MANAGEMENT PLAN FOR NIGHTINGALE REED-WARBLERS IN THE SAIPAN UPLAND MITIGATION BANK, CNMI

Division of Fish and Wildlife
Department of Land and Natural Resources
Commonwealth of the Northern Mariana Islands
Saipan

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SUMMARY

The purpose of the Saipan Upland Mitigation Bank Management Plan (Management Plan) is to protect, manage and maintain the Nightingale Reed-warbler (NIRW) population in the new Protected Area. The Management Plan includes measures to achieve the performance standards outlined in the Saipan Upland Mitigation Bank Agreement (SUMBA) intended to increase NIRW breeding success through stewardship activities. The Management Plan sets out goals and activities that are intended to guide managers over the next five to ten years and has built-in flexibility (called adaptive management) for each management activity to meet changing circumstances over that period. The Management Plan sets out strategies that include short-term actions (to be accomplished in the immediate future) and long-term ones (that will be ongoing for many years) to achieve objectives and to assure compliance with the SUMBA. It is intended that the Mitigation Bank managers will prioritize yearly activities with the U.S. Fish and Wildlife Service (USFWS), based on results of previous management actions and the anticipated revenue from the Mitigation Bank Endowment Fund.

The management activities that are detailed in the following document can be summarized as:

Management Activity 1: Reduce Human and Other Disturbances to NIRW Habitat

- Hire Protected Area Manager by January 2003.
- Reduce or eliminate incompatible activities in the Protected Area by January 2003.
- Assess whether existing fences adequately safeguard the Protected Area from humans and livestock by monitoring existing fencing and installing fences where necessary.
- Post and maintain boundary signs for the Protected Area.

Management Activity 2: Implement a Fire Management Program for the Protected Area consistent with Maintaining the Baseline Population of NIRW.

- Increase the capability and capacity to respond to wildfires in the Protected Area.
- Develop and implement a Fire Management Plan in consultation with CNMI-Department of Public Safety and USFWS by January 2004.

Management Activity 3: Promulgate Rules and Regulations for the Protected Area.

- Publish regulations for the Protected Area within one year of Management Plan approval by the Parties.
- Enhance enforcement capabilities in the Protected Area.

Management Activity 4: Monitor NIRW Population in the Protected Area

- Conduct NIRW abundance surveys using Variable Circular Plot (VCP) methods in September and March of each year.
- Statistically compare survey results among years to assure maintenance of NIRW baseline population in the Protected Area annually.

Management Activity 5: Predator Control in the Protected Area

- Reduce risk to NIRW from Brown Treesnake predation in the Protected Area through interdiction and control.
- Conduct investigation to identify predators on NIRW nests in the Protected Area.
- Determine the effectiveness of rodent and cat control in augmenting reproductive success and recruitment into the population of NIRW in the Protected Area; implement predator control if necessary.
- Identify control measures for predators other than rats and cats if they are a problem.

Management Activity 6: Reporting on Management and Financial Status of the Protected Area

- Assist Marianas Public Land Trust in providing quarterly accounting reports to the Department of Lands and Natural Resources (DLNR) and USFWS.
- Until the Endowment Account is fully funded, prepare annual report to USFWS by December 31st of each year including:
  - a record of all credits and debits made to the Mitigation Bank (a comparison of the actual to projected rate of credit sales),
  - all transactions from the financial accounts (a comparison of actual expenses with budgeted expenses and a comparison of the anticipated to the actual endowment),
  - the status of required management actions and achievement of success criteria,
  - the status of monitoring efforts and progress in sustaining the baseline population of NIRW, and
  - a list of management recommendations for the following year.
- Two years after the Endowment Account is fully funded and every 5 years thereafter, a summary report on the status of the Mitigation Bank will be submitted to USFWS.
- An independent audit of Mitigation Bank operations will be conducted in 2007 and every five years after that until all credits have been used, sold or transferred. The independent auditor shall determine whether
  - (a) the financial ledgers and the annual reports present fairly the Mitigation Bank's financial position and results of its operations;
  - (b) the CNMI's accounting and control systems are managing the Mitigation Bank in compliance with the SUMBA and other laws and regulations; and
  - (c) the CNMI has complied with the SUMBA and all applicable laws and regulations.

MANAGEMENT PLAN FOR NIGHTINGALE REED-WARBLERS IN THE SAIPAN UPLAND MITIGATION BANK, CNMI

POLICY STATEMENT

The Saipan Upland Mitigation Bank (Mitigation Bank) has been established on the island of Saipan, Commonwealth of the Northern Mariana Islands (CNMI) for the protection of Nightingale Reed-warblers *(Acrocephalus luscinia)*. It will also serve as protected habitat for other threatened and endangered species including the Micronesian Megapode (*Megapodius laperouse*) and the Mariana Swiftlet (*Aerodramus bartschi*). The Mitigation Bank consists of a Protected Area (Fig. 1) that provides habitat for endemic species protected by the CNMI Division of Fish and Wildlife (DFW), such as the Collared Kingfisher (*Halcyon chloris*), Mariana Fruit-dove (*Ptilinopus roseicapilla*), and Golden White-eye (*Cleptornis marchei*). Additionally, Mariana Fruit Bat (*Pteropus mariannus*) and scarce herpetofauna and invertebrates occur within the Protected Area. Management of the Protected Area will foster suitable habitat for Nightingale Reed-warblers (NIRW). However, as suitable habitat for NIRW is enhanced, existing native forest habitat used by other endemic species will not be disturbed.

The purpose of the Saipan Upland Mitigation Bank Management Plan (Management Plan) is to protect, manage and maintain the NIRW population and to protect and manage other covered species. The intent of the Management Plan is to maintain the ecological function of optimum habitat within the Protected Area in order to sustain the baseline population of NIRW in perpetuity. The Management Plan includes measures to achieve the performance standards outlined in the Saipan Upland Mitigation Bank Agreement (SUMBA) intended to increase NIRW breeding success through stewardship activities. The Mitigation Bank may fund research intended to clarify aspects of NIRW ecology and habitat restoration that will contribute to the conservation of the species, providing that funds are available. Potential habitat restoration and research activities are detailed in the appendices.

The Management Plan sets out short-term (to be accomplished in the immediate future) and long-term (ongoing for many years) strategies to achieve the objectives stated above and to assure compliance with the SUMBA. It is not expected that all of the tasks outlined will be implemented simultaneously. Rather, it is intended that the Mitigation Bank managers will prioritize yearly activities with the U.S. Fish and Wildlife Service (USFWS) based on results of previous management actions and the anticipated revenue from the Mitigation Bank Endowment Fund. It is recognized that only a few strategies may be implemented at the Mitigation Bank's initiation, with more activities possible as funding levels increase. The Management Plan sets out goals and activities that are intended to guide managers over the first five to ten years of the Mitigation Bank and has built in flexibility to meet changing circumstances over that period. This Management Plan should not be regarded as engraved in stone, nor as a legally binding document, but should be used as a guide for management activities that will need to be revised over time to incorporate information learned in previous years by managing the Mitigation Bank.

The Management Plan incorporates an adaptive management process that provides managers with the flexibility to address changing conditions throughout the future. This process will

modify management activities when~~in light of~~ new information becomes available or when performance standards are not met. The following steps outline the adaptive management process for the Protected Area:

Goal: maintain or increase 194 male NIRW territories in the Protected Area

- Review results of on-going management activities for NIRW and the Protected Area.
- Identify unanticipated effects from applied management (both positive and negative).
- Review information gaps and evaluate range of alternatives available to adjust management activities.
- Design tests of alternative hypotheses using pilot studies.
- Alter management activities to achieve identified objective based on the results of testing alternative hypotheses.
- Implement revised activities.
- Evaluate results.
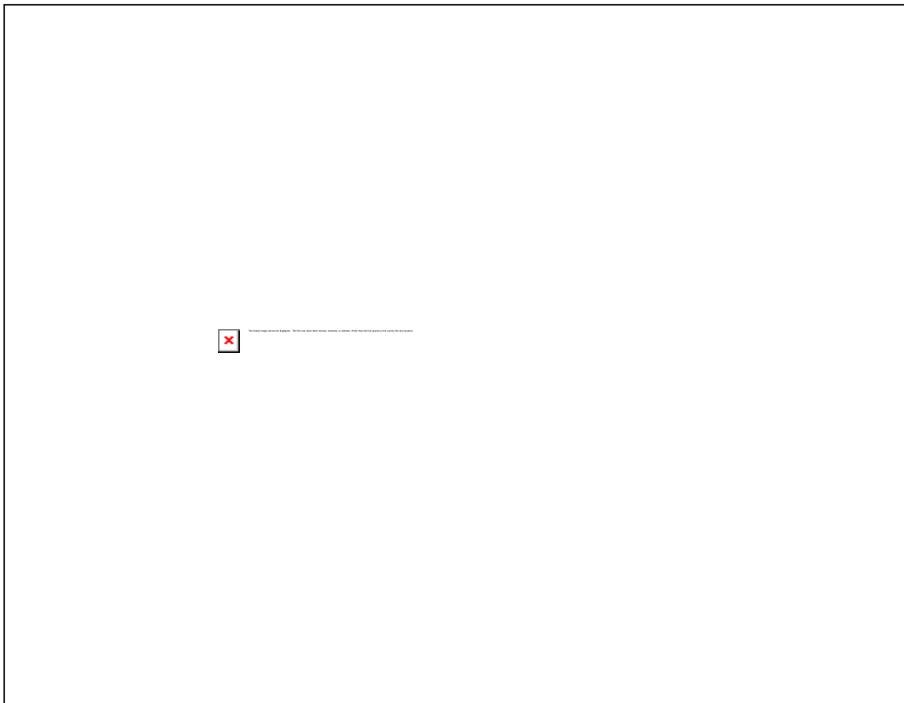- Repeat above steps if objective has not been reached.

