lawkananda WS, Kyaikhtiyow, Huakang Tiger Reserve, Lashio, Shwesettaw Wildlife Sanctuary, and Yadanabon Zoo. Other sites should be evaluated for suitability. Specific recommendations for each site and facility have been made.

အကြံပေးလိုသောအဓိက အချက်အလက်များ

မြန်မာ့တိုက်လိပ် *Kachuga trivittata* မျိုးသုဉ်းမှုမှ ကာကွယ်ရန်ပြုလုပ်သင့်သည့်အချက်များ

၁). နှစ်စဉ်ပေါက်ဖွားလာသော တိုက်လိပ်များ၏ ၁၅%ရာခိုင်နှုန်းကို မူရင်းပေါက်ဖွားရာမူလသောင်ပြင်၌ လွှတ်ပေးသင့်ပါသည်။

၂). အရွယ်အစားကြီးမားသောလိပ်များသည် သဘာဝအန္တရာယ်ကိုပိုမို ရင်ဆိုင်နိုင်စွမ်းရှိပါသဖြင့် ယခုလက်ရှိခြံခတ်မွေးမြူထားသော တိုက်လိပ်များမှ အရွယ်ကြီးမားသော အချို့လိပ်များကို ချင်းတွင်းမြစ်အတွင်းသို့ ပြန်လွှတ်ပေးသင့်ပါသည်။ အထူးသဖြင့် မျိုးမအောင်သောဥများ အုံချနေသည့် လိပ်မကြီးများ ကျက်စားရာနေရာများသို့ လိပ်ထီးများသာလွှတ်ပေးသင့်ပါသည်။ လိပ်ထီးများပိုမိုလွှတ်ပေးနိုင်ခြင်းသည် လိပ်မများအားမျိုးအောင်သောဥများ ပိုမိုရရှိစေရန်ပံ့ပိုးနိုင်သောကြောင့်ဖြစ်ပါသည်။

၃). မြစ်ပြင်တစ်လျှောက် လေ့လာရေးခရီးစဉ်များဆက်လက်ပြုလုပ်သင့်ပါသည်။ သို့မှသာ ကျန်ရှိနေသေးသော လိပ်မျိုးစိတ်များ၏ ရှင်သန်နိုင်မှုကို လေ့လာနိုင်ပါမည်။

၄). တိုက်လိပ်အသိုက်အများဆုံးတွေ့ရသော ချင်းတွင်းမြစ်အတွင်းရှိ သောင်ပြင်များတစ်လျှောက် (အလျားအားဖြင့် ၆မိုင်) ဧရိယာအား ငါးမဖမ်းရဏှဖြစ် (သို့မဟုတ်) ကန့်သတ်နယ်မြေအဖြစ် သတ်မှတ်ပေးသင့်ပါသည်။

၅). သဘာဝမြစ်များအတွင်းတိုက်လိပ်များဥအုခြင်း၊ သားပေါက်ဖွားခြင်းစသည့် ဂေဟဗေဒကို စနစ်တကျ လေ့လာမှုများစတင်လုပ်ဆောင်သင့်ပါသည်။ ဤသို့လေ့လာခြင်းဖြင့် တိုက်လိပ်များအထီး(သို့)အမ ဖြစ်တည်လာခြင်းသည် ဥကျင်းအတွင်းရှိအပူချိန်နှင့်ဆက်နွယ်မှုရှိ၊ မရှိကို လေ့လာသိရှိနိုင်ပါသည်။ ယင်းရလဒ်သည် တိုက်လိပ်မျိုးများနှင့် ရှင်သန်မှုအတွက် အလွန်တရာမှ အရေးပါပါသည်။

၆). ယခုလက်ရှိမွေးမြူထားသော တိုက်လိပ်များ၏အရေအတွက်ကို မျိုးပွားနိုင်သော သက်ကြီးကောင်လိပ်ထီး၊ လိပ်မ (၂၅)စုံနှင့် အရွယ်မရောက်သေးသော လိပ်ငယ်(၄၀၀)အထိ မွေးမြူနိုင်အောင် တိုးချဲ့သင့်ပါသည်။

