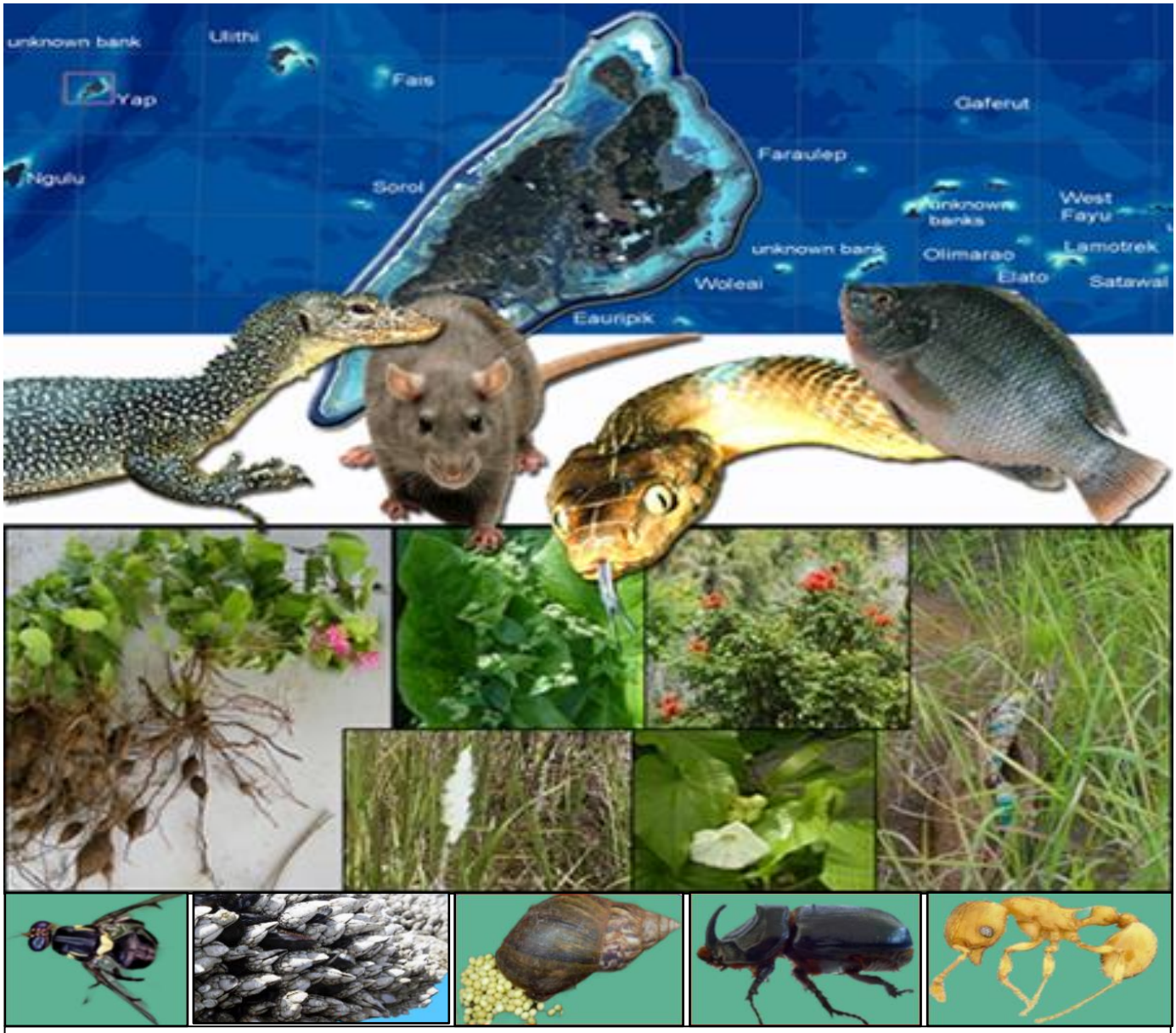
Yap Invasive Species Taskforce
Adaptive Strategic Management Plan
2025-2034



Invasive Species is Everybody's Problem

Prepared by Francis Ruegorong, 2025

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Foreword

It is with great pleasure that I express, on behalf of the Government of Yap State, my endorsement of the Adaptive Strategic Management Plan dedicated to the management of invasive species within Yap's jurisdiction. This Plan presents prioritized solutions to the pressing challenges posed by invasive species, which significantly affect the residents of Yap. Furthermore, it aligns with our commitments at both the state and national levels and supports the objectives of the United Nations' Sustainable Development Goals. The Plan delineates strategies and key actions that are essential for effectively preventing, managing, and mitigating the impacts of invasive species on our environment, economy, cultural heritage, infrastructure, and the overall well-being of Yap's populace.

Over thirty years have passed since the founding of the Federated States of Micronesia and the formation of Yap State. The visionary leaders of our past thoughtfully designed a pathway for Yap and its inhabitants that places great value on customs, traditions, and the natural environment as pivotal aspects of future development. As globalization progresses and free markets become more prevalent, the need for strong protection of our people and Yap's ecosystems is crucial to ensure sustainable development and a stronger economy, enabling the state to integrate into the modern world. Invasive species pose a significant threat to that vision and our future, like a brewing storm in our voyaging path. Although this challenge is formidable, it is within our realm to conquer it. I invite everyone to come together in addressing this important challenge. The key to our success in managing invasive species, as well as other challenges, lies in our unwavering commitment to collaboration for the betterment of our state and nation.

At this juncture, I would like to extend my heartfelt thanks to the FSM Department of Resources and Development and the Yap Invasive Taskforce for their invaluable contributions to the formulation of this revised plan, as well as their essential role in the management of invasive species in Yap. I encourage all stakeholders to engage thoughtfully with this plan as we work together to protect the State of Yap from the impacts of invasive species.

Kammagar gad!

Sincerely,

Francis Itimai
Acting Governor

Acknowledgments

The Yap Invasive Species Taskforce (YIST) would like to thank everyone who contributed to the development of this plan. We are particularly thankful to the FSM GEF-6 Invasive Project Implementation Unit (PIU) within the FSM Department of Resources and Development (Elijah Tarofalmal) for their support in changing the Strategic Action Plan to the Adaptive Strategic Management Plan (ASMP) and Yap Department of Resources and Development (Alexander Yowblaw). We also appreciate the significant contributions from the Division of Agriculture and Forestry (Tamdad Sulog, Francis Liyeg, Joseph Tutuw, Ernie Guswal, and Augustine Dibay), the Marine Resources Management Division (Anthony Yolon), the Yap Community College Land Grant (Viviancella Ken), the Environmental Protection Agency (Shane Sopluw), Public Works (Moon), FSM Quarantine (Andrew Fagolur), and the Environmental Health Division (Charlene Laamtal and Maxshelton Talimelipiy). Their expertise and data on invasive species were crucial for the development of the ASMP. Furthermore, we are grateful to Francis Ruegorong and all the participants involved in drafting the YIST ASMP for their dedication and hard work. Finally, we would like to express our sincere appreciation to our colleagues and friends for their invaluable input and motivation. With their collective support, this plan reflects our shared vision.

Abbreviations

ASMP	Adaptive Strategic Management Plan
BTS	Brown Tree Snake
COM-FSM	College of Micronesia-FSM
COP	Council of Pilung
COT	Council of Tamol
CRB	Coconut Rhinoceros Beetle
DAF	Division of Agriculture & Forestry
DHS	Department of Health Services
DOE	Department of Education
DPS	Division of Public Safety
DDRD	Director of the Department of Resources & Development
DR&D	Department of Resources & Development
EDARR	Early Detection and Rapid Response
EHS	Environment Health Section
EPA	Environmental Protection Agency
FSM	Federated States of Micronesia
GEF	Global Environmental Facility
HS	Health Services
IEAC	Invasive Emergency Advisory Committee
LFA	Little Fire Ants
NGO	Non-Governmental Organization
MRMD	Marine Resources Management Division
PILN	Pacific Invasive Learning Network
RIFA	Red Imported Fire Ants
R&D	Resources and Development
RISC	Regional Invasive Species Council
SPC	Secretariat of the Pacific Community
SPREP	Secretariat of the Pacific Regional Environment Programme
SWOT	Strength, Weaknesses, Opportunities, and Threats
TA	Technical Assistance
USFS S&P	U.S. Forest Service Region 5 State & Private Grants Program
YapCAP	Yap Community Action Program
YBSAP	Yap Biodiversity Strategic Action Plan
YINS	Yap Institute of Natural Science
YIST	Yap Invasive Species Taskforce

2. Executive Summary

Invasive species pose a significant and multifaceted threat to the diverse terrestrial and marine ecosystems found on the islands of Yap, jeopardizing not only its unique biodiversity but also the local economy, property values, and public health. In response to these pressing issues, the Yap Invasive Species Taskforce (YIST) has developed a comprehensive Adaptive Strategic Management Plan (ASMP) designed to tackle these challenges head-on. The vision expressed in this ambitious plan envisions a future where "Yap will have a sustainable invasive species strategy and strengthened capacity to manage aquatic and terrestrial ecosystems, ensuring cultural, social, economic, and overall well-being." The ASMP lays out a series of critical initiatives aimed at lessening the impact of invasive species over the next decade, specifically from 2025 to 2034. This plan takes a proactive approach by identifying and targeting a diverse selection of prioritized invasive species, including those that have yet to be introduced to the island. Among the key initiatives, set for implementation during this crucial timeframe is the ongoing control of the notorious Little Fire Ant, accompanied by combined efforts to prevent its threat from reaching the outer islands. The potential spread of this invasive species poses a grave risk to the ecosystems and the well-being of the communities. Moreover, the ASMP highlights the urgent necessity of monitoring and managing aggressive plant species, such as the fast-spreading lantana and the African tulip, both of which threaten to outcompete the island's native flora. Crucial to this plan is the strengthening of capabilities for early detection and rapid response to high-risk invasive species. By implementing this forward-thinking strategy, the people of Yap will be able to protect their rich natural heritage while concurrently safeguarding the interests of its residents. The ASMP advocates for a collaborative approach that unites government agencies, local communities, and passionate partners devoted to the cause of invasive species management. Therefore, the success of this initiative hinges on securing adequate funding, fostering meaningful community involvement, and steadfastly executing the proposed strategies. These combined efforts are vital for ensuring the continuing health of Yap's ecosystems and the well-being of its inhabitants as they strive to maintain their environment against the ever-present threats posed by invasive species. Through dedication and unity, the people of Yap can work toward a future where their natural landscapes are preserved and cherished for generations to come.