Figure 1. Approximate boundaries of the Saipan Upland Mitigation Bank are outlined on this topographic representation of Saipan's northern sector.

I. Background

The Mitigation Bank was developed in cooperation with the U.S. Fish and Wildlife Service (USFWS) to serve as mitigation for the incidental take of NIRW by public and private development projects on the island of Saipan. The Mitigation Bank documents consist of the Saipan Upland Mitigation Bank Agreement, CNMI Public Law 10-84 establishing the Protected Area, Mitigation Bank cash flow credit calculations, survey maps of the Protected Area, the designation of use of public land, declaration of servitude running with the land, and NIRW survey methodology. Additional documents consist of the Memorandum of Understanding (MOU) between the Department of Lands and Natural Resources (DLNR) and the Marianas Public Lands Trust (MPLT) detailing the establishment of an Endowment and a Management Account, an investment policy statement, and a contractual agreement between buyers and DLNR for the sale of mitigation credits.

The Management Plan for the Mitigation Bank was developed by and represents concurrence between the USFWS and the CNMI (the Parties). It outlines management strategies subject to initial implementation based on prioritization of needs and the proceeds from the sale of credits each of which represents two NIRW male territories in the Protected Area. Upon mutual consent of the Parties, this plan may be revised or re-evaluated to address specific management needs of other listed, covered, or preferred species if and when they are added to the SUMBA. Implementation of the Management Plan is subject to endowment or income restrictions and reductions, with prioritized activities agreed upon annually by the Parties until the Mitigation Bank Endowment is fully funded.

The purpose of the Management Plan is to outline activities that will contribute to the conservation of the species and, to the greatest extent possible, ensure the long-term viability of NIRW by maintaining the ecological function of optimum habitat. The Management Plan identifies strategies to achieve the performance standards listed in the SUMBA, namely the sustained maintenance of 194 male NIRW territories. For the purposes of this Management Plan, 194 male NIRW territories are considered the baseline population. It is expected that the NIRW population will not deviate by more than 30% below the baseline population in any one (1) year period, or below the baseline when averaged over a five (5) year period. There are provisions in the SUMBA for amending this performance standard in the event that it does not represent the natural variation in the numbers of NIRW.

The Management Plan also identifies appropriate wildlife resource stewardship strategies, fire management, resource monitoring, applied research, and adaptive processes to achieve the above primary objectives. A secondary objective of the Management Plan is to increase our understanding of the ecology of NIRW in the Protected Area, thereby providing a range of alternative actions available to managers. A tertiary objective of the Management Plan is to increase the number of NIRW.

II. Description of Saipan Upland Mitigation Bank

The Protected Area encompasses approximately 419 hectares on the northern portion of the island of Saipan. The Mitigation Bank has been designated as an off-site mitigation area for the incidental take of the federally and locally endangered NIRW. ~~The service area for the Mitigation Bank is for~~ for proposed development projects on the island of Saipan. The

Mitigation Bank will be used to offset unavoidable impacts to NIRW associated with development projects and will be managed for the protection of NIRW in perpetuity.

The Protected Area is legally defined by the survey map attached to the SUMBA (Attachment A). The Bird Island Wildlife Conservation Area and a proposed golf course border the area on the east. The area is bordered on the southeast by cliffs, while roads bound the north, south, and west. There are no private properties located within the Protected Area. However, a rock quarry, Department of Public Safety firing range, and a radar station and its access road impinge on the continuity of the site.

The CNMI Division of Fish and Wildlife (DFW) conducted a vegetation survey of the Protected Area in 1999-2000. The objective of the survey was to determine the proportion of different habitats that exist within the area and the percentage of habitat suitable for NIRW. Five broad habitat classifications resembling those established by Falanruw *et al.* (1989) were identified. These classifications were used because they allowed for comparisons with earlier vegetation surveys. The DFW survey data also can be modified for comparison with Engbring *et al.* (1986) habitat criteria if necessary.

The vegetation survey revealed that 41.5% of the area is *Leucaena leucocephala (*tangantangan) forest; 30% is native (limestone) forest, 13.5% is introduced forest; 8% is grass field; and 7% is *Lantana camara* (lantana) field. The NIRW occurs in both tangantangan and introduced forest-types that collectively comprise 55% of the Protected Area. The most widely spread plant species in the Protected Area are introduced *L. leucocephala,* followed by endemic *Guamia marianne* (paipai), introduced *L. camara* and indigenous *Aidia cochinensis* (sumak). Among trees and shrubs, *L. leucocephala* is found in the greatest density followed by *L. camara* and indigenous *Cynometra ramiflora*. The invasion of latana has occurred within the last 10 years.

III.   Adaptive Management Process

Integral to the Management Plan is an adaptive management process (Fig. 2) that evaluates ongoing efforts, identifies responses to positive or negative results, and then allows the parties to modify current strategies to achieve performance standards. The purpose of using an adaptive management process is to ensure that managers have flexibility in responding to changing circumstances and in meeting the SUMBA's performance standards in perpetuity.

This process will prioritize long range (such as research) and short-term (such as fence repair) needs, and ensure a balance between obtaining and applying useful information to achieve the goals of the Mitigation Bank. As described in the adaptive management process (Fig. 2), the mechanisms for implementing management activities will be identified at the beginning of each monitoring cycle and will be based on an evaluation of the success of previous activities.
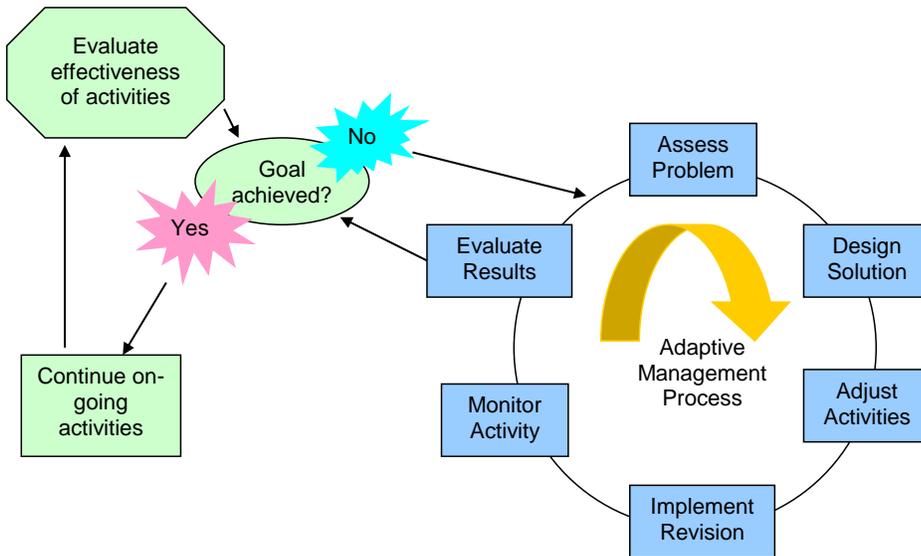
Figure 2: Adaptive Management Process for the Saipan Upland Mitigation Bank Management Plan.

IV. MANAGEMENT ACTIVITIES

The following six Management Activities are proposed to guide managers toward the goals of protecting, maintaining, and increasing Nightingale Reed-warblers (NIRW) in the new Protected Area. They are designed to increase NIRW breeding success through good stewardship. Each Management Activity sets out objectives that will be met by the listed strategies. The strategies will be prioritized annually. Each strategy includes short-term actions (to be accomplished in the immediate future) and long-term actions (that will be ongoing for many years) to achieve the objectives based on availability of funds to support such activities. All strategies include an adaptive management component so that each activity can meet changing circumstances over a long period of time. Each Management Activity outlines steps that are necessary to achieve the performance standards and fulfill the requirements of the SUMBA. Several of the tasks specified in the SUMBA need to be completed between now and January 31, 2003 (they include removal of incompatible uses such as livestock, grazing, human habitation, and burning).