၇). ယခုလက်ရှိ ရတနာပုံတိရစ္ဆာန်ဥယျာဉ်အတွင်းမှ လိပ်မွေးမြူရေးကန်များကို ပိုမိုတိုးချဲ့ခြင်းအပြင် အခြားနေရာ(၂)ခု၌လည်း ထပ်မံဆောက်လုပ်ပေးသင့်ပါသည်။ ပထမဦးစားပေးရွေးချယ်သင့်သော နေရာမှာ ထမံသီဘေးမဲ့တော၊ ဟုမ္မလင်းမြို့ဖြစ်ပါသည်။

မြန်မာ့ကြယ်လိပ် *Geochelone platynota*

မြန်မာ့ကြယ်လိပ်မွေးမြူရေးခြံများအားလုံး (အစိုးရမွေးမြူရေးခြံငုခုနှင့် ပုဂ္ဂလိကခြံ၁ခု) သည်အတူတကွ ပူးပေါင်းဆောင်ရွက်သင့်ပါသည်။ မြန်မာ့ကြယ်လိပ်များ ရောဂါကင်းရှင်းစေရန်နှင့် ရေရှည်လိပ်မျိုးများ မျိုးပွားရှင်သန်စေရန် ရည်မှန်းချက်ဖြင့် အစိုးရမွေးမြူရေးခြံများနှင့် ပုဂ္ဂလိကမွေးမြူရေးခြံတို့ ပူးပေါင်း၍ လိပ်မျိုးမသုဉ်းရေး၊ အာမခံချက်ရှိသော ကြယ်လိပ်မျိုးစိတ်ကြီးတစ်ခုတည်းအနေဖြင့် စီမံဆောင်ရွက်သင့်ပါသည်။

အစိုးရကြယ်လိပ်မွေးမြူရေးခြံများ၌ သားပေါက်ဖွားရန်ပိုမိုအလားအလာကောင်းသည့် အရွယ်ရောက်ပြီးသည့် လိပ်ထီး၊ လိပ်မ အရေအတွက်ကို ပိုမိုထပ်တိုးသင့်ပါသည်။ ယင်းလိပ်ကြီးများသည် သဘာဝတော အတွင်းမှ ဖမ်းဆီးခဲ့သော လိပ်များဖြစ်သင့်ပြီး၊ အချင်းချင်းအမျိုးတော်စပ်မှုမရှိသော လိပ်ကြီးများဖြစ်သင့်ပါသည်။ အရေအတွက်အားဖြင့် အရွယ်ရောက်ကောင်ရေ (၂၀၀)ခန့် သို့မဟုတ် အထီးအမအစုံ (၁၀၀)ခန့်ရှိသင့်ပါသည်။

Griffin Enterprise ရှိလိပ်မျိုးစိတ်ပြန့်ပွားမှုအတွက် မျိုးရိုးဗီဇတန်ဖိုးရှိသော တောတွင်းဖမ်းဆီးမိသက်ကြီးကောင်များကို အစိုးရမွေးမြူခြံများအတွင်းသို့ အထီးအမ ညီမျှစွာခွဲဝေ ထည့်ပေးသင့်ပါသည်။ လိပ်ခြံများအားလုံးတွင်မှတ်တမ်းများကို ပိုမိုအသေးစိတ်မှတ်တမ်းသင်တင့်ပါသည်။ ကြယ်လိပ်တစ်ကောင်ခြင်းစီကို Microchip ID များထည့်ပေးသင့်သည်။ မှတ်တမ်းနှင့် ID ကို တွဲ၍တစ်ကောင်ခြင်းစီ မှတ်တမ်းထားရှိသင့်ပါသည်။ မည်သည့်ကြယ်လိပ်မှ ID မပါရှိပဲ နိုင်ငံခြားသို့တင်ပို့ခြင်းမပြုရန် တားမြစ်သင့်ပါသည်။

မည်သည့်အကောင်ကို Griffin Enterprise မှ အစိုးရပိုင်လိပ်ခြံသို့ ပြောင်းရွှေ့သင့်သည်ကို တစ်ကောင်ခြင်းရွေးချယ်ပြီး ခွဲခြားဆုံးဖြတ်ရပါမည်။ Griffin Enterprise ရှိမွေးမြူထားသော ကြယ်လိပ်များ၏ အုပ်စုစီမံခန့်ခွဲမှု၊ မှတ်တမ်းတင်မှု၊ အကောင်အရေအတွက် စာရင်းများအားလုံးကို ပိုမိုပြည့်စုံအောင် ထားရှိသင့်ပါသည်။