3. Background/Needs

The Federated States of Micronesia (FSM) consists of four states: Yap, Chuuk, Pohnpei, and Kosrae. These states cover an area of 3,000,000 km² and are home to 427 species of corals, over 1,200 species of fish, 782 native plant species, 110 endemic plant species, 241 bird species recorded, 22 of which are endemic and 24 are globally threatened. Additionally, there are more than 1,200 species of ferns and flowering plants, three endemic species of flying foxes, and one endemic species of sheath-tailed bat. Yap State is generally divided into two distinct regions: Yap's main islands and the Outer Islands. The main islands is made up of four islands (Ramung, Maap, Gagil-Tomil, and Marbaa). The outer island region stretches eastward to encompass an additional 134 outer islands (Figure 1), most of which are low-lying atolls that host 376 native plant species. This geographical area experiences periodic storms, extended dry periods, and high temperatures and now experiencing shift in temperature, weather pattern, and rising sea level[1].The primary lifestyle on the islands revolves around a blend of nature-based activities, strong community ties, and a slower pace of life. Many residents practice a subsistence lifestyle, relying on the land and water for their livelihoods through traditional management and culturally specific practices. The island culture and livelihoods are closely intertwined with the island's flora and fauna, all of which face risks from invasive species.

[1] FSM. 2020. The Federated States of Micronesia: Sixth National Report to the Convention on Biological Diversity. https://www.cbd.int/doc/nr/nr-06/fm-nr-06-en.pdf

Invasive species are organisms introduced to new environments that can disrupt local ecosystems and pose threats to the environment, economy, and animal and human health. Their impact can range from minor inconveniences to severe consequences, including significant alterations to local lifestyles, biodiversity, property damage, and, in extreme cases, loss of life. One key factor contributing to these escalating threats is the changing nature of connectivity between once-isolated regions.

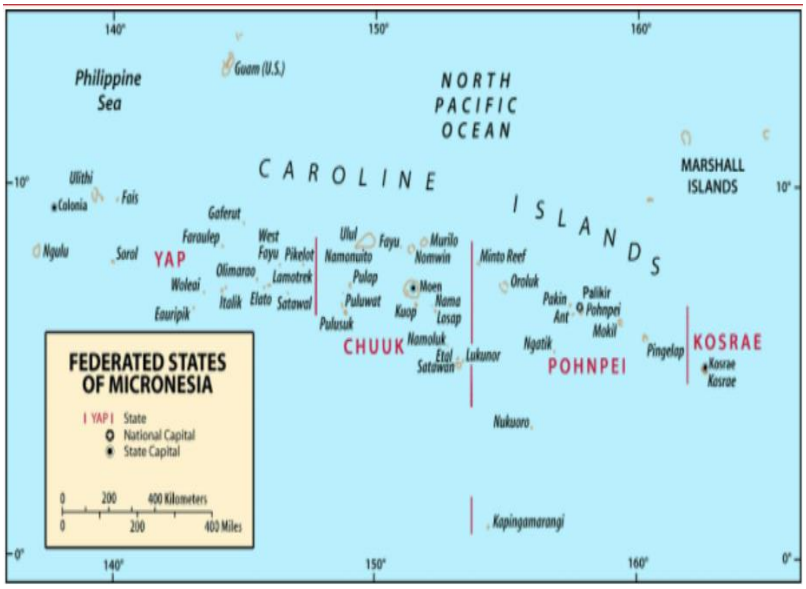


Figure 1. The Map of Yap State Islands

In Yap, the vast ocean that once served as a barrier protecting the islands within the State is no longer as effective. Today, the distance between islands is measured in flight hours rather than the days or weeks it once took to sail between them. Consequently, organisms traveling as stowaways have a higher chance of surviving and multiplying upon arrival at the island shores. These invasive organisms tend to be aggressive, reproduce quickly, and often out-compete native species or serve as a host for pathogens. A significant challenge in managing them is the uncertainty regarding their arrival; it is often unclear "which species will appear, when, where, and how they will appear". As a result, invasive species are often addressed only after they have established themselves and caused considerable damage. They possess unique biological and adaptable traits that allow them to thrive in new environments, which significantly affects mitigation costs and resource allocation.

The islands within Yap State are particularly vulnerable to these biological invasions. In fact, there are already various established invasive species causing negative impacts, and there is a high risk of additional pests establishing themselves and causing even greater harm and disturbance. In 2000, the Secretariat of the Pacific Community (SPC) Plant Protection for Micronesia created a poster featuring the top ten invasive weeds in Yap, leading to the formation of the first unofficial Invasive Species Taskforce. In 2002, the Yap State Legislature allocated more than $100,000 to eradicate cogon grass, locally known as *Pan nu Machbab* (*Imperata cylindrica*). That same year, the U.S. Forest Service, through State & Private Forestry, provided additional funding and has continued to support the Yap invasive species program ever since. In 2004, three more species were added to the priority list for eradication. As of 2021, two of the originally listed species have been successfully eradicated, while two additional species have been added on the eradication list.

The Federated States of Micronesia (FSM) National Biodiversity Strategic Action Plan was endorsed in 2002, followed by the endorsement of the Yap Biodiversity Strategic Action Plan (YBSAP) in 2004. Invasive species were highlighted in both plans, as a priority for the State. The plans also emphasize the need to develop a five-year invasive species plan. In response to the recommendations of the plans, Yap established positions for an Invasive Species Coordinator and a Spray Technician. In 2005, Yap became a founding member of the Regional Invasive Species Council (RISC), and in 2006, it joined the Pacific Invasive Learning Network (PILN). Leadership recognized that addressing invasive species is not the responsibility of one person or an agency, but rather a collective effort. In February 2008, the YIST was officially established, and the first draft of the YIST Strategic Action Plan (SAP) was created to address invasive species issues within the State. YIST serves as an essential coordinating body for state plans concerning the management of invasive species. It facilitates collaboration and communication among stakeholders and ensures that effective strategies are developed and implemented to address the challenges posed by invasive species. The YIST Plan was presented to the Regional Invasive Species Committee (RISC) in August 2008 during the Micronesian Chief Executives Summit held in Palau. A follow-up YIST SAP was completed in December 2008, covering the years 2009 to 2015. In 2014, the Regional Biosecurity Plan for Micronesia and Hawaii was finalized. In 2015, the FSM National Invasive Species Strategy and Action Plan was completed, highlighting the need to address invasive species at both

the National and Yap State levels. In 2018, GEF 6 funding through the FSM Department of Resources and Development (FSM R&D) became available, allowing YIST to change the YIST SAP to an Adaptive Strategic Management Plan (ASMP) covering a period from 2025 to 2034. This plan reviews and incorporates activities related to both previously and currently manage invasive species to create stronger and more flexible policies for handling invasive species efficiently and effectively. This approach employs a variety of innovative techniques aimed at minimizing uncertainty, enabling policymakers, invasive species teams, and conservationists to adjust their tactics in response to evolving challenges and opportunities. By remaining flexible and responsive, the plan ensures that we can confront the complexities associated with invasive species, safeguarding the island's beauty, economy, health, and biodiversity for the future.

4. YIST Member

1) Health Serv.	Health Services
2) COT	Council of Pilung
3) COP	Council of Tomol
4) EHS	Environment Health Section
5) USFS	United States Forest Service
6) DHS	Department of Health Services
7) DAF	Division of Agriculture & Forestry
8) EPA	Environmental Protection Agency
9) PILN	Pacific Invasive Learning Network
10) SPC	Secretariat of the Pacific Community
11) DR&D	Department of Resources & Development
12) MRMD	Marine Resources Management Division
13) FSM Quarantine	FSM Resources & Development/FSM Quarantine
14) COM-Land Grant (CRE)	Community College of Micronesia – Land Grant (CRE)
15) SPREP	Secretariat of the Pacific Regional Environment Programme

5. Vision

Yap will have a sustainable invasive species strategy and strengthened capacity to manage aquatic and terrestrial ecosystems, ensuring cultural, social, economic, and overall well-being.

6. Mission

To establish effective institutional arrangements and networks that support efforts in protecting biodiversity, property, economy, and the well-being of the people in Yap, while ensuring a peaceful environment that is relatively free from invasive species.

7. Goals and objectives

The purpose of this plan is to establish a comprehensive strategy aimed at protecting native biodiversity, preserving ecological integrity, and ensuring the well-being of human interests through the effective management of invasive species. The primary objectives are to prevent the introduction and spread of new invasive species, reduce or eradicate the populations of established invasive species, and, when necessary, restore disrupted natural ecosystems. Table 2 presents clearly defined, realistic, and achievable goals and objectives for the YIST Adaptive Strategic Management Plan. These goals are organized around five key thematic areas: funding and resources, public awareness and engagement, capacity building, effective coordination, and the management of YIST selected invasive species.

Table 1. The goals and objectives of Yap Invasive Adaptive Strategic Management Plan.