It is anticipated that Mitigation Bank managers will prioritize the activities outlined below annually with the U.S. Fish and Wildlife Service (USFWS) based on results of previous management actions and the anticipated revenue from the Mitigation Bank Endowment Fund.

Thus, activities will not all be implemented simultaneously, but each is necessary to assure compliance with the SUMBA. It is expected that most activities will be implemented over the next 5 to 10 year period and while each strategy is mandatory, there is built-in flexibility (adaptive management) so that challenges that will arise over that period can be met.

Management Activity 1: Reduce Human and Other Disturbances~~Perturbations~~ to NIRW Habitat

Objective A: *Hire staff to initiate management activities in the Protected Area.*

*Strategy***:** Hire Protected Area Manager by January 2003.

Short-term
- Develop a description of job duties, supervisory responsibilities, and qualifications for an ecologist who will perform biological surveys, complete data analysis, write reports, and render accounts as Protected Area Manager.
- With DFW Director, DLNR Secretary, and DFW-Wildlife Supervisor, identify the Protected Area Manager's immediate supervisor.
- Develop a description of job duties, responsibilities, and qualifications for at least one Wildlife Technician who will be dedicated to work in the Protected Area.
- Begin process of creating full time positions with job descriptions and salary levels through CNMI's Office of Personnel Management (OPM).
- Advertise job(s) in appropriate professional forums and/or locally through OPM.
- Interview, evaluate, and hire appropriate persons for the positions of Protected Area Manager and Wildlife Technician(s) as soon as funds become available to do so.
- Should limited funds in the Management and Endowment Accounts preclude the immediate hiring of a Protected Area Manager and/or staff, then together with USFWS, DLNR and DFW will prioritize management tasks and determine those that can be reasonably completed by staff at hand (*e.g.*, the continuation of twice yearly monitoring of the NIRW population in the Protected Area).

Long-term
- Ensure that the Protected Area Manager enjoys the protection of a longer-term contract or civil service status so that management has a better chance of being consistent over time.

Adaptive Management
- Should the Protected Area Manager or associated staff be determined by DFW to fail in the performance of their duties, then DFW will replace them in accordance with CNMI Office of Personnel Management regulations with appropriate qualified personnel as soon as possible.

Objective B: *Eliminate incompatible land uses in the Protected Area.* ~~*Prevent unauthorized intrusions into SUMBA*~~

Strategy 1: Reduce or eliminate incompatible activities. ~~sources of intrusion~~

Short-term

- Remove or terminate allincompatible livestock, -grazing, activity land clearing except for restoration purposes, burning, farming, human habitation, leases, contracts, and other practices that adversely impact covered species habitat in the Protected Area by the end of January 2003.
    -
- Install appropriate barriers to deter unauthorized grazing access.
- Notify adjacent landowners of incompatible activitiesuses, particularly livestock grazing, grass burning, and firewood cutting.
- Install signsage similar to that of Bird Island Conservation Area at existing trails and permitted entry points access points of the Protected Area indicating prohibitions and penalties(as noted below).
- Advise the public that domestic animals are not allowed in the Protected Area.
- Publicize compatible and incompatible activities as well as the location and boundaries of the Protected Area.

Long-term
- Continue legal action against this incompatible land uses (such as grazing) inof the BankProtected Area.
- Remove any remaining domestic or feral animals (goats, pigs, cattle, cats, dogs, and fowl) from the Protected Area by hunting or other effective measures.

Adaptive Management
- If incompatible activities continue to persist beyond January 2003, take action to ensure that activities are eliminated by the end of June 2003.
- Consider developing brochures or other measures for trail heads if signs are not sufficient to educate the public using the area.

Strategy 22: Assess whether existing fences adequately safeguard the Protected Area from humans and livestock.existing habitat from human and livestock (cattle and goats) intrusions

Short-term
- Conduct fencing assessment.Identify fenced and unfenced areas and uUpdate existing map of fence locations. Assess where fencing exists, where it does not, types of fencing used and its condition relative to re-use, repair, and/or replacement.
- Assess and maintain structural integrity of existing fences.
- Monitor whether fenced and unfenced areas adequately prevent human and livestock encroachment into the Protected Area. Conduct access assessment. Update existing map of access and entry points into the Protected Area including trails, roads, coral and dirt tracks, and paths. Highlight impediments to access such as topography, vegetative barriers to humans and livestock, and any other applicable barrier that may exist.
- Prioritize areas for installation of barriers and boundary signs including listed considerations.
    - Fencing and signs should first occur in areas likely to have incompatible livestock and human intrusions. Also, signs that highlight appropriate Protected Area uses (and/or prohibitions) should be posted in areas of existing trails and permitted entry points.
    - Develop quotations for the purchase and installation of various appropriate fencing materials relative to the prioritization.
    - Develop quotations for the purchase and installation of boundary markers at set appropriate intervals along the perimeter of Mitigation Bank Area, with an emphasis on

~~accessible areas and perimeter roads. Investigate off-island sources such as Guam to reduce the costs of signage.~~
- ~~Develop quotations for the purchase and installation of grates, gates, or other barriers to deter unauthorized access at these points as appropriate from the prioritization scheme.~~
- ~~Develop and assess 'green' alternatives to man-made barriers such as vegetative buffers, recycled telephone pole posts with cable, and other forms of blockade, incorporating aesthetic concerns, typhoon resistance, durability, cost, time scale to implementation and other applicable factors.~~
- ~~Develop schedule for installation.~~

Long-term
- ~~Install barriers (including appropriate fencing) as determined by prioritization scheme.~~
- ~~Set up monitoring schedule at specific time intervals for barrier and boundary markers to assess structural integrity, efficacy, and the need for maintenance, repair or replacement.~~
- ~~Incorporate results into Management Plan decision making process.~~
- Monitor and maintain structural integrity of ~~both barrier and boundary markers.~~fences quarterly.
- Continue to remove domestic livestock (*i.e.*, goats, pigs, etc.) from within the Protected Area.
- Implement additional fence monitoring after typhoons and other natural catastrophes.

Adaptive management
- If existing fences are determined to be ineffective in safeguarding the Protected Area from people and livestock (*e.g.*, if monitoring shows that cattle or goats continue to graze in the Protected Area) then repair or improve fence integrity to meet exclusion standards.
- If monitoring shows that incompatible uses occur in unfenced areas, then:
  - Prioritize areas for installation of fences,
  - Determine most effective fence design for areas in question,
  - Develop schedule for installation,
  - Remove livestock, and
  - Install fence.
- If monitoring shows that fencing is not necessary, then existing fences may not be maintained.

Strategy 3: Post boundary signs for the Protected Area.

Short-term

- Purchase and install boundary markers (*e.g.*, No Hunting, Conservation Area) at 100 m intervals along the perimeter of the Protected Area with an emphasis on accessible areas and perimeter roads.

Long-term

- Monitor integrity of boundary markers annually and replace as necessary. Additional monitoring may be necessary following typhoons and other natural catastrophes.

Adaptive management

- Adjust spacing interval between signs if necessary.
- Use languages other than English on signs if necessary.
- Conduct active outreach program if signs are not effective.

Management Activity 2: Implement a Fire Management Program for the Protected Area consistent with Maintaining the Baseline Population of NIRW.

Objective A: *Prevent habitat damage from wildfires.*

- ~~ontrol information.~~
- ~~Tailor outreach efforts to this user group; for example, provide mailers to adjacent landowners (particularly farmers who are grazing cattle) or hold direct meetings with these individuals to educate them on the danger, risks, and penalties associated with setting fires.~~

~~Long-term~~

- ~~Erect signage indicating the penalties associated with setting fires in high-risk areas.~~
- ~~Conduct regular monitoring and enforcement activities based on the information learned about this user group's behavior.~~
- ~~Collaborate with Guam DAWR representatives on their public education and outreach efforts on wildfire management. Note that Guam has had over 13,000 intentionally set fires in the past several years (1999-2001).~~

~~Adaptive Management~~

- ~~Alter the timing and intensity of enforcement activities to coincide with the timing and seasonality most likely to have intentionally set fires.~~
- ~~Incorporate Guam's materials and experience relative to the intended audience that may intentionally, or unintentionally, begin wildfires.~~
- ~~Alter the 'message' of fire management as the intended audience changes; for example, if grazers are moved from neighboring lands then outreach should focus on recreational users (*e.g.,* unattended barbeques or campfires).~~
- ~~Alter the frequency of enforcement and outreach efforts in relation to climactic (El Niño) and weather (drought) patterns.~~

Strategy: Increase the capability and capacity to respond to wildfires in the Protected Area.