ရွှေစက်တော်ဘေးမဲ့တောနှင့် လောကနန္ဒာဥယျာဉ်ရှိ လက်ရှိကြယ်လိပ်မွေးမြူရေးခြံများအား တိုးချဲ့ဆောက်လုပ်ခြင်းအပြင် အဆောက်အဦးအသစ်များလည်း ထပ်မံဆောက်လုပ်သင့်ပါသည်။

ရတနာပုံတိရစ္ဆာန်ဥယျာဉ်နှင့် မင်းစုံတောင်ဘေးမဲ့တောရှိ ကြယ်လိပ်ခြံများအတွက်လည်း လိပ်များရောဂါဖြစ်လျှင်ထားရှိရန် သီးသန့်အဆောက်အဦးများ ဆောက်လုပ်ပေးသင့်ပါသည်။

ကြယ်လိပ်မွေးမြူရေးခြံများကိုလည်း နေရောင်ခြည်ပိုရရှိစေရန် ဖန်တီးပေးခြင်း၊ အစာအဟာရပိုမိုဖြည့်စွက်ပေးခြင်း၊ ဥအုရန်အတွက် ပိုကောင်းမွန်သောနေရာပြုလုပ်ပေးခြင်း၊ လိပ်ငယ်ကလေးများအားဒဏ်ခံနိုင်စေရန်အတွက် ပိုမိုနွေးထွေးစေမည့် အခင်းများဖြည့်စွက်ပေးရန်နှင့် အကောင်ကြီးများအတွက်

အရိပ်ရရှိရန်နေရာဖန်တီးပေးခြင်း၊ အရိပ်အလွန်အကျွံများပါက သင့်တော်အောင်ပြုပြင်ဖန်တီးပေးခြင်းများ ဆောင်ရွက်သင့်ပါသည်။

လိပ်ခြံများ၏ လုံခြုံရေးကိုလည်းအထူးကြပ်မတ်သင့်ပါသည်။ လုံခြုံရေးစနစ်ကောင်းမွန်လျှင် လိပ်ငယ်ကလေးများအား ညစဉ်သော့ခတ်ထားသော လှောင်အိမ်ငယ်များအတွင်းသို့ သိမ်းဆည်းရန် မလိုအပ်တော့ပါ။ နောင်လာမည့်ကြယ်လိပ်များ သဘာဝသို့ပြန်လွှတ်ပေးခြင်းအစီအစဉ်ကို အောက်ပါ အချက်အလက်များပေါ်မူတည်ပြီး အထူးသတိပြု၍ ဆောင်ရွက်သင့်ပါသည်။ လွှတ်ပေးမည့်တစ်ကောင်ခြင်းစီ၏ရွေးချယ်မှုသည် အသက်၊ အထီးအမ၊ မျိုးရိုး၊ မျိုးပွားရန် အရေးပါမှုတို့အပေါ် မူတည်သည့်အပြင် လိပ်နံပါတ် ID၊ လွှတ်မည့်နေရာရွေးချယ်မှု၊ လွှတ်ပြီးနောက် လိပ်တို့၏ရှင်သန်မှုတို့ကို အမြဲမပြတ် လေ့လာခြင်း၊ လုံခြုံရေးစနစ်နှင့် ထိန်းသိမ်းကာကွယ်မှုပိုမိုပံ့ပိုးခြင်းနှင့် မလွှတ်မီကျန်းမာရေးစစ်ဆေးခြင်းတို့လည်းလုပ်ရန် လိုအပ်ပါသည်။