1) FUNDING AND RESOURCES					
Goals	**Objectives**	**Project/Activities**	**Outputs/Measures**	**Outcomes**	**Lead/Partners**
Secure funding for invasive species activities	1. By November 2025, YIST ASMP is endorsed by the leadership	Finalize the YIST SAP	YIST SAP endorsement	Finalized and endorsed YIST SAP	YIST, DAF, DR&D MRMD, EHS, DHS
	2. Submit budget proposals to support invasive works	Complete budget proposal write-up and submission and meet with budget review committee	Number of proposals approved	Copy of proposal with a budget breakdown	
	3. Ten project proposals have been completed	Proposal write-up and submission	Funding available	Proposals approved	
2) PUBLIC AWARENESS AND EDUCATION					
Goals	**Objectives**	**Project/Activities**	**Outputs/Measures**	**Outcomes**	**Lead/Partners**
Improved engagement by communities and visitors with supporting invasive species prevention and management	1. Improved understanding of the local communities and visitors regarding invasive species and awareness of the effects and impacts of invasive species	Create and provide public educational/ awareness materials on the context of invasive species (i.e. Publications, Radio, CB Radio, clubs, theme competitions, community and school visits.	• Percentage of people and communities targeted • Number of people and communities consulted or engaged	The public will be more aware of invasive species problems	YIST/, SPC, PILN SPREP, USFS, YapCAP, DOE DR&D, HPO, COM-FSM, Public Safety, Public Health, Yap EPA, COT, COP
	2. Resource owners support and engage with the YIST and its projects	Consult and advise resource owners of upcoming YIST activities	Percentage, number, or acreage of areas and resource owners visited	Resource owners will be aware of and collaborate with YIST	
	3. Communities engaged in directly supporting invasive species management and prevention projects	Develop appropriate list and activities for traditional leaders to distribute	Number of materials distributed to ten municipalities and four neighboring island precincts	At least 10% of households will receive a list of target invasive species and prescribed control measures.	
3. Capacity Building					
Goals	**Objectives**	**Project/Activities**	**Outputs/Measures**	**Outcomes**	**Lead/Partners**
Identify and build capacity for effective prevention, control, and eradication of invasive species.	1. Secure/hire needed staff	Secure funding for needed staff	Number of funding sources secured	Funding for staff secured	YIST/, SPC, PILN SPREP, USFS, YapCAP, DOE DR&D, HPO, COM-FSM, Public Safety, Public Health ,Yap EPA, COT, COP
		Hire needed staff	Number of staff hired	Needed staff hired	
	2. Train and develop the capacity of existing and new staff	Develop individual training needs	Number of matrixes developed for offices	A matrix of individual training needs to be completed	
		Develop timetable & activities for training needed.	List of activities and corresponding timeline	Timetable and training activities developed	

		Conduct identified training	Number of participants certified	Certification of participants in respective trainings	
4) EFFECTIVE COORDINATION					
Goals	**Objectives**	**Project/Activities**	**Outputs/Measures**	**Outcomes**	**Lead/Partners**
To increase effective coordination between implementing agencies.	YIST members and partners working effectively together	• Identify all member and partner agencies • Regular and special meeting	• # of participating agencies and a signed MOA • No. of YIST meetings	Regular YIST updates shared with members and partners	YIST/ SPC PILN (SPREP) USFS YINS YapCAP DOE, DR&D HPO COM-FSM Public Safety Public Health Yap EPA COT COP
	Maintain an updated list of invasive species including potential invasive by risk categories (low, medium, high).	• On-going data collection on species through surveys. • Regular ongoing data review and information sharing	Updated list of invasive is shared with the community and partners	List of top ten invasive species and risk/priority including those outside the island	
5. EFFECTIVE CONTROL MANAGEMENT OF TARGETED INVASIVE SPECIES BY YIST TEAM					
Goals	**Objectives**	**Project/Activities**	**Outputs/Measures**	**Outcomes**	**Lead/Partners**
to prevent new invasions, control existing populations, and restore/rehabilitate native species and communities	Control and limit the spread of established invasive species, restore native ecosystems, and prevent introduction of new invasive invaders.	• Prevention measures • Early detection and rapid response (EDARR), see appendix 2 • Treatment control measures; mechanical, physical, chemical, and biological control methods, often in combination. • Population growth control measures. • Employ traditional/cultural strategies	• implementing and enforcing policies • Monitoring for new infestations, and implemented control methods • Changes in the number of invasive species, infested sites, biodiversity values, and the extent of areas affected. • Monitoring the presence or absence of target invasive species • And prevented and newly invaded species, as well as their potential impacts	• Recovery of native ecosystems, • Improved economic well-being, and positive health outcome • Increased public awareness of impact of invasive species. • Protect valuable natural resources, property, and cultural • Effective quarantine measures	YIST, SPC, PILN, SPREP, YINS, YapCAP, DOE, DR&D, HPO, COM-FSM, Public Safety, Public Health, Yap EPA, COT, COP, FSM R&D, USFS, Communities, Private land owner

8. SWOT Analysis

One significant challenge in managing invasive species is the uncertainty and the difficulty of early detection, along with the high costs associated with control efforts once an invasive species becomes established. These issues are further complicated by factors such as extreme/shifting weather, the isolation of the islands, and the fact that most land and reef are privately owned. To address these challenges, a SWOT analysis was conducted to gain a clearer understanding of the invasive species situation in Yap (see Table 1). This analysis examined internal factors, focusing on the strengths and weaknesses of current management efforts, as well as external factors that can reveal opportunities and identify threats posed by invasive species and other influences. The purpose was to facilitate better-informed decision-making and develop effective strategies for managing invasive species in Yap.

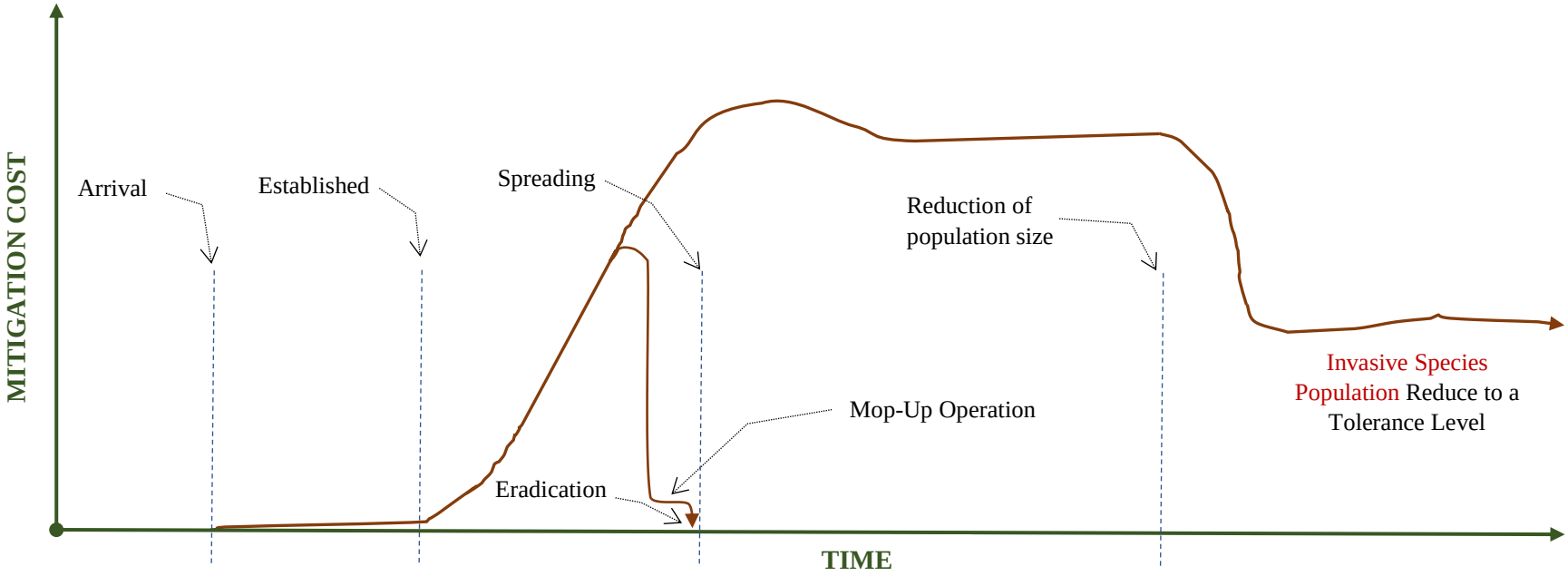
Table 2. The SWOT Analysis Results

Internal Strengths and Weaknesses	
STRENGTHS	*WEAKNESSES*
1. Agency collaboration 2. Smallness of the islands 3. Political support (RISC) 4. Terrestrial Invasive Coordinator/Field Team 5. Member of PILN 6. Locally hired spray technicians 7. Public Awareness Program 8. Previous experience of effectively management and eradication of five invasive species 9. Technical Advertisement 10. Citizen science (involving the public) 11. International collaboration 12. Access to SPREP, SPC, and USFS grants and specialists 13. Biosecurity X-Ray at the airport on the main island 14. LFA/CRB Respond plan	1. Minimal funding & resources for Invasive works 2. Minimal awareness and outreach efforts 3. Limited expertise and facility 4. Inadequate number of trained personnel 5. Limited Quarantine officers 6. Lack of quarantine treatment facilities 7. Access to supply because of isolation 8. Insufficient laws, regulations, and enforcement 9. Reporting of data/findings 10. Difficulty in controlling widespread 11. Need scale-up of early detection & prevention 12. Working with soft fund such grants 13. Lack of experts and readily available fund for rapid response. 14. No quarantine officer at the entry points in the outer island for yacht and other ships. 15. No policy for interstate ship inspection 16. Limited research information available on some targeted species 17. Limited knowledge, funding, species information 18. Logistic issues 19. Inability to rapidly access private lands and reefs (must ask for permission)
External Opportunities and Threats	
OPPORTUNITIES	*THREATS*
1. Technical assistance 2. Funding Sources/Grants 3. Educational/ Training 4. Networks 5. Public Ed/Awareness 6. Communities willingness to act 7. Assistance through RISC/MIF 8. Biosecurity Training (GEF-6) via COM 9. Regional Biosecurity Training 10. One health Approach Conference 11. SPC Enhance Direct Access Grants 12. SPREP PRISM Grant	1. Minimal control efforts for established invasive species. 2. Not enough staff to absorb technical assistance from outside organizations to carry out work 3. Need for good case studies information. 4. Upside-down pyramid – not enough support for on-the-ground workers; outside organizations and consultants consume time, resources, and funds. 5. Smuggled or hitchhikers invasive species. 6. Military build-up 7. Location of Yap between Guam and Palau; vulnerable to invasive species 8. Helps spread wildfire and vice-versa 9. Climate-Change/extreme weather change 10. Impact human health, and fauna & flora 11. Economic cost on other sectors including agroforest and other agencies. 12. Out migration 13. Extreme/shifting weather

9. Invasive Species Population Dynamics and Management

The population dynamics of invasive species can be complex and unpredictable, influenced by their biological characteristics, environmental conditions, and natural predators. Understanding these factors is critical in making informed decisions on the best ways to address targeted invasive species. It is essential for effective management, as it helps develop strategies to tackle the root causes or underlying factors driving the species' spread and success. By analyzing population growth rates, life history, traits, and other demographic characteristics, managers can identify vulnerable stages in an invasive species' life cycle and implement effective control measures. This knowledge optimizes resource use and delivers effective control measures that minimize the ecological and economic impacts of invasive species. The measures outlined are based on four main strategies: outreach and awareness, prevention and containment, eradication, and population suppression. The goal of outreach is to educate the public about invasive species, their impacts, and ways to prevent their spread. Prevention begins with quarantine efforts and includes biosecurity measures aimed at stopping invasive species from arriving and establishing themselves. Containment is the second part of prevention that focuses on keeping invasive species within the infested area and preventing them from spreading to other parts of Yap. Eradication, on the other hand, aims for the complete removal of the invasive species, while suppression focuses on reducing its impact, spread, and overall population size.

