



Micronesian Fish Species Fact Sheets

A Tool for Sustainable Fisheries Management

 <p>Fitishu <i>Chuukese</i> Hyok <i>Chamorro</i> Kwi <i>Kosraean</i> Kwi <i>Marshallese</i> Belai <i>Palauan</i> <i>Pohnpeian</i> Wolol <i>Yapese</i> Lined surgeonfish <i>English</i></p>	
<p>SPAWNING CONSIDERATIONS <i>Recommended to protect spawning locations and times</i></p> <p>Time Closures No clear time closures based on existing scientific knowledge</p> <p>Area Closures Consider creating a protected area at spawning sites</p>	<p>LOCAL KNOWLEDGE Where and at what time of the year and/or moon phase does this species spawn in your area?</p> <p>Are the habitats for these species protected?</p> <p>Is there a no-take zone large enough to protect this species?</p>
<p>PREFERRED MANAGEMENT OPTIONS</p> <p>No-Take Zones Protected areas that are large enough to meet the movement needs of target species allow individuals to grow to adults and reproduce successfully.</p> <p>Species of no concern Additional management actions outside of no-take zones may not be currently needed given healthy populations. Continue monitoring to identify any potential changes on status.</p> <p><i>See reverse side for details.</i></p>	<p>REGIONAL STATUS NO CONCERN No evidence of compromised populations</p> <p>VULNERABILITY LOW</p> <p>LOCAL STOCK ASSESSMENT (SPR) N/A</p>
<p>LOCAL KNOWLEDGE How has your local population of this species changed over time?</p> 	<p>HABITATS NEEDED <i>Recommended to protect all important habitats for this species</i></p> <p>Coral reefs</p> <p>SIZE AT MATURITY: 7 inches</p> <p><i>Recommended minimum size: 9 inches</i></p> <p>HOME RANGE: 0.06 miles</p> <p><i>Recommended to double home range for minimum no-take zone size: 0.1 miles</i></p> <p>COMMERCIAL VALUE</p> <ul style="list-style-type: none"> • 3.6% of all commercial landings regionally • Average \$380,500 per year to the economy <p>CLIMATE BENEFITS</p> <ul style="list-style-type: none"> ✓ Herbivore • They graze on seaweed • Key for maintaining coral reef health in the face of climate change and other stressors



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Background

Micronesia has seen a drastic decline in coastal fisheries over the past decades, negatively impacting livelihoods, food security, and cultural identity. As society shifted to a cash-based economy with modern technology, such as new fishing gears and refrigeration, traditional ecological knowledge and practices are getting lost over time. This led to the rise of unsustainable fishing practices (e.g., night-time spearfishing, taking undersized fish) and over-harvesting of resources causing sharp declines in populations and reduction in the sizes of many fish species.

Much of the conservation efforts over the past 20 years in Micronesia have focused on using spatial management as a primary means to address fish population and biodiversity declines, including installing No Take Zones. Scientists recommend that the size of no take zones should be at least double the size of the home range of the target species. However, large no-take no take zones are not very feasible in Micronesia as many sites have been designed at a small community scale. It has been recognized in recent years that many of these sites are too small to provide adequate protection to improve the populations of many locally important marine species or support sustainable fisheries. Even if no take zones are large enough and properly enforced, excessive fishing pressure outside these areas can diminish fish populations. As such, additional management measures may be needed to maintain healthy populations and fisheries of targeted species.

Consequently, conservation practitioners and the communities they serve are increasingly looking at developing locally managed areas that incorporate zoning and rule development across a larger area of water. Additionally, there is increasing interest in developing improved fisheries management policies to address areas not covered within protected areas. This evolution is demonstrated in the Micronesia Challenge 2030 goals of effectively managing at least 50% of marine resources (now for the whole EEZ) and 30% of terrestrial resources across Micronesia and incorporating regional and jurisdictional fisheries management approaches integrated with no take zones. Many communities and governments are now looking for ways to integrate better fisheries management approaches into policy, planning, and spatial management design. While foundational science and stock assessments have become more prevalent across the region, tools to help translate those into actual management still need to be improved.