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Short-term
- Obtain existing GIS information on water lines and access points near the Protected Area.
- Coordinate with DPS to determine:
    - Fire suppression requirements,
    - Water resources sufficiency,
    - Access to areas susceptible to fires,
    - Best fire management practices (fire breaks, water tanks or cisterns, suppression methods), and
    - Response protocols (where to call, chain of command, and response time).

Long-term
- Develop and implement a Fire Management Plan in consultation with DPS and USFWS by January 2004.
- Enter into a Memorandum of Understanding (MOU) between DLNR and DPS to ensure timely and effective response to any wildfire in the Protected Area.
- Map the location of all major water lines and access points within and around the perimeter of the Protected Area if these maps do not already exist.
- Collaborate on water supply with neighboring water dependent users such as the golf course(s), Commonwealth Utilities Corporation, and the rock quarry to help suppress fires in the Protected Area.
- Remove fallen trees and other refuse blocking access points to the Protected Area, particularly those used for fire management.

Adaptive Management
- If fires continue to be a problem in the Protected Area, then alter Fire Management Plan to incorporate additional considerations such as:
    - Increase and maintain access and physical capacity for suppression methods.
    - Conduct mock fire suppression activities in conjunction with DPS to improve response time.

Management Activity 3: Rules and Regulations for the Protected Area.

Objective A: *Improve regulatory and enforcement capacities for the Protected Area.*

Strategy 1: Publish regulations for the Protected Area.

Short-term
- DFW Natural Resources Planner will fashion regulations in accordance with the needs identified in P.L. 10-84 and the SUMBA; include providing a fact-sheet for the public, and an explanation of the regulations regarding public, educational, medicinal, and scientific uses of the Protected Area(s).
- Identify permitted and prohibited activities in the Protected Area(s).
- Revise local permits for use of the Protected Area so that covered species will not be adversely impacted through loss of habitat or by incompatible uses.
- DFW will designate zones where compatible uses, such as collection of medicinal plants and scientific research, may occur within the Protected Area, based on the best scientific information available.
- Publish Protected Area regulations within one year of Management Plan approval by the Parties.

Adaptive Management
- Review adequacy of regulations for conservation of NIRW.
- Revise regulations to include public comments as necessary.

Strategy 2: Enhance enforcement capabilities in the Protected Area.

Short-term
- Identify necessary enforcement response to unauthorized activities including, but not limited to:
    - Hunting,
    - Dumping,
    - Crab and fruit bat poaching,
    - Animal fodder collecting, and
    - Coconut crab traplines.
- Target enforcement responses to areas occupied by NIRW.
- Prioritize enforcement activities with DFW-Enforcement Section.
- Inform the public of prohibited activities and associated penalties in the Protected Area.

- Supply topographic map(s) to the DFW-Enforcement Section indicating boundaries and access points, permissible activity zones, and areas where NIRW are at high-risk.
- Develop list of agency contacts incorporating those responsible for:
  - Removal of incompatible land uses from the Protected Area,
  - Ensuring adequacy of fence and boundary signs,
  - Resource monitoring,
  - Compliance with the Fire Management Plan for the Protected Area,
  - Maintaining reasonable access for the USFWS to inspect and monitor implementation of the SUMBA, and
  - Other CNMI agencies.

Long-term
- Ensure availability of qualified personnel to enforce regulations in the Protected Area.
- Supply copies of regulations to these enforcement personnel.

Adaptive Management
- If enforcement activities fail to protect the baseline population of NIRW, change the timing and intensity of enforcement responses to perceived needs and violations.
- Review enforcement needs bi-annually to improve performance.
- Alter educational and outreach activities as adjacent land use patterns and enforcement capacity change.

Management Activity 4: Monitor NIRW Population in the Protected Area

Objective A: *Assess NIRW population levels in the Protected Area.*

Strategy 1: Conduct NIRW abundance surveys using Variable Circular Plot (VCP) methods.

Short-term
- For observers conducting counts, perform calibration exercises for distance and NIRW vocalizations (males and females) prior to initiating each survey.
- Conduct VCP surveys (Appendix 1) according to protocols attached to the SUMBA.
- Conduct VCP abundance surveys in August-October (preferably September for consistency) and February-April (preferably March for consistency) along transects used for the baseline survey.
- Enter survey results onto a computer database.
- Report survey results annually to USFWS.

Long-term
- Maintain survey transects through the Protected Area annually.
- Monitor NIRW population in perpetuity.
- Train appropriate personnel to proficiency levels with VCP monitoring methods.
- Update GIS layers to reflect abundance of NIRW in various habitats.

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Adaptive Management

- The Parties will consider adopting new survey tools that provide more accurate information assuming that the data remain comparable and consistent.
- If monitoring indicates a decline from the NIRW baseline population, examine results of on-going management activities and other factors to identify possible causes (*e.g.*, are fences effectively excluding incompatible uses?, impacts of recent typhoons?).
- If monitoring shows a decline and no causal factor can be immediately identified, consider further investigations into the ecology and life history of the bird to help clarify causes of mortality (Appendix 2).
- If monitoring indicates a stable or increasing population, then ongoing management strategies will be considered effective.

Strategy 2: Statistically compare survey results among years to assure maintenance of NIRW baseline population in the Protected Area.

Short-term

- Analyze NIRW survey results for species abundance yearly using the computer program DISTANCE.
- Identify whether or not there are statistically significant changes from the baseline in NIRW abundance among years as the success criteria is the sustained maintenance of the baseline population of NIRW (see Performance Standards to Determine Mitigation Bank Success, SUMBA, p. 19).
- Report results of analysis annually to USFWS.

Long-term

- Train appropriate personnel in use of analytical packages.
- Consider maintaining statistical proficiency by attending symposia dedicated to distance sampling and analysis.
- Continue statistical analysis of NIRW population size in perpetuity.

Adaptive Management

- If survey results indicate a population deviation of more than 30% below the baseline in any one (1) year period, or below the baseline when averaged over a five (5) year period, examine the possible causes of NIRW decline (see SUMBA, pp. 19-20). If Management Plan activities (*e.g.*, fencing, predator control) can be identified as ineffective, then develop an/or implement alternative actions (see Appendix 2 for potential alternative actions).
- If survey analysis shows a decline and no causal factor can be immediately identified, consider further investigations into the ecology and life history of the bird to help clarify causes of mortality (see Appendix 2 for potential research strategies).
- Revisit success criterion in view of annual natural variation in the number of NIRW after the first 5 years (see SUMBA, pp. 19-20). Parties will determine and agree on another appropriate criterion based on monitoring data, if necessary.
- When better models than DISTANCE are developed, tested, and available, the Parties will discuss adopting the improved analytical method.

Management Activity 5: Predator Control in the Protected Area

Objective A: *Reduce risk to NIRW from predation in the Protected Area.*

Strategy 1: Brown Treesnake interdiction and control.

Short-term
- Develop contingency plans for controlling Brown Treesnakes (BTS) in the Protected Area. Plans need to be developed for BTS management on Saipan because the pattern of live BTS captures and reported sightings possibly indicates an incipient BTS population on Saipan. The contingency plan should include:
  - Identification and prioritization of areas for immediate BTS control and interdiction activities.
  - Consideration of the need to construct a snake barrier for the Protected Area, in which case, additional sources outside of contingency funds should be identified if available bank funds are inadequate.
- The Protected Area Manager and BTS Section Supervisor will discuss the necessity of periodic surveys for BTS in the Protected Area based on the best available information on the status of the snake on Saipan. If it is decided that BTS surveys are necessary then:
  - Identify and prioritize areas to conduct visual night-time searches for BTS or the use of other appropriate BTS control techniques in the Protected Area based on NIRW abundance and distribution.
  - Conduct visual night-time searches for BTS with observers trained by appropriate agencies on Guam in identified priority areas at least twice a year during NIRW peak breeding seasons (January-March and July-September).
- Map BTS detections in the Protected Area and environs together with NIRW species abundance using GIS techniques.

Long-term
- If it is proved practical in a scientific manner, consider the possibility of funding training for an existing or additional detector dog and handler team for responding to snake sightings in forested areas.
- Maintain awareness of technological improvements in BTS control techniques through SUMBA staff contact with professionals implementing BTS control in the Pacific Basin.
- Secure financial support for active BTS control program from funding sources outside of the Endowment and Management Accounts (*e.g.*, OIA), if BTS are determined to be established on Saipan.

Adaptive Management
- Should BTS interdiction efforts provide evidence of establishment on Saipan, implement the contingency plan in the Protected Area as developed above.

Strategy 2: Identify predators on NIRW nests in the Protected Area.

Short-term
- Identify and prioritize areas to conduct study.
- Design one to two year study that includes:

- Automatically-triggered cameras placed on 10 to 20 NIRW nests located in the Protected Area,
- Placing cameras at different nests sequentially,
- Conducting observations during two peak breeding periods (Janury to March and July to September) to help maximize sample size, and
- Increasing sample size if necessary with a second year of observations.
- If study funded by USFWS on bird communities in Saipan fails to identify nest predators of NIRW in the Protected Area, then conduct study designed above as soon as funds become available.