However, once an invasive species breaches quarantine measures and becomes established in a new environment, it may remain inactive for an extended period in the lag phase. This phase can last for years or even decades, during which the species exists in low numbers, surviving without thriving or spreading, and their impact may not be immediately noticeable. This phase can last anywhere from a few months to over 50 years. For example, "*Imperata cylindrical*" remained inactive near the old airport in Milaew for over 50 years, while little fire ants stayed in this stage at a newly infested site in Yap for 1-2 years. When favorable conditions or triggering factors arise, the invasive species can experience rapid population growth, entering the log phase if it is not addressed. It will eventually reach the stationary phase, and it is very expensive to control at this stage. Eradication is most feasible when the target invasive species population is still in the arrival phase to the early log phase. Beyond these stages, eradication efforts may be suspended or shifted to suppressing population growth to a manageable or tolerable level. At this point, the invasive species will likely persist, and the costs associated with population suppression may become a recurring expense that many families cannot sustain unless natural enemies or biological control is introduced to suppress or reduce the population size. In the second stationary growth phase, the goal is to minimize the impact of the invasive species by protecting resources and health through adaptations, integrated pest management, or the introduction of biological controls. Therefore, the most effective strategy for managing invasive species is prevention, early detection, and rapid response. These approaches have been proven to save resources and funds, as demonstrated by Yap invasive data collected, analyzed and displayed in Figure 2. Our successful efforts to eradicate some of the world's worst invasive species have been made possible through the implementation of effective prevention/containment measures, early detection, and swift action. These strategies are the most effective and most cost-efficient way to manage invasive species.



Population Dynamic				
Absent	*Localized (Lag Phase)*	*Intrusive (Log Phase)*	*Stationary Growth Phases*	
			Maximum Carrying Capacity (1st Stationary Growth Phase)	Long-Term Management (2nd Stationary Growth Phase)
Managements (Controlled Efforts)				
"Prevention" & Quarantine Measures	Surveillance, Awareness, Containment, & "Eradication"		"Population Suppression" = Fail to Eradicate	
			Treatment must continue until a tolerance level is achieved.	Resource and Health Protection, Adaptation, introduction of biological control, and/or Integrated Pest Mgt.

Figure 1. ***Invasive species population dynamics and control management.***

10. Prioritized and Targeted Invasive Species

Organisms considered invasive species must pose various negative effects on the environment, property, the economy, human health, and lifestyles. These species must have the potential to disrupt Yap's ecosystems by outcompeting native species and altering habitats, which can lead to a loss of biodiversity and even the extinction of certain species. From an economic perspective, species are selected based on their potential to cause significant losses, such as reduced crop yields, diminished fish stocks, and disrupted marine ecosystems. Additionally, the selected species may damage infrastructure, increase management costs, heighten fire vulnerability, and negatively affect tourism and other businesses. Furthermore, species that pose risks to human health by introducing new diseases, serving as disease vectors, or decreasing the quality and availability of water are also prioritized. In light of these concerns, YIST has compiled a list of species that require urgent attention and management, referred to as "Targeted Species." This list includes species already established in the state, as well as those that have not arrive yet. The selected species are categorized into three groups: "Low to Medium Risk," native organisms with pest tendencies, and "High Risk" organisms.

10.1 Identified "Low to Medium Risk" Invasive Species (Low to Medium Impact on health, biodiversity, ecosystems, property, economy, way of life, and species hardiness).

a) Rodent
   1.Brown Rats (*Rattus norvegicus*) – on Yap mainland
   2.Ship Rats (*Rattus rattus*) – on uninhabited neighboring islands
   3.Pacific Rats (*Rattus exulans*) on uninhabited neighboring islands

b) Mammals
   1. Wild and stray cats (*Felis catus*)
   2. Wild and stray dogs (*Canis familiaris*)

c) Monitor lizard (*Varanus indicus*) – on neighboring islands.

d) Mozambique Tilapia (*Oreochromis mossambicus*) – On main Island

e) Crown of Thorns (*Acanthaster planci*)

f) Cuban slugs (Veronicella cubensis) in Saipan and Hawaii

g) Aquatic Snail vector for Schistosomiasis (Bilharziasis)

h) Barnacles and other biofouling organisms

i) Insects
   1. Mosquito
      - Aedes vector for chickungunya, dengue, L. Filariais, Rift valley fever, yellow fever, zika
      - Anophetes vector for Lymphatic Filariasis, Malaria, O'nyong'nyong virus
      - Culex vector for Japanese encephalitis, L. Filariasis, West Nile Fever

   2. Culicoides flies vector for Oropouch fever
   3. Blackflies vector for Onchocerciasis (river blindness)
   4. Fleas vector for plague transmit for rat to human and Tungiasis
   5. Body Lice vector for typhus and louse-bourne relapse fever

6. Sandflies vector for leishmaniasis and sandfly fever (phlebotomus fever)
7. Ticks vector for Crimean-Congo hemorrhagic fever, Lyme disease, Relapsing fever (borreliosis), Rickettsial diseases (eg: spotted fever and Q fever), Tick-borne encephalitis, Tularaemia
8. Triatome bugs vector for Chagas disease (American trypanosomiasis)
9. Tsetse flies vector for Sleeping sickness (African trypanosomiasis)
10. Mango Fruit flies (*Bactrocera frauenfeldi*)
11. And other fruit fly that are not in Yap such as the oriental (*Bactrocera dorsalis*) & cucurbit (*Bactrocera cucurbitae*), Mediterranean (*Ceratitis capitate*), and etc.

j) Weeds:
1. African Tulip (*Spathodea campanulata*)
2. Lantana (*Lantana camara*)
3. Mile-A-Minute Vine or Makenya (*Mikania micrantha*)
4. Paper Rose (*Operculina ventricosa*)
5. Bronze-Leafed Clerodendum or Februwari (*Clerodendrum quadriloculare*)
6. Pennesetum or "Cat's Tail" Grass (*Pennisetum polystachion*)
7. Merremia or Wachathngal (*Merremia peltata*)
8. Wedelia or Susuwan' (*Wedelia trilobata*)
9. Giant Sensitive Plant or Rachloy' ni Biech (*Mimosa sp.)*
10. Chromolaena *or Thuu in Biech (Chromolaena odorata)*

k) Major Agriculture Pests including pathogens
1. Black Sock Fungus (*Phellinus noxius*).
2. Whitefly (*Aleyrodidae*)
3. Others

10.2 Priority Potential Native Organisms with Pest Tendencies

- Crown of Thorns (*Acanthaster planci*)
- Merremia or Wachathngal (*Merremia peltata)*
- Poison Ivy Tree or Changad (*Semecarpus venenosus*)

10.3 Identify Priority "High Risk" Invasive Species not found in Yap, (High impact on health, biodiversity/ecosystems, property, economy, way of life, and species hardiness).

- Coconut Rhinoceros Beetle (CRB) (*Oryctes rhinoceros*): The aggressive genotype of CRB, CRB-G, is known to be established on Guam, Palau, Oahu, and the Solomon Islands (other genotypes are widespread but are more manageable with viral and fungal biocontrol)
- Brown Tree snake (BTS) (*Boiga irregularis*): established on Guam and native to Papua New Guinea and Australia or other snakes
- Red Imported Fire Ant (RIFA) (*Solenopsis invicta*): Established in the southern US mainland, China, Australia, and Osaka seaport, Japan
- Coconut Rainbow Termite (*Neotermes rainbow*)
- Sea Snake
- Other Fruit Flies
- "High Alert" agriculture pests

10.4 Invasive Currently Under Management (On-going Control Efforts)

- African Tulip (*Spathodea campanulata*)
- Lantana (*Lantana camara*)
- Little-Fire-Ants (*Wasmannia auropunctata*) – **"High Risk"**

10.5 Eradicated invasive species (but they can be easily reintroduced)

- African Snail (*Achatina achatina*) - Eradicated in the early 80's, harvest incentive methods used when it was still in its lag-phase, <$20K over 1 year funded by Yap Government.
- Bird (mayna Bird) - Eradicated in the late 90's, bounty hunting methods used when it was still in its lag phase, <$50K over 2 years funded by Yap Government.
- Cogon Grass (*Imperata cylindrica*) - Eradicated in 2021, mechanical and chemical were used when its early log phase, ≈$1.5+ mil over 21 years funded mostly by USFS and Yap Government.
- Chain-of-Love (*Antigonon leptopus*) - Eradicated in 2021, mechanical & chemical were used when it was in its lag phase, ≈$500K over 13 years, funded mostly by USFS and Yap Government.
- Crocodile (Crocodylus porosus) – Eradicated in 2010, mechanical methods was used when it was still in its arrival phase, <$15K, over 3 weeks funded by Yap Government & FSM R&D.

10.6 Long-Term Management Control Effort (Population Suppression)

- Crown of Thorns (*Acanthaster planci*)……..Mechanical control in the early 80's.
- Mile-A-Minute Vine or Makenya (*Mikania micrantha*)……...Suspended control efforts in early 2000.
- Giant Sensitive Plant or Rachloy' ni Biech (*Mimosa sp.)*……Biocontrol released in the late 90's.
- Chromolaena or Thuu in Biech *(Chromolaena odorata)* …….Biocontrol released in the late 90's.
- Lantana (*Lantana camara*) ……....Biocontrol released in mid-80's.
- Mealybugs (*Paracoccus marginatus*) in Eaurpik ……..Biocontrol released in late 90's.

11. High Priority Actions

Many invasive species that threaten neighboring countries are often absent in the Federated States of Micronesia (FSM), and a number of them are also absent in Yap. This makes it crucial to prioritize the prevention of introducing these invasive species. Both visitors and community members play a critical role by ensuring they do not transport invasive species between islands or locations. They should also cooperate with quarantine officers to help prevent accidental introductions of new pests into the state. Active support and engagement from residents, visitors, and the private sector are necessary to prevent pests from arriving and establishing themselves, as well as to manage those already present. Although government departments and offices typically lead these efforts, they cannot protect the state and manage pests effectively without support from local communities and visitors. Invasive species affect everyone in different ways, and the only effective way to protect the islands and reduce the ongoing impact of these pests is for all of everybody to contribute and work together. This collective problem requires our attention and action. Given the urgency of the situation, several key activities have been identified as top priorities for the years 2025 to 2034. These activities outline the essential steps we can take together to tackle this pressing issue:

- Continue to control LFA and determine if it is possible to eradicate it from Yap State and decide what to do next.
- Prevent LFA from expanding its current range and specifically ensure it does not spread to outer islands.
- Survey outer islands for the presence of LFA.