ဖမ်းဆီးရရှိသောလိပ်များအား ထိန်းသိမ်းထားရှိခြင်း

တရုတ်ပြည်နယ်စပ်မှ ဖမ်းဆီးရရှိသောလိပ်များအား ယာယီထားရှိရန် ရှေးဦးကယ်ဆယ်ရေးစခန်း (၂)ခု ကိုမြစ်ကြီးနားမြို့နှင့် လားရှိုးမြို့တို့၌ဆောက်လုပ်သင့်ပါသည်။ ဤမြို့ကြီး(၂)ခုသည် တရုတ်ပြည် ဆက်သွယ်ရေးလမ်းကြောင်းပေါ်တွင် အဓိကတည်ရှိခြင်းကြောင့် ယာယီကယ်ဆယ်ရေးစခန်းအနေဖြင့် ဆောက်လုပ်ရန်သင့်လျော်ပါသည်။ ၄င်းယာယီကယ်ဆယ်ရေးစခန်းသည် ဖမ်းဆီးရမိသည့်လိပ်များကို ခေတ္တထားရှိရန်နေရာဖြစ်ပြီး လိပ်များ၏ကျန်းမာရေးနှင့် လိုအပ်သောဆေးကုသမှုတို့ကို ပံ့ပိုးပြီးမည်သည့်နေရာသို့ပြန်လွှတ်မည်၊ မည်သည့်နေရာ၌ ခြံခတ်မွေးမြူမည်ဟု ဆုံးဖြတ်ချက်မချမီအချိန်အထိ ထားရှိရပါမည်။ ဤကယ်ဆယ်ရေးအဆောက်အဦးများသည် သစ်တောဦးစီးဌာနပိုင်မြေတွင်တည်ရှိပြီး သဘာဝဝန်းကျင်နှင့် သားငှက်တိရစ္ဆာန်ထိန်းသိမ်းရေးဌာန၏ ကြီးကြပ်မှုအောက်၌ ဖြစ်သင့်ပါသည်။

ရေရှည်ရောဂါကုသပေးမည့်နေရာတစ်ခုအား မန္တလေးမြို့၌ဆောက်လုပ်သင့်ပါသည်။ ရှားပါးမျိုးစိတ်များအား အထူးကြပ်မတ်ကုသမှုပေးရန်အတွက် ယင်းနေရာ၌ဦးစွာ ထားရှိပြီးနောက် ခြံခတ်၍မျိုးပွားရန် သို့မဟုတ် သဘာဝသို့ပြန်လွှတ်မည်ဟု မဆုံးဖြတ်သေးမီ ကာလအထိ အဆိုပါနေရာ၌ထားရှိသင့်ပါသည်။

၂၀၀၉ခုနှစ်၊ ဩဂုတ်လတွင် Turtle Survival Alliance (လိပ်များရှင်သန်ရေးမဟာမိတ်အဖွဲ့) အဖွဲ့ဝင်များ၊ မြန်မာဇီသုကာပညာရှင်နှင့် ဆောက်လုပ်ရေးဝန်ထမ်းများစုပေါင်းဆွေးနွေးပြီး သင့်လျော်မည့် အဆောက်အဦပုံစံများ၊ ကုန်ကျမည့်ငွေကြေးပမာဏများတွက်ချက်မှုပြုလုပ်ပါမည်။

ဖမ်းဆီးရရှိသောလိပ်များအား ထိထိရောက်ရောက်အကျိုးရှိစွာ ကယ်ဆယ်နိုင်ရေး သယ်ယူပို့ဆောင်ရေးတို့အတွက် သင်တန်းအမျိုးမျိုးကို ပို့ချသင့်ပါသည်။ ဥပမာအားဖြင့် လိပ်များအားမွေးမြူပုံ၊ ရှေးဦးသူနာပြုဆေးကုသပုံ၊ အရေးကြီးရောဂါအဆင့်ခွဲ၍ အရေးပေါ်စောင့်ရှောက်ပုံ၊ ဥပဒေကြပ်မတ်ပုံ စသည်တို့ဖြစ်ပါသည်။

လိပ်မျိုးများမပြုန်းတီးအောင်ကာကွယ်ရန်နှင့် ဖမ်းဆီးရရှိသောလိပ်များအား အချိန်မီကုသပေးခြင်း၊ ပြောင်းရွှေ့ပေးခြင်းများ ဆောင်ရွက်ရန်အတွက် အချိန်ပြည့်ဝန်ထမ်းတစ်ဦးအား Wildlife Conservation Society (သားငှက်ထိန်းသိမ်းရေးအဖွဲ့) မြန်မာနိုင်ငံအစီအစဉ်မှ ခန့်ထားသင့်ပါသည်။ အလားတူ တာဝန်များထမ်းဆောင်ရန်အတွက် တိရစ္ဆာန်ဆေးကုဆရာဝန်တစ်ဦးအား Turtle Survival Alliance (လိပ်များရှင်သန်ရေးမဟာမိတ်အဖွဲ့)၏ပံ့ပိုးမှုဖြင့် Wildlife Conservation Society (သားငှက်ထိန်းသိမ်းရေးအဖွဲ့) မြန်မာနိုင်ငံအစီအစဉ်မှ ခန့်ထားသင့်ပါသည်။