Adaptive Management
- Should not enough natural NIRW nests be identified to provide sufficient sample size, then consider:
  - Lengthening the study for a year to increase sample size, and
  - Using artificial nests (see VanderWerf 2001) to identify predators in the Protected Area.
- If the above study indicates that rats are a significant predator of NIRW nests or adults, then pursue Objective B, strategy 1.
- If the above study identifies cats as a significant predator of NIRW nests or adults, then pursue Objective B, strategy 2.
- If the above study identifies predators other than rats and/or cats as having significant impacts on nests or adults, then pursue Objective B, strategy 3.
- If the above study shows that predation of nests and/or adults is not significant in the Protected Area, then:
  - Maintain vigilance for possible predator impacts over time, conducting identification strategies as needed, and
  - Consider using funding designated for predator control to implement habitat restoration activities as outlined in Appendix 3, or other management strategies agreed upon by the Parties.

Objective B: ***Document effects of predator control on NIRW in the Protected Area.***

Strategy 1: Determine the effectiveness of rodent control in augmenting reproductive success and recruitment into the population of NIRW in the Protected Area

Short-term
- Identify and prioritize candidate study sites.
- Design five to six year study to measure effectiveness of rodent control on NIRW reproductive success and recruitment that includes:
  - Rat trapping in a grid around 10 to 20 nesting trees (treatment) annually to assess whether rat trapping effectively increases reproductive output of NIRW compared with 10 to 20 unprotected nests (control).
  - Setting traps 25 m apart along the grid, with the size of the grid remaining to be determined.
  - Nest monitoring once a week to determine nest fate. Nests fledging at least one chick will be considered successful.
  - Banding of fledglings before they leave the nest.
  - Quantifying the differences in recruitment rates from treatment versus control nests using mark-resighting techniques.

- Simulating population size and rates of increase based on reproductive success and recruitment rates under different mortality scenarios.
- Maintaining data on species, size, weight, and reproductive status of rodents removed from the area.
- Investigators should take into account annual variation in rodent abundance, food abundance, and climatic impacts that may confound results.
- Describe and quantify any unanticipated impacts on either target or non-target species resulting from the removal of rodents.

Long-term
- DFW in consultation with the Protected Area Manager will contract qualified principal investigator to lead the study.
- If natural NIRW nests are not encountered in numbers to complete a sufficient sample size, then investigator should consider working with artificial nests to test the hypothesis (see VanderWerf 2001).

Adaptive Management
- In the event that rodent predation is found to significantly affect NIRW nest success and that rodent control can significantly reduce the effects of predation, consult with cooperating agencies such as USDA Wildlife Services, National Wildlife Health Research Center, USGS BRD, and possibly non-profit organizations with expertise on predator management to formulate rodent control methods for the Protected Area and target implementation locations as appropriate.
- If area-wide rodent control is deemed necessary as above, then the Protected Area Manager will be responsible for planning the campaign and hiring sufficient personnel to implement the plan.
- If rodent control is observed to inadvertently increase predation by cats on NIRW nests during the above study, then implement strategy 2.
- Maintain contact with USFWS Invasive Species Manager on progress with EPA approval of a rodenticide for use in the Mariana Islands. When EPA approves a rodenticide, revise protocols for rodent control testing (or if area-wide control has been implemented) to include distribution of the bait in bait boxes that are crab and tamper-proof.
- In the future, if rodent predation is shown to be a major threat to NIRW breeding success, recruitment, or adult survival, and if control of rodents has not already been implemented in the Protected Area, then implement control methods that have already been outlined as above.
- If the use of rodenticides in CNMI is approved, adjust rodent control tests (and/or control techniques if already initiated) to include use of baits and bit boxes that are crab and tamper-proof.

Strategy 2: Determine effectiveness of cat control in augmenting reproductive success and in augmenting recruitment into the breeding population of NIRW.

Short-term
- Design five to six year study to measure effectiveness of cat control on NIRW reproductive success and recruitment that includes:

- Cat trapping in a grid around 10 to 20 nesting trees (treatment) annually to assess whether cat trapping effectively increases reproductive output of NIRW compared with 10 to 20 unprotected nests (control).
  - Setting cat traps every 50 m along the grid. The size of the grid remains to be determined.
  - Nest monitoring once a week to determine nest fate. Nests fledging at least one chick will be considered successful.
  - Banding of fledglings before they leave the nest.
  - Quantifying the differences in recruitment rates from treatment versus control nests using mark-resighting techniques.
  - Simulating population size and rates of increase based on reproductive success and recruitment rates under different mortality scenarios.
  - Maintaining data on species, size, weight, numbers and stomach contents of animals removed from the Protected Area.
- Investigators should take into account annual variation in rodent and cat abundance, food abundance, and climatic impacts that may confound results.
- Describe and quantify any observed and unanticipated impacts on either target or non-target species resulting from the removal of cats.
- Trapped cats will be removed permanently from the area for euthanizing and disposal, as appropriate.

Long-term
- DFW in consultation with the Protected Area Manager will contract qualified personnel to implement the study.
- If natural NIRW nests are not encountered in numbers to complete a sufficient sample size, then investigator should consider working with artificial nests to test the hypothesis (see VanderWerf 2001).

Adaptive Management
- In the event that cat predation is found to significantly affect NIRW reproductive success and that cat control can significantly reduce the effects of predation, consult with cooperating agencies such as USDA Wildlife Services, National Wildlife Health Research Center, USGS BRD, and possibly non-profit organizations with expertise on predator management to formulate predator control methods for the Protected Area and target implementation locations as appropriate.
- If area-wide cat control is deemed necessary as above, then the Protected Area Manager will be responsible for planning the campaign and hiring sufficient personnel to implement the plan.
- In the future, if cat predation is determined to be a threat to NIRW breeding success, recruitment or adult survival and no predator control has been implemented in the Protected Area, then cat control measures will need to be planned and implemented at that time.

Strategy 3: Identify control techniques for problem introduced/alien predators other than rats or cats.

Short and Long-term
- If rodents and/or cats are not deemed to be a significant problem, but other introduced predators are identified as a major threat (*e.g.*, monitor lizards), then:

- Identify appropriate control measures from the literature and consulting organizations, or
  - Conduct studies to determine appropriate control methodologies.
- Implement control methods in experimental design as above.
- Document effect of control on NIRW nest success and recruitment as above.

Adaptive Management
- If effectiveness of control decreases, evaluate and modify control plan as necessary.
- If native wildlife is determined to cause significant NIRW nest failure, then discuss studying the circumstances under which predation of NIRW nests by natives occurs and modifying the circumstances to decrease the likelihood of predation (*e.g.*, if predation by Collared Kingfishers is found to occur in open field/tangantangan areas then the proposed solution may be to re-vegetate the area with more native trees and understory).

Management Activity 6: Management Plan and Financial Reporting

Objective A: *Quarterly reporting.*

Strategy 1: Assist MPLT in providing simple, standardized quarterly accounting reports to DLNR and USFWS.

Short-term
- Establish Management and Endowment accounts once credits have been sold in accordance with MOU between MPLT and DLNR.
- With MPLT devise to a method to of tracking credit sales using a ledger/database.
  - The method must include the recipient's name, address, and contact information, as well as the number of credits received.
- Notify MPLT each time a credit is used, sold, or transferred.
- LiaiseWith MPLT agree on a method to track account balances, operations balance, and other endowment and financial records as required by the SUMBA and sufficient for auditing.
- MPLT will prepare a quarterly report that includes the number of credits debited or added to the ledger/database.
- MPLT will distribute the quarterly report to the Parties.

Long-term
- Review MPLT quarterly reports for accuracy.
- Assist MPLT in correcting any inaccuracies or deficiencies.
- Alter assistance efforts in light of MPLT's needs and capacity.

Adaptive management
- If the database/ledger system fails to track credit sales, modify the system.
- If MPLT consistently fails to meet quarterly reporting deadlines, modify the MOU to improve timeliness.

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Objective B: *Annual reporting.*

Strategy 1: Prepare annual summary report.

Short and Long-term
- ~~DLNR will provide the USFWS with a quarterly report of credits debited or added to the ledger / database of the Mitigation Bank.~~
-
- Until the Parties agree that the Endowment Account is fully funded, DLNR shall provide a certified annual summary report to USFWS on December 31st of each year.
  - The report must include financial conditions that incorporate:
    - All credits and debits made to the Mitigation Bank (see Objective A above), and
    - All transactions from the financial accounts (see strategy 2 below).
  - The report must describe the progress made in meeting performance standards:
    - The status of required management actions (see strategy 3), and
    - The status of monitoring efforts (see strategy 4).
  - Develop a list of recommendations for the following year.