- Prevent Black Sock/Tree killer Fungus (*Phellinus noxious*) from expanding its range and specifically ensure it does not spread to the outer islands from the main islands where it is established or from other jurisdictions such as Pohnpei, Saipan, Palau, Kosrae, and Guam where it is also established.
- Continue to monitor for other fruit-flies and reduce Mango Fruit-Fly population.
- Continue to eradicate African Tulip and Lantana
- Prevent and strengthen early detection and rapid response capacity to reduce the risk of additional pests such as CRB, BTS, RIFA, Giant African Snail, and other new vector organisms from establishing in Yap State. These species are identified as "High Risk" invasive species and must follow the responding procedures describe in Figure 3 & 4, and prescribe rapid respond activities in appendix 2.
- Identify marine species that can potentially destroy Yap's marine ecosystems.
- Establish and implement management efforts to control the aforementioned marine species.

12. Control Management Efforts

Managing invasive species is similar to addressing hypertension also known as "sneaky silent killer." It is a complex challenge that requires long-term commitment and ongoing support. Invasive species can be elusive and frequently go unnoticed until they start causing significant problems. Their management normally follows a sequence; prevention, early detection and rapid response, established species management efforts along with outreach activities. Different invasive species may require various management methods tailored to their specific biological characteristics, the environmental context of the affected areas, and local cultural norms. It is essential to customize strategies for each targeted invasive species, by careful consideration of its biological characteristics and tolerance limits, the lifestyles of local communities, the availability of funding, and commitment from all involved partners. The management process should start with public education to build trust, raise awareness, and empower people. This effort should continue throughout the treatment plan for each species being targeted.

12.1 Outreach and Awareness Program

In Yap, where over 95% of land and coastal waters are privately owned, outreach and awareness programs are vital for the effective management of invasive species. The program must inform the public about the invasive issues, the YIST targeted invasive species, build support for control measures, and influence individual behaviors. The goal is to encourage behavioral changes and limit the movement of people or goods to and from infested areas, thereby helping to restrict its spread. It should promote the adoption of responsible practices that urge the public to report sightings of invasive species and/or symptoms. The program must educate the public about the threats posed by invasive species, prescribe a control treatment plan for the target species, and encourage individuals to take action to prevent their spread. Furthermore, the outreach and awareness works should encourage the public to comply and help enforce the prescribed control efforts. Empowering individuals is critical in addressing the growing ecological, social, and economic threats posed by invasive species. In essence, it is crucial at all levels of invasive management and must be an ongoing effort throughout the control management of each of the targeted species and implementation of this plan.

12.2 Biosecurity/Quarantine Measures (Prevention)

Biosecurity is a responsibility of the Government of the Federated States of Micronesia (FSM). The FSM government has developed a biosecurity plan that focuses on preventing invasive species and harmful organisms from entering the country. The plan prioritize the main island of Yap but neglecting outer islands ship, yacht, and small airplane entry points. It includes measures such as risk assessments and border security. To implement this plan, the FSM's quarantine services enforce specific biosecurity measures that isolate and treat potentially harmful species or imported goods. These actions help prevent the arrival of invasive species, limit their spread, and restrict the movement of goods that may carry pests or infectious pathogens. This proactive approach is the most

economical and safest way to manage invasive species. Taking early action to prevent the introduction and spread of invasive species, pests, and pathogens is far more effective and cost-efficient than trying to control them after they have already established themselves. Once these organisms pass through the quarantine barrier, it becomes the responsibility of the State to detect and respond to them. However, this task can be costly and requires a long-term commitment, forcing mandated agencies to seek significant external assistance in terms of funding, resources, and expertise for effective management. Unfortunately, such assistance is not always guaranteed, which can lead to delays in responding to sightings.

12.3 Responding to Invasive Sighting or Reporting

12.3.1 Stage 1: Initial Identification & Delimiting Survey

Reports concerning terrestrial invasive species and their symptoms should be directed to the Division of Agriculture and Forestry (DAF). In contrast, reports related to marine invasive species should be submitted to the Marine Resources Management Division (MRMD) office in Colonia, Yap. Any species that may act as vectors for pathogens affecting humans should be reported to Environmental Health Services (EHS). Locally based Technical Specialists, including the State invasive coordinator and the Yap-FSM Quarantine Officer in Charge, along with specialists from MRMD or EHS, will visit the reported/identified potentially infested site to conduct a preliminary diagnosis. They will collect specimens when possible and take photographs of the suspected damage and symptoms. If the detection of an invasive species is confirmed, the Chief of DAF, MRMD, or EHS must be notified on the same day. Photographs of the pest and the associated damage will then be forwarded to overseas specialists, whose contact information can be found in Appendix 1. A follow-up survey is necessary to assess the extent of the infestation. Local specialists from the Crop Development/Extension Service, Forestry, Invasive Species Taskforce, FSM Quarantine Office, and experts from MRMD or EHS will carry out the survey. They will mark the site and quarantine it, ensuring that GPS waypoints and coordinates are recorded. Once an infested area is identified and assessed, a 100-foot buffer zone will be established around each infested area to clearly define its boundaries.

In addition to site assessment, the invasive species will be evaluated based on its biological characteristics and the type and level of threat it poses. This assessment will help determine its potential invasiveness and risk level. Following this evaluation, a feasibility decision will be made on whether it is possible to eradicate the species, manage its population growth, or take no action at all. This decision will be made by the members of the YIST, the Chiefs of DAF, MRMD, or EHS. If action is deemed necessary, it will be clear whether to initiate treatment aimed at eradication or to implement measures to control or reduce the population size to acceptable levels. Species ranked “Low- to medium-risk” will be managed by either the Chief of DAF, MRMD, or EHS, depending on whether the species is terrestrial, marine, or a vector for pathogens (see Figure 3). If a species is classified as "High Risk," the management responsibility will shift to the Director of the Department of Resource Development (DDRD) or the Department of Health Services (DDHS), who will recommend declaring a "State Invasive Species Emergency," thereby initiating the second phase of the response (see Figure 4).

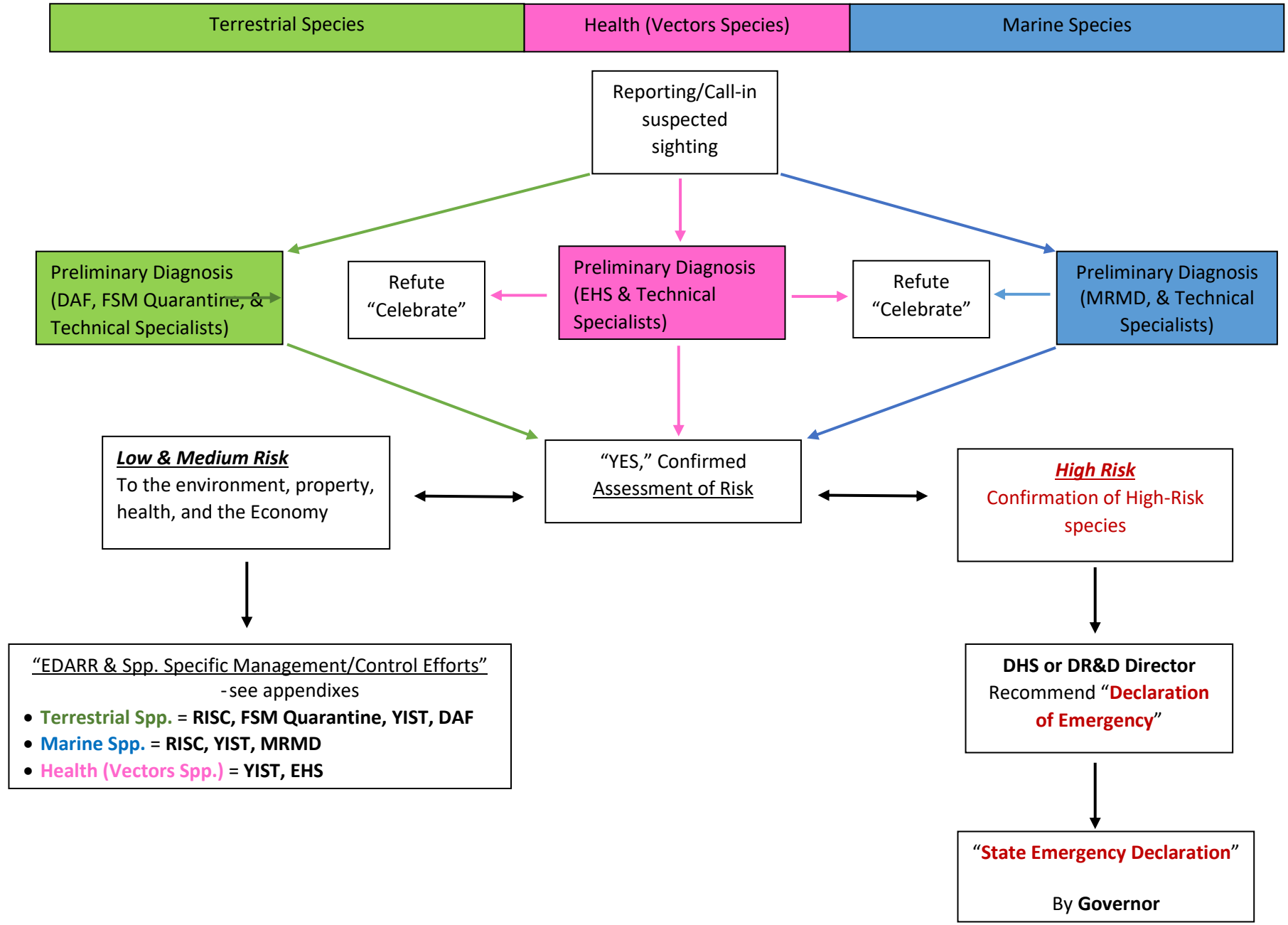


Figure 2. The Framework of responding to reported potential invasive species.