This introductory document and associated species fact sheets aim to fill this management need and provide much-needed guidance for managers and practitioners who work with communities to support fisheries management. It offers critical fisheries information tailored for Micronesian fisheries and their management needs that can help

community engagement and sound decision-making in a visual and user-friendly manner that supports the efforts of local practitioners and communities.

Using these fact-sheets in community planning

These species fact sheets were designed to support management decision-making, including at a community level. More guidance on a participatory community process can be found in the following document: [Designing Effective Locally Managed Areas in Tropical Marine Environments: A Facilitator's Guide to Help Sustain Community Benefits Through Management for Fisheries, Ecosystems, and Climate Change](#).

This tool guides community facilitators to lead the design of locally managed areas, including:

- Outreach to understand critical ecological and social factors that contribute to healthy and abundant resources, and the latest science-based recommendations for managing resources so they are healthy, abundant, and resilient; (some examples shared below), and
- Planning steps to develop zones and rules for LMAs to build long-term healthy, abundant, and resilient coastal and marine resources.

Designing Effective Locally Managed Areas
in Tropical Marine Environments



A Facilitator's Guide to Help Sustain Community Benefits
Through Management for Fisheries, Ecosystems, and Climate Change



CORAL TRIANGLE
INITIATIVE
ON OCEAN RESILIENCE, LIVELIHOODS, AND FOOD SECURITY

A publication supporting the Coral Triangle Initiative on
Coral Reefs, Fisheries and Food Security (CTI-CFP)
www.coraltriangleinitiative.org

These fact sheets complement this community process by providing critical scientific information about target species in one place. This information becomes particularly relevant during the planning steps in identifying target species' needs and potential management strategies and can be combined with local knowledge collected in the process.

Introduction to species fact-sheets

These species fact sheets represent 30 finfish species that are prevalent/important across Micronesia. They were developed with fisheries practitioners in mind and share critical biological and ecological information about the species and evidence-based management guidance in an easy-to-understand format. The 30 species were selected based on their prevalence in documented landings from across the region (species that made at least 3% of landings on at least one island), their importance for subsistence fishing/food security, their cultural value, and their status (species highly compromised). Each of the 30 species fact sheets shares the same structure.

- The front page includes the following:
 - Local names for all the Micronesian islands,
 - A general summary of potential management options to consider when trying to manage each species, and
 - An overview of the regional status of each species alongside key metrics (vulnerability and existing stock assessments).
- The back page includes more specific information to support management decision-making, including:
 - Information regarding potential spawning dynamics and associated management considerations,
 - Summary of known habitat needs for each species,
 - Size at maturity benchmarks and associated recommendations for minimum size limits,
 - Home range best estimates and associated recommendations for minimum no take zone sizes, and
 - Information regarding species' known regional commercial value and relevant climate change benefits.

While scientific knowledge regarding the many target fish species across Micronesia continues to grow, significant gaps remain. This is not surprising given that over 200 species of fish have been recorded in catches across the region, and their behavior, life histories, and environments they live on can vary from island to island. Alternatively, local fishers have been observing, accumulating, and passing on local fisheries knowledge for countless generations, building an extensive and very localized knowledge base that served local management needs for centuries before anybody heard of marine biology. As a result, local knowledge can provide more information about nearby fisheries' characteristics, especially trends in population over time and spawning times and locations. Given this, utilizing local knowledge should remain a central component of modern fisheries management across Micronesia. As such, the fact sheets include sections

to discuss and capture local knowledge that is extremely important to validate scientific information and/or fill prevalent gaps.

The species fact sheets and the information they contain will be updated regularly to reflect any new relevant information that becomes available over time and to include potential new species of interest. Next, we provide a more detailed explanation of the different sections/terms used in the species fact sheets.

How to Use The Guides

The rest of this document provides more details on the types of information shared in each species' fact sheet and how conservation practitioners can use the information.

Preferred Management Options

Based on the best available information, a menu of preferred management options is presented that could best help establish a sustainable fishery for this species. Those **options include:**

No take zones

Areas where fishing is prohibited to protect species within their boundaries allow individuals to grow to adults and reproduce successfully, and to protect important habitats.