Adaptive Management
- Timing of reports and their contents may be adapted after review and approval by both Parties.

Strategy 2: Financial requirements for the annual report.

Short-term
- The financial portion of the annual summary report shall include an accounting of the Management and Endowment Accounts not limited to:
  - Beginning and ending balances,
  - All deposits and expenditures,
  - Funds received and expended for the management of the Protected Area,
  - A comparison of actual expenses with budgeted expenses,
  - A comparison of the actual to projected rate of credit sales (the latter are incorporated into the cash flow calculations attached to the SUMBA), and
  - A comparison of the anticipated to the actual endowment (the former is incorporated into the cash flow calculations attached to the SUMBA).

Long-term
- Identify the number of credits used, sold or transferred by the CNMI in the preceding year including the cumulative total of credits used, sold or transferred by the CNMI since the effective date of the SUMBA.
- Report the name, address and contact information for each entity which has used credits or to whom credits have been sold or transferred in the preceding year, and the number of credits used, sold or transferred to such entity.
- Determine the number of available credits remaining in the Mitigation Bank.
- Assist MPLT in meeting annual reporting requirements that incorporate the above information if necessary.

- Two years after the Endowment Account is fully funded and every 5 years thereafter, a summary report on the status of the Mitigation Bank will be submitted to USFWS. This report must include:
    - An accounting of the Management and Endowment Accounts,
    - Beginning and ending balances,
    - All deposits and expenditures, and
    - A comparison of actual expenses with budgeted expenses.

Adaptive Management
- Timing and content of reports may be modified after review and approval of both Parties.

Strategy 3: Report on required management actions and achievement of success criteria.

Short-term
- The annual summary report will include information on the following:
    - Progress in the development, approval, and implementation of the Management Plan by January 2003.
    - Progress in eliminating incompatible uses of the Protected Area by January 2003.
    - Progress made on the hiring or assignment of qualified personnel to oversee operation of the Mitigation Bank by January 2003.
    - Progress on the protection and maintenance of the Protected Area in perpetuity.
    - Report on the expansion or granting of any~~Any grants of~~ additional easements, rights-of-way, or any other property in the Protected Area which was not approved in writing by both Parties.~~(which is not permitted without the permission of both parties)~~
    - Provisions for USFWS to access the Protected Area for the purposes of inspection and monitoring the implementation of the SUMBA.
    - Prioritization of management actions given funding limitations.
    - Progress in posting boundary signs for the Protected Area (*e.g.,* where, when, how many).
    - Evaluation of fencing needs for the Protected Area.
    - Other steps taken to implement portions of the Management Plan.
    - A description of any problems encountered in managing the Protected Area.
    - Any changes in management activities and the rationale for alterations.
    - The results of adaptive management actions and any inherent challenges.
    - The loss or creation of native forest and optimum habitat for covered species within the Protected Area.
    - Progress of any restoration efforts.
    - Progress with biological studies and data sets.
    - Summary information on any additional studies or data sets available for the Protected area and/or its covered species.
    - Progress made to implement a Fire Management Plan for the Protected Area by January 2004.

Long-term
- Two years after the Endowment Account is fully funded and every 5 years thereafter a summary report shall be submitted to the Parties that incorporates the information below:
    - A description of any problems encountered in managing the Protected Area.
    - The results of adaptive management actions and any inherent challenges.

- Any changes in management activities.
- Other steps taken to implement portions of the Management Plan.
- Five years (5) after the Management Plan's approval, the Parties will evaluate whether performance standards criteria accurately accommodate the natural variation in the number of NIRW.

Adaptive Management
- Timing and content of reports may be adapted after review and approval by both parties.

Strategy 4: Report on the status and effectiveness of monitoring activities and progress in sustaining the baseline population of NIRW.

Short-term
- Describe the methodology and frequency that is used to monitor NIRW.
- Report on compliance with the species-specific success criteria of sustained maintenance of the baseline population of NIRW as per SUMBA.
    - Report statistical comparisons of NIRW abundance from surveys and the NIRW baseline population and interpret the results.
    - Provide results of monitoring programs.
    - Describe incidental observations made during the bi-annual NIRW abundance surveys.
    - Describe any changes agreed on by the Parties in the monitoring program and the rationale for these alterations (*e.g.*, typhoon, fire, etc.).
    - Describe the status of the biological resources in the Protected Area.
    - Summarize results of studies on the status of covered species in the Protected Area.
    - Identify management and monitoring recommendations.
    - Recommend and discuss results with USFWS and appropriate stakeholders.
    - Prioritize management activities for the coming year based on these results and on the availability of funds. Describe other relevant studies or data sets concerning the status of the Mitigation Bank Area.
    -

Long-term
- Two years after the Endowment Account is fully funded and every 5 years thereafter a summary report shall be submitted to the Parties that includes the information below:
    - Qualitative and quantitative results of monitoring programs.
    - A general description of the status of the biological resources in the Protected Area.
    - Qualitative observations made during the bi-annual NIRW abundance surveys.
    - Summaries of restoration efforts, biological studies, and data analysis.
    - Statistical comparisons of NIRW abundance from surveys and the baseline NIRW population.
    - A summary and analysis of data or studies concerning the status of covered species in the Protected Area. Other relevant studies or data sets concerning the status of the Mitigation Bank Area.
- Recommend and discuss results with USFWS and appropriate stakeholders.
- Prioritize management activities for the coming year based on these results and on the availability of funds.

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Adaptive Management
- Revise timing, frequency, and content as necessary and as mutually approved by all Parties.

Objective C: *Auditing requirements.*

Strategy: Timing and procedures for conducting audits.

Long~~Short~~-term
- An independent audit of Mitigation Bank operations will be conducted in ~~during~~2007 and every five years thereafter until all credits have been used, sold or transferred. The independent auditor shall determine whether:
    - The credit/debit and financial ledgers or database and the annual reports present fairly the Mitigation Bank's position and results of its operations in accordance with generally accepted accounting principles.
    - The CNMI has internal accounting and other control systems to provide reasonable assurance that it is managing the Mitigation Bank in compliance with the SUMBA and applicable laws and regulations.
    - The CNMI has complied with the SUMBA and all applicable laws and regulations.
- A report will be prepared at the completion of the audit and copies provided to the CNMI and USFWS.
- The auditor will report illegal acts (*e.g.,* falsification of records, misappropriation of funds) or other irregularities to the USFWS or to other Federal law enforcement officials as appropriate.
- After all credits are used, sold or transferred, independent audits will be conducted every tenth year rather than every fifth year.

~~Long-term~~
- ~~An independent audit of Mitigation Bank operations will be conducted every fifth year after 2007 until all credits are sold.~~
- ~~After all credits are sold, an independent audit of Mitigation Bank operations will be conducted every tenth year.~~

Adaptive Management~~Timing and content of audits may be adapted after review and agreement between both parties.If adverse information is contained in the monitoring, annual reports, or other available information, the USFWS may require additional information concerning Mitigation Bank operations and performance or additional oversight.~~
- Resolution of findings shall be made within six (6) months after receipt of the report and corrective action should proceed as rapidly as possible.
- If adverse information is contained in the audit of the monitoring, annual reports, or other available information, the USFWS may require additional information concerning Mitigation Bank operations and performance or additional oversight.
- Timing and content of audits may be modified after review and agreement between both Parties.

V. LITERATURE CITED

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APPENDIX 1

Nightingale Reed-warbler Variable Circular Plot survey protocol for Saipan Upland Mitigation Bank

Count protocol is based on the Variable Circular Plot method as articulated by Reynolds *et al.* 1980. For the Saipan Upland Mitigation Bank, the protocol was modified from the original to suit the types of vegetation encountered in the Protected Area, the species under consideration, and the skill level of the observers. Variations on the original protocol were discussed with Dr. John Morton, Mr. Michael Lusk, Dr. Annie Marshall, and Dr. Steve Fancy, all of whom have experience with the methodology, with Saipan, and with the species.

Transects:

     Transects were initiated from a randomly chosen coordinate in the northwest corner of the Saipan Upper Mitigation Bank Area. Seventeen (17) parallel transects were laid out at 200 m intervals (Fig. 3, see page 28). Fifteen (15) of these run NW-SE at 280° and two run SW-NE at the base of cliff lines. The transects cut across all vegetation types and also cross the major geological land formations in the forest. Transects range in length from a few hundred meters to over a kilometer long and are marked every 10 m with flagging.

Count Stations:

     Ninety (90) point count stations are laid out along the above transects at 200 m intervals. The center of each station is marked with a 50-75 cm high piece of brightly painted rebar that is tagged with transect and station numbers for clear identification in the field. Each stationed has had GPS co-ordinates taken using a hand-held unit for GIS mapping purposes. White paint and flagging mark radial distances of 20 m from the central point in 4 easily visible locations. Blue paint and flagging mark a 30-m radius. These marks are meant as an aid in distance estimation during survey counts.