12.3.2 Stage 2: Activation of the Emergency Respond Plan/Management Team for "High Risk" Invasive Species (State Emergency Declaration)

Based on the recommendation and strategy developed by the Technical Specialists, the Chief will inform the DDRD or DDHS of a confirmation of a "High-Risk" targeted invasive species. The director informs the Governor to initiate necessary Act(s) and procedures to declare a "State Invasive Species Emergency." Once it is declared, the DDRD or DDHS immediately activates the IEAC and other relevant agencies to review the situation and recommend a response operation. The DDRD or DDHS automatically becomes the Chair of the IEAC and its Chief will automatically become the Operations Manager/HQ Controller (Incident Commander) who will mobilize field teams according to set procedures. Operations will be conducted according to the advice of the Advisory Committee. Field response operations will be divided into the following areas of activities:

- Operations / HQ management
- Logistics / Administration
- Mapping
- Surveillance/monitoring, trapping, ground service
- Movement control (quarantine of infested sites)
- Feasibility decision-making (eradication, population control, or no action)
- Treatment (mechanical, chemical, biological, traditional/cultural strategies, intergraded pest management/long-term management)
- And then Stand-down

12.3.2.1 The Roles and Functions of the State Invasive Emergency Declaration Team Member.

The team members are responsible for coordinating all aspects of invasive species emergency management within the state. This involves collaborating with various stakeholders to ensure a comprehensive and effective response to the negative impacts of the species. The primary duty is to coordinate and integrate all activities related to mitigating, responding to, and recovering from the effects of "High Risk" invasive species. Figure 4 shows the key partners and agencies involved in managing the State Invasive Emergency. Additionally, Table 3 outlines the management structure, detailing the functions and responsibilities of each member, as well as the main management team responsible for overseeing the management of the "High-Risk" species.

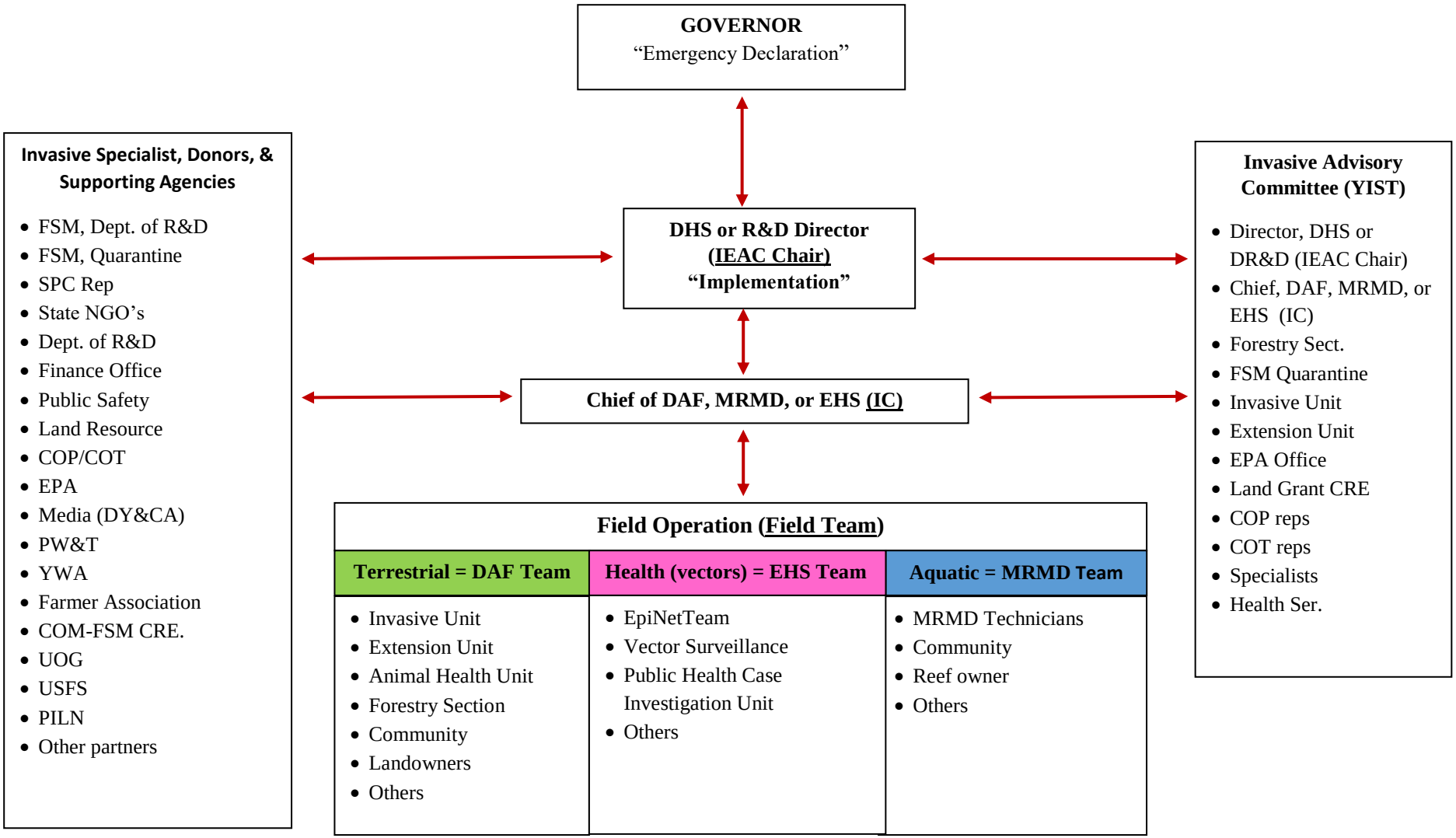


Figure 3. The State Emergency Declaration Framework.

Table 3. The Roles and Specification Functions.

POSITION	FUNCTIONS AND RESPONSIBILITIES
Governor	• The ***Governor of Yap*** on advice from the Directors plays a lead role in the implementation of the Emergency Respond Plan (ERP). The Governor declares a "State Emergency" and initiates the necessary Emergency Acts. • Provides State resources. Approves external resources
Director of Resources and Development or Health Services	• The **Director of R&D or HS** reports to the Governor, chairs the Invasive Emergency Advisory Committee *(IEAC),* and then call a meeting. • Supports YIST recommended activities by liaising between the Chief of DAF, MRMD, or EHS and the Governor, and other Government Offices including the National Government.
Chief of DAF, MRMD, or EHS	• The **Chief of DAF, MRMD, or EHS** is appointed at the declaration of a response by the Directors as the *Operations Manager/Incident Commander (IC)* to implement the ERP. • Supports field operation by managing appropriate response groups. Reports to the Director of R&D or HS, and authorities. • Requests support from the state/national government, stakeholders, community, and/or leaders. • He/she is the Operations Manager/Incident Commander (IC) and will be responsible for the entire operation. He/she is required to: 1) Manage and oversee the program and entire operation (including expenditures, compilation, and storage of records). 2) Provide feedback to the IEAC on the progress of the program. 3) Notify other government agencies, non-government organizations, and stakeholders, on implications of action taken such as environmental impact (chemical, slaughter of animals, dumping and burning), human health, and social and economic issues. 4) Responsible for administering restrictions on the movement of people, machinery, plant or plant material/product, animal or animal product, and the sale of such products according to appropriate legislation. The Operations Manager should liaise with the EPA and other governmental agencies if required. 5) Consulting with the Advisory Committee to determine whether the closure or quarantine of the infested area should be enforced and coordinating with the relevant government agencies and communities. • May create ***a Logistics Group*** responsible for the supply of the resources and the provision of a budget that includes, but is not limited to, the following: 1) Human resources (salaries, benefits, overtime) 2) Accommodation, meal allowances 3) Transportation & fuel and spare parts (mobilization of staff and equipment by land and sea) 4) Equipment & Supply for the response (i.e., traps, pheromones, safety equipment) 5) Office Supplies 6) Loss compensation – appropriate compensation payment for destroyed crops animals or any materials affected by the outbreak.
Specialists, Institution, APHIS, USFS, SPC, SPREP	• Accompany the lead/Field Agencies or receive collected sample/photo to confirm and recommend plan (control efforts) to address the targeted invasive.
Support Agencies	• Reports to Lead Agency. Responds to requests to provide resources and/or technical knowledge. Gathers information to support operations.
Invasive Emergency Advisory Committee (IEAC)	• Should be based on personnel holding a key responsible area from all authorities and agencies involved in the emergency/outbreak or who can contribute to its resolution. • Representatives need to be of sufficient authority to be able to make decisions on behalf of their organization. The IEAC will make decisions on what actions to take according to reports received on the outbreak. • The committee makes decisions and recommendations. Advises on operations of field teams, and Directors & Chiefs.

	• Supports field operation. Ensure that appropriate and sufficient supplies and equipment are stored for emergency use.
FSM Quarantine Officers (Yap Office)	• Quarantine Officers will ensure that ships leaving for the Yap outer islands follow all recommended procedures. • Along with State Police enforced quarantine zone(s). • Involved in survey and assessment of infested site(s).
Field Team Supervisor, Invasive Coordinator	• Informed the Incident Commander of progress, challenges, and accomplishments. • **Immediate Actions:** 1) Delimiting Survey including but not limited to GPS/GIS mapping and site description 2) Assisting the Chief in contact regional experts, e.g. SPC, UOG, USFS 3) Determine from EPA if the selected pesticides can be used or allowable. 4) Collect samples, and Send photos and details to Pest Net and others 5) Outreach (Press Release & Develop, print, and distribute flyers in the local community) 6) Define quarantine zones and other measures, and know who will enforce them, and how they will be enforced 7) Local area, community meetings 8) Development of budget for emergency response action 9) Pest Alert and ask for assistance 10) Establish incident command headquarters 11) Sanitation of infested area and an outside perimeter (buffer zone) to slow down the spread. • Manages daily containment and eradication activities within the response zone. The duties include: 1) Deliver field response operations as specified by OM/IC and IEAC. 2) Assess personnel requirements and establish the support team. 3) Liaise and coordinate activities with the OM/IC. 4) Carry out contingency plans for the outbreak. 5) If necessary, request recruitment of casual labor, keep records of all field staff employed in the operation, and submit pay sheets to the administration group. 6) Suggest improvements to the Incident Command and technical advisors. 7) Compile reports as required. • **Long-term Actions:** (If immediate attempts at eradication fail) 1) Biocontrol (seek assistance from SPC, UOG, USFS, and other partners) 2) Sanitation efforts continue 3) Outreach efforts 4) Assisting in secure funding for long-term effort 5) Adaptation plan and integrated pest management 6) Modify Quarantine zone as needed 7) Continue to operate a surveillance program (delimiting survey, monitoring, and evaluation).