Size limits

Minimum catch size limits that allow fish to reproduce enough before being caught to replenish populations.

Spawning protection

Protections during times when fish are aggregating and/or excessively targeted to avoid overfishing and allow fish to reproduce successfully. Management options to protect spawning aggregations and/or excessively targeted can include area closures, temporal bans (season, moon phase...) and gear bans/limits.

Catch limits

Strict catch limits (e.g. bag limits) to limit extraction of endangered species so enough individuals are maintained for a viable population.

Fishing bans

Full fishing bans for very vulnerable species (e.g. bumphead parrotfish) to allow their populations to recover.

Destructive fishing methods are not discussed in the fact sheets because they are already banned in most Micronesian islands, and their most damaging impacts can be on ecosystems and non-target species. Nevertheless, discussions should continue about destructive fishing methods that may still be used (e.g., dynamite fishing or the use of chemicals for fishing), and stopping or banning such practices should be encouraged due to their profound negative impacts on stocks and ecosystems. The use of Scuba gear for fishing is increasingly considered very damaging and consequently banned across the region.

Regional status

Description:

A simplified regional status category for each species is presented based on available local stock assessments, intrinsic vulnerability to fishing, anecdotal and indirect evidence, and expert and local knowledge from the different Micronesian islands. Regional status is described as either NO CONCERN, LOW CONCERN, MODERATE CONCERN, OR HIGH CONCERN. While this represents a general regional status, the status for each species may vary across islands. Islands subject to higher historical fishing pressure and/or less favorable ecosystems most often demonstrate populations with worse current conditions. Due to this regional variation, in addition to exploring any local available scientific information, it's critical to capture local knowledge from fishers and managers to understand the status of local populations to inform local management. An example of questions to stakeholders to capture this information would be: How has the amount of fish and sizes of this species changed (decreased, increased, the same) over your lifetime?

How to use this information:

Species with worse conditions/status and higher vulnerability to fishing would most likely require stronger and more immediate management actions to establish sustainable fishing regimes and populations. Alternatively, species that currently appear in healthy condition

and have low vulnerability to fishing could be low-priority species for immediate protective management actions.

Vulnerability

Description:

Assessing the vulnerability to extinction of fish species due to fishing is complex and requires extensive data and understanding of any given population. This data is only available for a limited number of species in developed countries. Alternatively, a combination of life history and ecological characteristics, such as at what age first mature, how fast they grow, how productive they are, or how long they live, can be used as proxies for vulnerability to fishing. For example, a fish that grows very fast and produces many eggs would generally be less vulnerable to fishing than a fish that grows slowly and does not produce many eggs. Using such a combination of proxies, studies have produced estimates of relative vulnerability to fishing that can help us understand how vulnerable to fishing different species may be. The species fact sheets provide a general vulnerability ranking (low-mid-high) based on these specific species vulnerability scores.

How to use this information:

Knowing the intrinsic vulnerability of different species to fishing can help us focus on management options, especially in the absence of proper stock assessments. For example, species with higher vulnerability will probably need more urgent and stronger management actions than those with low vulnerability.

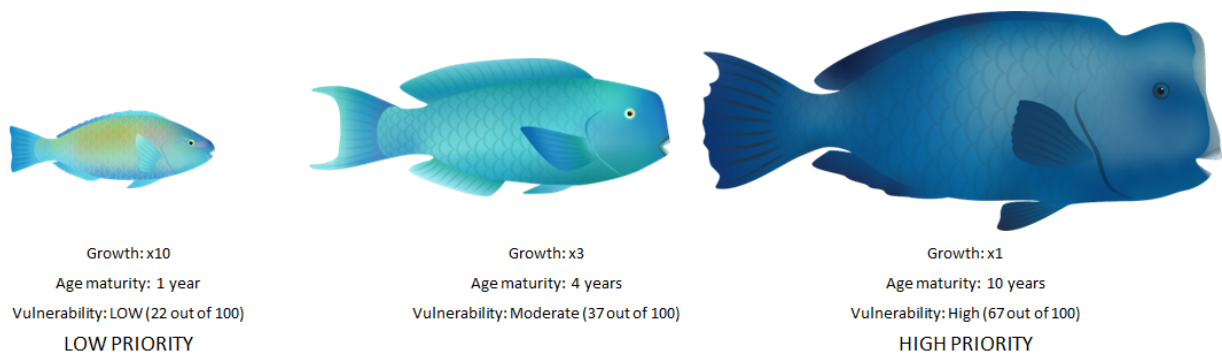


Figure 1: Example of three species from the same family (parrotfishes) with very different life history characteristics that give them varied vulnerability rankings to fishing, and therefore different management needs.