Observer Training:

     Only observers previously experienced at identifying both male and female NIRW calls in the field conduct surveys. Because the accuracy of distance estimates increases with practice, all participating observers calibrate distance estimations for one four-hour period the day before the survey. Eight (8) trials each are performed by estimating the distance to a flag (a) without sound aids, and (b) using tape-recorded NIRW calls. Estimates are given orally, then the true distance to the flag is verified with a 50-m tape measure. A second round of distance estimates for flags with and without sound are performed using written estimates. This series of trials is repeated inside the forest for relatively short distances, and outside the forest for relatively long distances. Tape recordings play both male and female Nightingale Reed-warbler (NIRW) calls to ensure accurate identification.

Point Counts:

     Counts are conducted for 5 minutes at each station. No playbacks of pre-recorded birdcalls are used to elicit responses. The direction and distance to each bird detected is registered as well as whether it is heard (H), seen (S), or both heard and seen (H/S or S/H).

Detections of other bird species are recorded concurrently. Generally, two observers perform the counts; one is responsible for counting and the other for recording the detections. Counts are conducted between 6 and 10 a.m. in September and March of each year in order to capture numbers during both the wet and dry season (presumably peak breeding periods). Continuing to perform counts in these months is essential for comparison of data with baseline surveys that were also conducted in September 1999 and March 2000.

Other Data:
        Weather conditions are noted at each station. The protocol and coding of weather conditions are as follows:

        (a) Wind speed on the Beaufort Scale

Beaufort Number	Wind Speed in mph	Visual Wind Speed Indicators
0	Less than 1	Smoke rises vertically
1	1 to 3	Wind direction shown by smoke drift
2	4 to 7	Wind felt on face; leaves rustle
3	8 to 12	Leaves, small twigs in constant motion
4	13 to 18	Raises dust and loose paper; small branches on the move
5	19 to 24	Small leafy trees sway; crested wavelets on inland waters(survey must be discontinued in this kind of wind).

        (b) Rain conditions using Weather Bureau code numbers:
                0 Clear
                1 Light rain/drizzle
                2 Showers
                3 Heavy rain (survey must be interrupted until heavy rain passes)
                4 Fog or smoke
                5 Drizzle
                7 Snow
                8 Showers

        (c) Cloud conditions as percent of sky covered to the nearest 10%.

Data Analysis:
        Survey counts are statistically analyzed using the computer software package known as DISTANCE. A sample size of over 60 detections must be used in DISTANCE analysis in order to achieve reasonable results. Because each individual survey rarely detects this many NIRW, several survey data sets are run at the same time and are stratified to allow density estimates for each individual survey but a pooled estimate for detection functions.

Prior to model fitting, 5-10% of the furthest distances are eliminated from the data to help fit the mathematical functions. Distribution of the data is examined by histograms of frequency and density before statistical analysis. The remaining distance estimates from the survey then are grouped into intervals. This grouping (*e.g.*, 5 intervals of 19 m each) is chosen for each survey based on the best fit between model and data. The program may be run several times before

achieving the optimum grouping. Models that have fit previous NIRW survey data well (goodness-of-fit test P > 0.9) used half-normal detection functions. The analysis assumes that there are no significant observer effects, but this assumption should be tested in the future.

Literature Cited:

Reynolds, R.T., Scott, J.M., and Nussbaum, R. A. 1980. A variable circular-plot method for estimating bird numbers. Condor 82:309-313.
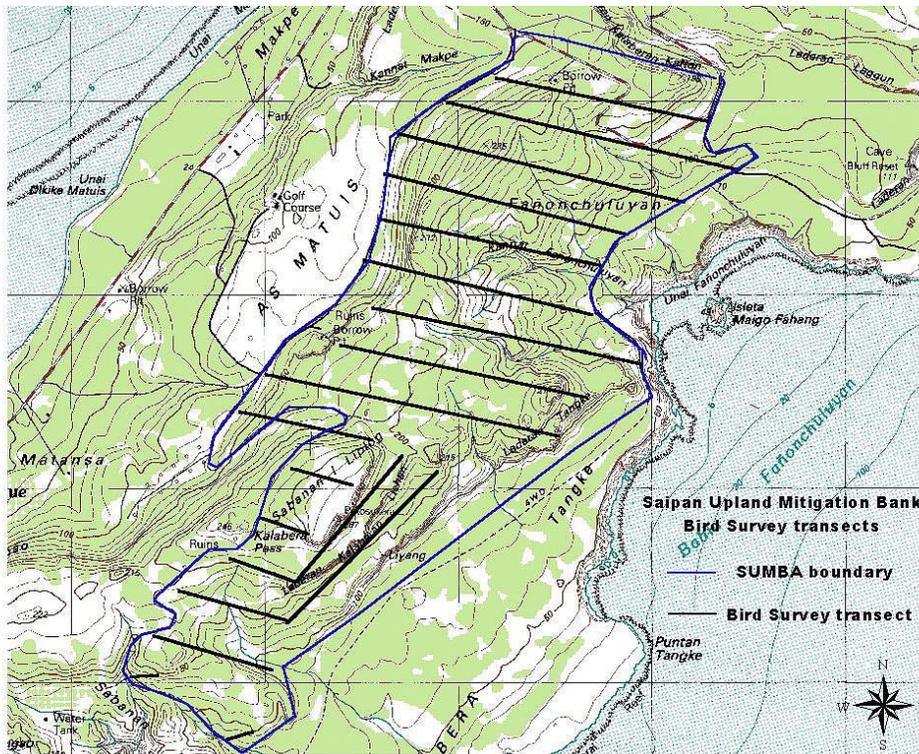

Figure 3. Location of NIRW survey transects in the Saipan Upland Mitigation Bank.

APPENDIX 2

Suggested Research on the Ecology and Life History of NIRW to Improve Ability to Manage the Species in the Protected Area

Study 1: NIRW reproductive success and recruitment in tangantangan and mixed secondary forest in the Protected Area.

- Design study based on previous research conducted by the Biological Resources Division of USGS to document NIRW reproductive success and rates of recruitment in tangantangan and mixed secondary forest habitats of the Protected Area.
- Determine study objectives that may include:
  - Nest fate and predation rate in different habitat types,
  - Nesting success and number of fledglings produced in different habitat types,
  - Juvenile behavior at nest,
  - Juvenile dispersal patterns,
  - Rate of juvenile recruitment into the breeding population,
  - Age of first breeding,
  - Home range use of both adults and juveniles, and/or
  - Gender differences in recruitment rates.
- Identify possible funding sources to support the study recognizing that this will be a long-term effort requiring focal observations, capture and banding of birds, and radio telemetry.
- Acquire funds, identify and contract qualified researchers to conduct the study.
- Acquire appropriate endangered species permit from USFWS.
- Conduct reproduction and recruitment study for 2-3 year period, or longer if necessary.
- Develop GIS maps of home-range use in different habitat types of the Protected Area based on telemetry and other data.

Adaptive Management
- Use study results and discussions to modify management strategies for sites where habitat will be restored in the Protected Area.

Study 2: Describe the availability of food resources and the prey spectrum of NIRW in tangantangan and secondary forests of the Protected Area.

- Design study to identify prey items in systematically collected fecal samples from different age classes of NIRW in two habitat types.
- Design study to sample environmentally available food resources coincident with collection of fecal samples.
- Identify possible funding sources to support this long-term study that will require capture and banding of birds and expertise in entomological taxonomy.
- Acquire funds, identify, and contract qualified researchers to conduct the study.
- Acquire appropriate endangered species permit from USFWS.
- Conduct prey base and food resource study for 2-3 year period in at least 2 habitat types.
- Assess food resource value of different habitat types to NIRW.
- Use results to help determine types and acreages of preferred habitat in the Protected Area.

Adaptive Management

- Use study results to help define and prioritize future restoration for degraded portions of the Protected Area.
- Assess study results and determine whether management strategies should be modified for sites targeted for habitat restoration in the Protected Area.

Study 3: Determine parameters influencing the population structure of NIRW (e.g., age of first breeding, fecundity, mortality levels, causes of mortality, etc.) in the Protected Area.

- Design study based on previous research conducted by the Biological Resources Division of USGS to document NIRW population parameters including, but not limited to:
  - Number of fledglings produced annually by each NIRW pair,
  - Juvenile and/or adult mortality rates,
  - Age of first breeding, and
  - Mortality factors.
- Identify possible funding sources to support this research recognizing that this will be a long-term study requiring intense observations, capture and banding of birds, and radio telemetry.
- Acquire funds, identify and contract qualified researcher to conduct the study.
- Acquire appropriate endangered species permit from USFWS.
- Conduct population study for 4-5 year period.
- Construct a population viability analysis (PVA) for NIRW in the Protected Area based on the parameters as quantified.
- Conduct a sensitivity analysis to help identify the life-stage of NIRW that is at highest risk in the Protected Area.