12.4 Early Detection and Rapid Respond (EDARR)

Yap is more vulnerable and is at risk of the introduction of High-Risk invasive species (CRB, RIFA, BTS, etc…) because of the regular traffic by air and sea. State ability to detect and respond rapidly to new invasive species or new infested area(s) is critical. It is the best way to manage invasive species. It is important to act swiftly to limit the species dispersion and prevent their adverse impacts. EDARR is crucial for invasive management because, it significantly increase the chance of successfully eradicate or contain the impacts of invasive species in comparison to widespread infestations. Appendix 2 outlines the activities that must be undertaken to implement EDARR effectively to control the effects of newly arrived species or identified infested areas. The activities will be adjusted according to the findings after each evaluation of the implemented activities. In appendix 3 also is the

EDARR for the Coconut Rhinoceros beetle species that has not arrived yet in Yap. It is most effective and cost-efficient when awareness and outreach are effectively implemented building up both citizen and community contributions. Through citizen science initiatives and community-led surveillance programs, the public can helped with monitoring, detecting, and assisting in managing invasive species, which can be challenging due to their widespread distribution, private lands and reefs, potential for rapid spread, and limited resources such as personnel and funding. These are the key factors, in addition to commitments, to YIST's success in eradicating five invasive species from Yap.

12.5 Treatment and Monitoring Efforts

Each selected species requires a specific treatment plan due to its unique biological characteristics and the uncertainties involved in managing invasive species. The treatment plans for species chosen by YIST are detailed in Appendix 4. These plans serve as guidelines and will be adjusted and refined as we learn more about how each species responds to treatment. Each plan is tailored to a specific species and outlines strategies for managing invasive species that have already established themselves and those categorized as "High-Risk" invasive species that have not yet arrived. Successfully managed species will be removed from the appendix, while any newly confirmed established species will be assessed, and their corresponding treatment plans will be added. The treatment methods described in the plans include containment, outreach, mechanical, and chemical approaches. For species that cannot be eradicated, long-term management is recommended such as mechanical, biological methods, or cultural strategies[2]. In some cases a combination of these approaches (known as integrated pest management), may be the best option.

Monitoring and data collection of the prescribed treatment plan are essential. It is important to track and record progress, identify potential obstacles, evaluate infestation levels, assess the extent of the infested area, and document the resources used (such as person-hours and pesticides) at each infested site. After the initial treatment, it is crucial to reassess the targeted species, evaluate the activities implemented, and make any necessary adjustments. Conducting periodic surveys of the treated areas and surrounding locations is vital. These surveys should assess the success of the treatment, identify any issues with the control methods used, and enable adjustments as needed to ensure effectiveness.

12.6 Restoration of Treated Infested Sites.

Restoration may not be necessary for all affected sites. Therefore, before starting any restoration activities, it is essential to conduct a thorough assessment of the treated site(s) to determine whether restoration is needed and to incorporate it into the species-prescribed treatment plan. After removing an invasive species from an infested area, the site is often left degraded or bare, making it highly vulnerable to reinvasion by other unwanted organisms, erosion, or nutrient leaching. If there is a need for restoration, it should begin as soon as possible to minimize environmental degradation and other negative impacts. The primary goal is to restore the function and biodiversity of the ecosystem that have been compromised. Efforts should focus on returning the habitats to their pre-invasion state after controlling the invasive species, as well as creating environments that are less susceptible to future invasions or degradation. This may involve replanting native species, introducing pest-resistant species, and/or restoring soil, coral reefs, or seagrass beds.

[2] Involve practices such as substituting native species with resistant ones, and modifying or halting certain traditional practices, etc...

Appendix 1: Technical Assistance Contact Information

Name	Role in Control/eradication	Agency	Contact	
			Phone	E-Mail
Francis Itimia	• Support activity and mobilize funds	Governor of Yap State	350-2108	-----
Bernard Gorong Theo Thinnifel	• Reports to the Governor and media. • **Advisory Committee chair**	Director of R & D Director of HS	350-2182 350-2110	
Tamdad Sulog, Anthony Yolon, or Charlene Laamtal	• Reports to Director R & D or HS • He is the **Operations Manager** /Headquarter Controller	DAF Chief MRMD Chief EHS Chief	350-2183 350-2350 350-2110	
DAF (Francis Liyeg) MRMD (Anthony Yalon) EHS (Maxshelton Talimelipiy) Public Work (Giltug) COP (Chairman) COT (Chairman) Andrew Fagolur EPA (Shane Sopluw)	**Field Team Manager/Commander**, duties and also reports to the Operational Manager H/Q • Delimiting survey • Trapping • Photograph • Flagging • Treatment • Clean-up campaign	Yap DAF Yap MRMD Yap EHS Public Work COP COT Quarantine EPA	320-2183 350-2350 350-2110 350-2175 350-2304 350-2343 350-2116 350-2317	
TBD or assigned an administrative officer(s).	**Logistics and Administration** • Salaries & wages overtime and allowances. • Transportation and equipment • And supplies	DAF MRMD EHS	350-2183 350-2164 350-2110	
Youth & Civic Affairs (Director)	**Media** • Inform the public and ask for cooperation and follow recommendation	Media Div.(V6AI)	350-2174	
John Waayan	**Mapping** • Mapping of sites, GIS map	Land Resources	350-2164	
DAF (Francis Liyeg) Quarantine (Andrew Fagolur) EHS (Maxshelton Talimelipiy) MRMD (Anthony Yalon) Police (Chief) COP (Chairman) COT (Chairman)	**Quarantine & Containment** • Prevention of movement and/or spread of the "High-Risk" invasive species. • Closure and Quarantine of "High-Risk" infest areas	Agriculture Yap Quarantine Office Env. Health Serv. Marine Resource Public Safety COP COT	350-2183 350-2116 350-2110 350-2350 350-2132 350-2304 350-2343	
US Forest Services (Stacy Hisinuma) US Forest Services (Stacy Clark) SPREP (Dave Moverley) Total Chemical in Guam (Rose Pelkey) Main FSM Quarantine Office (John Wechep) Mr. Maclean Vagalo, Mr. Tony Gunua Luisa Korodrau,	**Technical and Specialist** Plant & Pest that impact forest Forest Health & Pesticides Plants and Rodents Closest supplier of pesticides, safety gears FSM Quarantine Specialist SPC Entomologist SPC Plant Pathologist, SPC Biosecurity	US Forest Services US Forest Services SPREP Total Chemical Supplier FSM R&D SPC SPC SPC		stacy.hishinuma@usda.gov stacey.clark@usda.gov davidm@sprep.org rpelkey totalchemical.com jwichep@rd.gov.fm MacleanV@spc.int TonyG@spc.int LuisaK@spc.int

Appendix 2. Early Detection and Rapid Response (EDARR)

EDARR Model for Newly Arrived Priority Species or Infested Area(s)					
Goals	**Objectives**	**Project/Activities**	**Outputs/Measures**	**Outcomes**	**Lead/Partners**
Respond swiftly to eradicate or control their population and spread.	To control the impacts (ecological, economic, and social) of the newly arrived invasive species by identifying them early and responding quickly to control or eradicate them	• Follow the procedures describe in Figure 3 &4. • Conduct outreach and awareness activities to engage communities and businesses. • After a Feasibility Decision Making is done, inform relevant partners such as land/reef owners & communities, COP & COT, and etc… • Delineation of infested site, always add 100 ft. buffer zone at each of the demarcated infested site. • Containment • Resurvey for additional infested site(s) • Treatment plan (spp. Specific) 1) Eradication - Chemical - Mechanical - Prescribe burning - or combination 2) Population Growth/Size Control (Long-Term Management) - Cultural strategies - Biological control - Integrated Pest management - Chemical - Mechanical - Prescribe burning - or combination • Monitoring and Evaluation • Restoration (if needed) • Recording Keeping & Reports	• Choose and apply the best methods. • No. of communities and businesses engaged in the control program • Resources use per site per day • Total area impacted & treated area covered	• Increase participation of the communities and business • Less impacts of targeted species observed • Reduced species encounters • Successful eradication or long-term population growth management.	YIST Members and USFS, SPC, FSM R&D, SPREP, DR&D, MRMD, DAF, DHS/EHS, EPA, Public Safety, COP, COT, and other partners

Appendix 3. Coconut Rhinoceros Beetle "CRB" (*Oryctes rhinoceros*) RAPID RESPOND PLAN

"HIGH-RISCK" INVASIVE THAT HAS NOT ARRIVED IN YAP YET!					
1. Terrestrial Invasive Species Eradication Program: Coconut Rhinoceros Beetle "CRB" *(Oryctes rhinoceros)*					
Goals	**Objectives**	**Project/Activities**	**Outputs/Measures**	**Outcomes**	**Lead/Partners**
• Respond swiftly to eradicate or control their population size and spread.	• To control the impacts (ecological, economic, and social) of the newly arrived CRB by identifying them early and responding quickly to control or eradicate them	• Follow the procedures describe in Figure 3 &4. • Conduct outreach and awareness activities to engage communities and businesses. • After a Feasibility Decision Making is complete, inform relevant partners such as land/reef owners & communities, COP & COT, etc… • Resurveying for additional infested sites. • Delineation of infested site, always add 100 ft. buffer zone at each of the demarcated infested site. • Prevention plan: - Prevention of ships leaving and loading at night. - Containment • Treatment plan: 1) Eradication - Chemical (trapping) - Mechanical (netting & sanitation) - Prescribe burning - or Combination 2) Population Size Control (long-term) - Cultural strategies - Biological control - Integrated Pest management - Chemical - Mechanical - Prescribe burning • Monitoring and Evaluation • Restoration (if needed) • Recording Keeping & Reports	• Choose and apply the best methods. • No. of communities and businesses engaged in the control program • No. of treatment per month • Treated area covered • Resources use per site per day • Total area impacted & treated area covered	• Increase participation of the communities and business • Less impacts of CRB observed • Reduced CRB encounters	YIST Members and USFS, SPC, FSM R&D, SPREP, UOG, and other partners