မျိုးဆက်ထိန်းသိမ်းရန်အာမခံချက်ရှိသော အုပ်စုဖွဲ့မွေးမြူခြင်း

၁)။ ရှားပါးလာပြီဖြစ်သော လိပ်မျိုးစိတ် (၈)မျိုးအားမျိုးဆက်ထိန်းသိမ်းရန် ခြံခတ်မွေးမြူခြင်းကို အကြံပြုပါသည်။ ယင်းမျိုးစိတ်တို့မှာ

1. *Kachuga trivittata*
2. *Nilssonia Formosa*
3. *Chitra vandijki*
4. *Heosemys depressa*
5. *Manouria emys*
6. *Manouria impressa*
7. *Platysternon megacephalum*
8. *Melanochelys t. edeniana*

ထို့အပြင်နောက်ဆက်တွဲ လိပ်မျိုးစိတ် (၃)မျိုးကိုလည်း ထည့်သွင်းသင့်ပါသည်။ ယင်းတို့မှာ ၁။ *Cuora mouhotii* ၂။ *Batagur baska* နှင့် ၃။ *Indotestudo elongate* တို့ဖြစ်ပါသည်။ မျိုးစိတ်တစ်ခုခြင်းစီအတွက် သီးသန့်အကြံပြုထားပါသည်။

၂)။ ထိန်းသိမ်းမွေးမြူသားဖေါက်သင့်သော လိပ်မျိုးစုများအား ထားရှိရန်သင့်တော်သည့်နေရာ (၁၀)ခုကို အဆိုပြုလိုပါသည်။ ယင်းတို့မှာ လှော်ကားဥယျာဉ်၊ ရခိုင်ရိုးမဆင်ဘေးမဲ့တော၊ ထမံသီဘေးမဲ့တော၊ မင်းစုံတောင်ဘေးမဲ့တော၊ လောကနန္ဒာဥယျာဉ်၊ ကျိုက်ထီးရိုးဘေးမဲ့တော၊ ဟူးကောင်းဘေးမဲ့တော၊ ရွှေစက်တော်ဘေးမဲ့တောနှင့် ရတနာပုံတိရစ္ဆာန်ဥယျာဉ်တို့ဖြစ်ပါသည်။ အခြားသင့်တော်သောနေရာများကိုလည်း ဆက်လက်လေ့လာသင့်ပါသည်။ နေရာတစ်ခုခြင်းစီအတွက် သီးသန့်အကြံပြုထားပါသည်။

Appendix 1: Vernacular names for turtles known to occur in Myanmar. Asterisk denotes species endemic to Myanmar.

Species	Myanmar name
Amyda cartilaginea	Khabar leik, Leik pati
*Chitra vandijk*i*	Khabar leik, Zin kyar leik, Gaung thay leik
*Lissemys scutata**	Zin shaw leik
Lissemys punctata	Zin shaw leik, Leik kwet
*Nilssonia formosa**	Khabar leik, Sa-da-ba-wa, Leik kyi
Batagur baska	Teik leik, Ye ngan leik, Thaung leik
Kachuga trivittata	Teik leik, Paik, Leik gyo, Leik khone, Jay yay
*Geochelone platynota**	Kye leik, Shwe leik, Pink gu
Indotestudo elongata	Leik wa, Gin leik, See gyo leik
Manouria emys	Leik maung, Chauk chaung leik, Leik balu
Manouria impressa	Leik tat
*Morenia ocellata**	Sauk leik
*Heosemys depressa**	Yakhine leik, Leik pyin
Heosemys grandis	Thin baung leik
Heosemys spinosa	Nay kyar pan leik
Cuora amboinensis	Leik yin gyo
Cuora mouhotii	Kan leik
Cyclemys spp.	Leik poke
Melanochelys subtrijuga	Gaung gyar leik
Platysternon megacephalum	Kywet tu yway leik