Adaptive Management

- Based on study results, design management activities focused on reducing risk factors for the most vulnerable life-stages of NIRW.
- Discuss the PVA in terms of alternative conservation strategies suggested by the results.
- Prioritize management objectives suggested by project results.

Study 4. Other recommended research associated with reducing risks to NIRW in the Protected Area.

- Studies of potential importance for management of NIRW in the Protected Area(s) may focus on topics such as:
  - Quantification of immigration/emigration between the Protected Area and the rest of Saipan,
  - Presence/absence of avian diseases and vectors,
  - Presence/absence of botanical diseases and vectors affecting NIRW habitat, and
  - Genetic studies quantifying population's heterozygosity and inbreeding potential.
- Advertise research needs in professional forums.
- Prioritize studies by need and cost factors, and apply for funding to support research.

Adaptive Management

- Assess management needs based on results of studies as they are completed.

APPENDIX 3

Restoration of NIRW Habitat in the Protected Area

<u>**Objective A:**</u> ***Determine suitability of existing habitat for NIRW in the Protected Area***

Strategy: Correlate presence/absence of NIRW with habitat types and floral composition within the Protected Area.

Short-term
- Identify vegetation associated with count stations where NIRW tend to be present or tend to be absent based on NIRW monitoring from 1999-2002, vegetation surveys from 1999-2000 in the Protected Area, and from S. Mosher's 1997-98 study of reed-warbler ecology.
- Identify and create a list of plant species with special emphasis on native species in NIRW high abundance areas for use in future restoration of the Protected Area.
- Identify alien plant species that appear to be of marginal use to NIRW (especially invasive species and noxious weeds) for removal during future restoration of the Protected Area.
- Acquire aerial photos of Protected Area to help identify degraded areas in need of restoration.
- Prioritize habitats for restoration based on:
  - Zero to low NIRW abundance,
  - Abundance of plant species of marginal use to NIRW,
  - Availability, effectiveness, effort, and cost of control measures for marginal species,
  - Characteristics of the patch, such as:
    - Whether the site is dominated by a monoculture (*e.g.,* lantana),
    - Whether the site is a small patch of vining weeds, and
    - Whether the site consists of an extensive understory of noxious weeds,
  - Availability and readiness of plantings,
  - Amount of effort required and available work force, and
  - Effect on the habitat in the Mitigation Bank (*e.g.*, will restoration impact existing habitat?).

Long-term
- Conduct habitat inventory of the Protected Area at 5-year intervals.
- Develop GIS database for Protected Area with NIRW abundance layer, topographic layer, and vegetation layer.
- Assess changes in existing NIRW habitat using GIS technology in conjunction with comparisons of standard vegetation parameters.
- Ensure that data is comparable among years by following vegetation survey methods given in Appendix 4 and including at least the following variables:
  - Tree density,
  - Percent ground cover,
  - Percent canopy cover,
  - Shrub/sapling density, and
  - Species composition.
- Consult with the Environmental Protection Agency for emergency permits to apply invasive species control methods that are not approved for use in the Mariana Islands if necessary.

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- Continue to acquire aerial photos of Protected Area to help identify degraded areas in need of restoration.

Objective B: ***Implement habitat restoration activities in the Protected Area.***

Strategy 1: Prioritize restoration activities and re-seeding efforts in the Protected Area.

Short-term
- Determine the kinds of plantings that will restore habitat for NIRW based on species composition of optimal NIRW habitat as determined previously.
- Begin propagation of desirable tree and shrub species for restoration activities in conjunction with the CNMI Division of Agriculture, Forestry Section.
- Determine schedule for removal of invasive plant species from areas of existing marginal NIRW habitat based on prioritization in Objective A.
- Plan erosion control measures for areas where invasive species will be removed.
- Select restoration methods that are appropriate to the conditions of each patch (*e.g.*, natural regeneration, planting seedlings, re-seeding, native understory).
- Implement restoration plan appropriate to each habitat patch based on prioritization.

Long-term
- Following removal of invasive plant species, maintain enhancement areas free of noxious weeds as restoration efforts proceed.
- Update habitat map to reflect on-going enhancement efforts.

Adaptive Management
- Design study to identify best method to apply to various site conditions of each patch.
- Review effectiveness of maintaining cleared and replanted areas free of noxious weeds; modify as appropriate, based on results of monitoring.
- Implement erosion control measures if necessary.

Strategy 2: Monitor progress of habitat restoration in the Protected Area.

Short-term
- Monitor restoration area(s) to confirm establishment of seedlings on a monthly basis.
- Establish semi-permanently marked experimental plots around seedlings (dimensions to be determined) in restoration areas.

Long-term
- Measure growth of seedlings in semi-permanently marked experimental plots located in restoration areas as frequently as needed (note: frequency of monitoring is expected to decline over time).
- Provide photographic evidence that restored NIRW habitat is becoming or has been established in semi-permanent experimental plots.
- Evaluate progress of restoration based on measures of regeneration in experimental plots.
- Monitor NIRW colonization of recovering habitat.
- Assess association between changes in habitat and changes in use by NIRW.

- Modify restoration activities if there are demonstrated disturbances of NIRW behavior (*e.g.,* disruption of nesting attempts).

Adaptive Management
- If NIRW do not colonize restored areas, evaluate reasons (*e.g.*, food resources) and remove potential deterrents to species' establishment. Evaluate and implement predator control if necessary.
- If restoration areas are not regenerating, evaluate reasons and modify protocols for restoration based on evaluation.

Strategy 3: Collaborate with DLNR-Division of Agriculture Forestry Section on restoration of degraded areas in the Protected Area through a MOU.

Short-term
- Develop MOU between DFW and the Division of Agriculture's Forestry Section guiding collaborative restoration efforts in the Protected Area.
- Delegate specific jobs and identify parties responsible for completion of joint restoration efforts in the Protected Area.
- Improve seed/plant nursery to propagate species at the As Perdido Agricultural Center.

Long-term
- Identify possible grant sources through USDA that the Forestry Section might access to assist with invasive species control and restoration efforts.
- Evaluate progress of restoration based on results from experimental plots and adjust methods accordingly.
- Change monitoring frequency to reflect changes in the rate of vegetation growth--monitoring frequency might be reduced as growth of trees slows once past seedling stage.

Adaptive Management
- If native forest fails to recover, investigate circumstances leading to failure and adjust methods and MOU accordingly.

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APPENDIX 4

Vegetation survey protocol for Saipan Upland Mitigation Bank

The Saipan Upland Mitigation Bank area consists of 19 transects and a total of 89 point count stations for sampling bird populations. Transects are established 200 m apart and the stations are permanently marked every 200 m along each transect. Vegetation plots were established in association with each bird count station, one vegetation plot per count station (James and Shugart 1970). Vegetation plots were located in a random direction and at a random distance (double randomization) from the center of each bird point count station using a random numbers table. Each plot was 5 x 10 m^2. The plots were surveyed for all trees, seedlings (7 cm to 0.75 m in height), and shrubs (plants lacking a main stem or multi-stemmed species). These were all identified and quantified by count. Data were diameter-at-breast-height (DBH) of all stems over 0.75 m in height, tree height, and canopy cover as determined with a densiometer.

Lantana camara, *Alyxia torrensiana* and *Eugenia palumbis* were categorized as shrubs. The number of individuals and frequency data was collected on these species. *Eugenia palumbis* is described as a small tree or shrub. It was most commonly found as a shrub under 2 m with few exceptions in the SUMB. Quantifying the number of *Lantana camara* individuals in some cases was very difficult to the point of being impractical. *Lantana* forms dense thickets in the SUMB often 2.5-3 m high. *Lantana* is highly branched and lined with large woody thorns along the branches. In these thickets it is difficult to penetrate a 50 m^2 plot and determine the number of individuals. In this situation an estimate of the number of individuals was made by counting the number of individuals in a 1 x 5 m block and extrapolating to get the total plot population.

The data were analyzed for basal area (calculated according to the formula BA=[1/2 DBH]$^2\pi$); frequency (absolute frequency is the number of plots a species occurs in out of the total number of plots x 100), relative frequency (calculated as the frequency of a species divided by the total frequency of all species), density (number of trees/ha), dominance (calculated as the mean BA x density), relative density (the density of each species divided by the total density for all species), and importance (importance values combine all the above variables to determine the most influential tree species in a community and was calculated according to Mueller-Dombois and Ellenberg 1974, pp. 100-125).

Each plot was assigned a habitat designation similar to that used by Falanruw *et al*. 1989. Habitat designations were determined by the tree or tree species that were dominant in the plot. These designations were further categorized by the tree species or habitat type that occupied greater than 20% of the plot. The percent area of habitat types present within the 419 ha SUMB was then extrapolated based on the amount of area sampled.

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