Appendix 4: Work Plan for Targeted Invasive Species

1. Terrestrial Invasive Species Eradication Program: <u>African Tulip (*Spathodea campanulata*)</u> <u>Risk Level: Low to Medium</u> (Impact on health, biodiversity/ecosystems, property, economy, way of life, and species hardiness)					
Goals	**Objectives**	**Project/Activities**	**Outputs/Measures**	**Outcomes**	**Lead/Partners**
To protect and preserve biodiversity/ ecosystems, property, economy, and way of life.	Eradication of African Tulip Tree from Yap State	Surveillance/surveying	• Initial survey (Areas survey) • Delineation of infested site, always add 100 ft. buffer zone at each of the demarcated infested site. • Resurveying for additional infested sites.	Impacted Areas completely delimited and resurveyed and associated maps are made	DAF, YIST, RISC SPC, SPREP, USFS, Public
		Conduct outreach and awareness activities to engage communities and businesses.	Number of outreach conducted, people, or communities complying	Increase in the number of Public informed and better cooperation	
		• Prevention/containment • Treatment plan: 1) Eradication - Chemical (Garlon-4)	• Percentage or number of areas treated and monitored. • Resources use per site per day • No. of communities and businesses engaged in the control program • Treated area covered • Total area impacted & treated area covered	• Increase in number of abiding residences • decrease areas monitored and areas treated	
		MOP-UP Operation conducted.	Reduction in number or the size of seed banks or regrown per site	Eradication of African Tulip	
		Success story report	Public informed	Declaration of Successful eradicate African Tulip from Yap	
2. Terrestrial Invasive Species Eradication Program: <u>Lantana (*Lantana camara*)</u> <u>Risk Level: Low to Medium</u> (Impact on health, biodiversity/ecosystems, property, economy, way of life, and species hardiness)					
Goals	**Objectives**	**Project/Activities**	**Outputs/Measures**	**Outcomes**	**Lead/Partners**

To protect and preserve biodiversity/ ecosystems, property, economy, and way of life.	Eradication of lantana from Yap State	Surveillance/surveying	• Initial survey (Areas survey) • Delineation of infested site, always add 100 ft. buffer zone at each of the demarcated infested site. • Resurveying for additional infested sites.	Impacted Areas completely delimited and resurveyed and associated maps are made	DAF, YIST, RISC SPC, SPREP, USFS, Public
		Conduct outreach and awareness activities to engage communities and businesses.	Number of outreach conducted, people, or communities complying	Increase in the number of Public informed and better cooperation	
		• Prevention/containment • Treatment plan: 1) Eradication - Chemical (Garlon-4) -Mechanical (Hand pulling)	• Percentage or number of areas treated and monitored. • Resources use per site per day • No. of communities and businesses engaged in the control program • Treated area covered • Total area impacted & treated area covered	• Increase in number of abiding residences • decrease areas monitored and areas treated	
		MOP-UP Operation conducted.	Reduction in number or the size of seed banks or regrown per site	Eradication of Lantana	
		Success story report	Public informed	Declaration of Successful eradicate Lantana from Yap	
3. Terrestrial Invasive Species Eradication Program: "Paper Rose" (*Operculina ventricosa*); Bronze-Leafed Clerodendum or Februwari (*Clerodendrum quadriloculare*); "Cat's Tail" Grass (*Pennisetum polystachion*); Merremia or Wachathngal (*Merremia peltata*); Wedelia or Susuwan' (*Wedelia trilobata*); Giant Sensitive Plant or Rachloy' ni Biech (*Mimosa invisa*) **Risk Level: Low to Medium (Impact on health, biodiversity/ecosystems, property, economy, way of life, and species hardiness)**					
Goals	**Objectives**	**Project/Activities**	**Outputs/Measures**	**Outcomes**	**Lead/Partners**
To protect and preserve biodiversity/ ecosystems, property,	Develop effective management strategies	Conduct research on the control methods	Efficient control methods in place	Management strategies completed and control tools in place	DAF, YIST, RISC SPC, SPREP, USFS, Public
		Conduct delimiting surveys for all species.	Known range extent for each species	Delimiting surveys completed for each species	
		Conduct research on control methods and feasibility study	Efficient control method in place	Decrease in percentage	

economy, and way of life.	Engage communities in management efforts.	Public awareness and community involvement	Public supports and actively cooperates with control effort	Number of communities involved	
	Reduce ranges of at least 3 species	Implement management strategies	Decreased presence of 3 or more species	Reduced impacts from these species	
4. Health Vector Invasive Species Eradication Program: Rat (*Rattus norvegicus*)					
Goals	**Objectives**	**Project/Activities**	**Outputs/Measures**	**Outcomes**	**Lead/Partners**
To protect and preserve biodiversity/ecosystems, human health and welfare, and food security	Survey and prioritize other islands for possible rat eradication projects	• Survey and identify the island to do the project. • Conduct pre and post-bio surveys	• Pre and post-bio surveys and population monitoring data • Pretreatment population size	Island has been selected and works begin	YIST, RISC, Public DHS, Yap EPA
	Notify and educate the public.	Conduct public awareness	• No. of communities involved • No. of outreach conducted	• Community participation • Communities voluntarily support the project	
	Eradicate rats from at least one outer island	• Determine the best control methods • Implement control methods, surveys/evaluate, and refine • Monitor population size	• No. of traps or resourced used • Areas treated	• Decrease in the population size • Healthy reef & the biodiversity • Less rat related health issues • Evidence of absence of rats	
7. Health Vector Invasive Species Eradication Program: Rat (*Rattus spp.*)					
Goals	**Objectives**	**Project/Activities**	**Outputs/Measures**	**Outcomes**	**Lead/Partners**
To protect and preserve biodiversity/ecosystems, human health and welfare, and food security	Control program in place in Yap Proper	• Outreach and engagement of local communities and businesses • Inform the public of the best methods to use and engage their involvement	No. of communities and businesses engaged in the control program	Community and businesses participating	YIST, RISC, Public DHS, Yap EPA
	Reduce the population of rats on Yap	• Determine the best control system and Implement control program • Implement control methods, surveys/evaluate, and refine • Monitor population size	• No. of traps or resourced used • No. of treatment per month • Treated area covered	• Less incidence of rats in households • Reduced rodent encounters • A long term treatment plan is developed	
8. Terrestrial Invasive Species Control Program: Feral Cats and Dogs					
Goals	**Objectives**	**Project/Activities**	**Outputs/Measures**	**Outcomes**	**Lead/ Partners**
To protect and preserve terrestrial	A public education/ awareness program in place to decrease	Support yearly one-week animal clinics	Healthier animals increased public health and decreased the number of feral cats and dogs.	Fewer feral cats and dogs	DAF, EHS, YIST, RISC, SPC, Public

biodiversity, human health and welfare, and food security	the number of feral cats and dogs	Develop awareness materials and conduct community meetings	Decreased the number of feral cats and dogs through improved awareness	Number of awareness activities yearly	COM DHS DPS Yap EPA
		Conduct public awareness	Community participation	Number of communities involved	
9. Aquatic Invasive Species Control Program: <u>Tilapia (*Oreochromis mossambicus*)</u>					
Goals	**Objectives**	**Project/Activities**	**Outputs/Measures**	**Outcome**	**Lead/ Partners**
To protect and preserve marine biodiversity by controlling and managing tilapia	Assess distribution and population	Conduct surveys	Number of surveys conducted	More info. Is known about its distribution & population	YIST RISC SPC USFS MRMD Yap EPA
	Develop appropriate control mechanisms.	Find and test different control methods	Effectiveness of control methods developed	Control methods developed	
	Public awareness program in place	Developed awareness materials and conduct community meetings	Number of communities involved	Decreased number of tilapias through improved awareness	
10. Aquatic Invasive Species Control Program: <u>*Crown of Thorns (Acanthaster planci)*</u>					
Goals	**Objectives**	**Project/Activities**	**Outputs/Measures**	**Outcome**	**Lead/ Partners**
To protect and preserve marine biodiversity	Assess the status of the Crown of Thorns	Conduct surveys	Number of surveys conducted	Better knowledge of distribution & density	YIST RISC SPC MRMD Public Yap EPA
	Develop appropriate control mechanisms.	Find and test different control methods.	Effectiveness of control methods developed	Control methods developed	
	Public awareness program in place	Develop awareness materials and conduct community meetings	Number of communities involved	Decreased numbers through improved awareness	
11. Aquatic Invasive Species Control Program: <u>Corallimorph</u>					
Goals	**Objectives**	**Project/Activities**	**Output/Measures**	**Outcome**	**Lead/Partners**
To protect and preserve marine biodiversity	Assess the status of Corallimorph concentration on coral reefs	Conduct surveys in reefs with high corallimorph concentration	Better knowledge of distribution & density	Number of surveys conducted	MRMD, YIST RISC YapCAP, Yap EPA
	Developed appropriate control mechanisms	Find and test different control and mitigation methods	Control methods developed	Effectiveness of control methods developed	
	Public awareness program in place	Developed awareness materials and conduct community meetings	Decreased numbers through improved awareness	Number of communities involved	

12. Terrestrial Invasive Species Eradication Program: Little-Fire-Ants (*Wasmannia auropunctata*) "HIGH RISK"					
Goals	**Objectives**	**Project/Activities**	**Outputs/Measures**	**Outcomes**	**Lead/Partners**
To protect and preserve biodiversity/ecosystems, human health and welfare, and food security.	To control the impacts (ecological, economic, and social) of LFA by identifying them early and responding quickly to control or eradicate them	• Conduct outreach and awareness efforts. • Interview & resurvey for additional infested sites. • Delineation of infested site, always add 100 ft. buffer zone at each of the demarcated infested site. • Prevention plan: - Containment - Prevent it from getting off island • Treatment plan: 1) Eradication - Chemical (Tango, Provaunt, and Siesta) treats ants on the ground, underground, and arboreal ants once a month or according to the pesticide back-label. -Bush clearing/establishing a 10 ft. gridline over each of the infested sites for monitoring and evaluation - Mechanical (sanitation) - Prescribe burning - or Combination 2) Population Size Control (long-term) - Cultural strategies - Biological control - Chemical - Mechanical - Prescribe burning - Integrated Pest management • Monitoring and Evaluation • Restoration (if needed) • Recording Keeping & Reports • Stay in touch with off island experts and institutions for new developments and technologies.	• Choose and apply the best methods. • No. of communities and businesses engaged in the control program • No. of site treatment per month • Reduction on the number and area of infested site. • No. of infested site • Amt. of resources used per site	• Increase participation of the communities and business • Less impacts of LFA observed • Reduced LFA encounters	DAF YIST RISC SPC, SPREP USFS, UOG, UH Manoa, FSM R&D, Yap EPA,