To learn more fish vulnerability:

<https://www.sciencedirect.com/science/article/abs/pii/S000632070500042X>

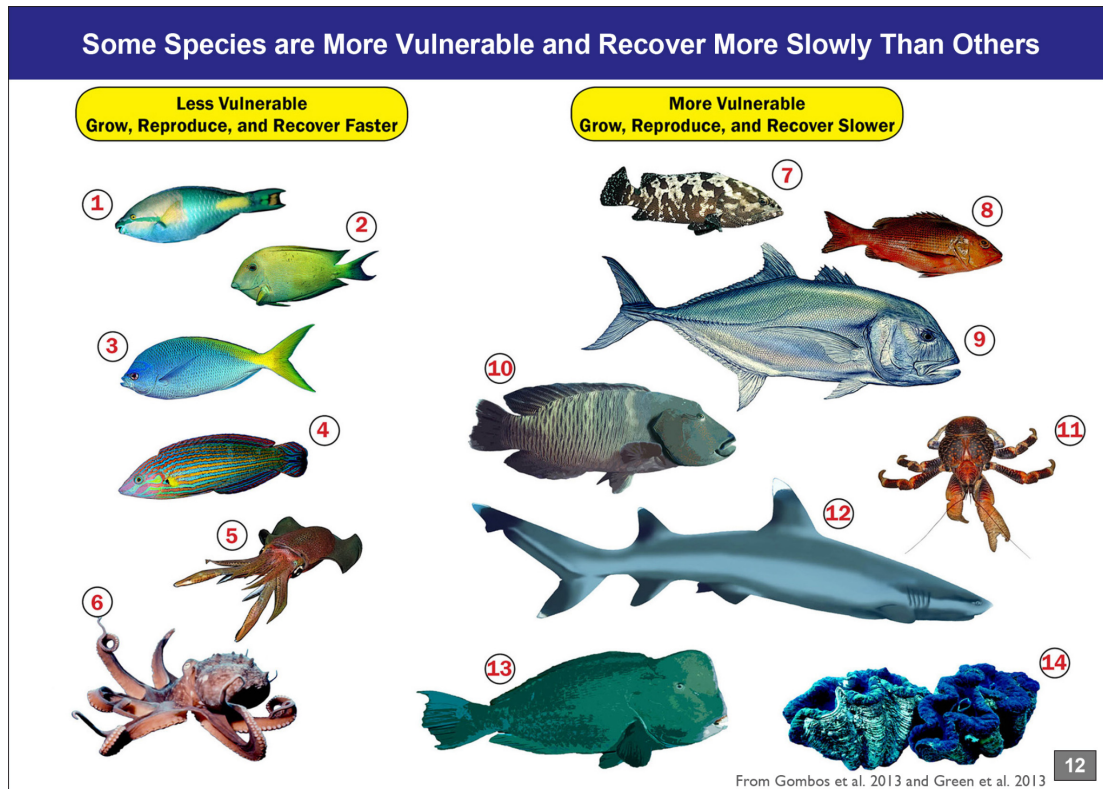


Figure 2: The left side of the illustration shows examples of fish species that tend to be less vulnerable to disturbance and recover more quickly. These species tend to have smaller maximum sizes, don't live as long, grow more quickly, and begin reproducing more quickly. They include most herbivorous fishes, small carnivores, and some planktivores. The right side of the illustration shows examples of fish species that tend to be more vulnerable to disturbances and take longer to recover. These include fish that have a larger maximum size, live longer, grow slowly, and take longer to reproduce (e.g., large predatory reef fishes)

Stock assessments/SPR

Description:

A stock assessment includes collecting, analyzing, and reporting demographic information to determine changes in the abundance of fishery stocks in response to fishing and, to the

extent possible, predict future trends of stock abundance. Stock assessments depend highly on the amount of information available for any given fishery. When data is limited (as is the case for most fisheries in Micronesia), data-poor stock assessment models can be used instead of more complex counterparts. Among data-poor stock assessment methods, length-based Spawning Potential Ratio (SPR) is utilized to assess fisheries when only size at capture data is available. SPR assessments have already been conducted in some Micronesian fisheries. The SPR of a stock is defined as the proportion of the unfished reproductive potential (or capacity to replenish) left at any given level of fishing pressure and can range from 0% (no replenishing ability left) to 100% (pristine condition). SPR models rely on several simplifying assumptions and the availability of reliable local life history information, which can impact their outcomes and implications for management. The species fact sheets contain references to any available formal stock assessment conducted in Micronesian islands to inform management decisions.

How to use this information:

Optimal values for SPR under sustainable harvest usually range from 20%-40%, and values below 20-30% suggest overharvesting. Species with worse SPR values (especially below 20-30%) would most likely require more robust and more immediate management actions to establish sustainable fishing regimes and populations. Alternatively, species with higher SPR values could be low-priority species for developing immediate protective management actions.

To learn more about the basics of fisheries stock assessments:

<https://www.fisheries.noaa.gov/topic/population-assessments/fish-stocks>

To learn more about SPR: <https://academic.oup.com/icesjms/article/72/1/217/815772>

Spawning considerations

Description:

Many fish species gather in large groups (aggregations) to reproduce at specific locations and times, making those times and locations especially sensitive, as they can be easily overfished. Clear examples of such overfishing are abundant across Micronesia (e.g., the permanent loss of most grouper spawning aggregations in Palau during the fishing boom in the 1980-90s). Therefore, protection during these sensitive periods is vital to maintain healthy populations and fisheries of many species. Local spawning times and locations are well known for some species across Micronesia (e.g. camouflage grouper), allowing for

informed management decisions to protect them (e.g., seasonal bans). Landing data collected over the past several years across Micronesia also reveals that many species are disproportionately fished during specific times (seasons and/or moon phases). However, it still needs to be clarified if this is linked to spawning aggregations.

How to use this information:

The species fact-sheets reference known spawning aggregation times/seasons or peak times of landings in Micronesia (i.e., seasons and/or moon phases). Managers should consider protecting species during times and locations when they may be spawning or disproportionately targeted. Additionally, because there are significant knowledge gaps for the reproductive behavior of most species, it's critical to capture local knowledge from fishers and managers to understand the existence of such potential aggregation locations and times so that they can be better managed. An example question to stakeholders to capture this information would be: Where and at what time of the year and/or moon phase does this species spawn in your area?

To learn more about fish spawning aggregations and their management:

<https://link.springer.com/book/10.1007/978-94-007-1980-4>

Habitat needs

Description:

Habitats are areas that are used by marine species to eat, live, grow, and reproduce. If a habitat used for any of these functions is damaged, it could negatively impact the populations of all species that use that habitat during their life cycles. Similarly, when designing no take zones to protect any target species, the no take zone should aim to include all the habitats that species may use during their life cycle. It is important to remember that each species may use different habitats, and may change the habitats they use during different life stages. While most fish species targeted in Micronesia spend the majority of their adult time living on coral reefs, some of them also live on sand bottoms, seagrass beds, and mangroves. Also, most species will begin their juvenile lives living in shallow coral reefs, seagrass beds, or mangroves, but as adults, move to deeper coral reef habitats.

How to use this information:

The species fact sheets showcase the known habitats used during the species' complete life cycle. These habitats should be considered for protection when discussing effective fisheries management options. Management includes protecting habitats by using managed/protected areas and/or general rules to minimize or prevent damage to habitats from various threats. Because some knowledge gaps exist for the habitat use of some species, it's important to capture local knowledge from fishers and managers to understand the habitats used locally by the different species during their life cycle and if those are protected. An example of questions to stakeholders to capture this information would be: Are the habitats used by this species throughout their life cycle protected?

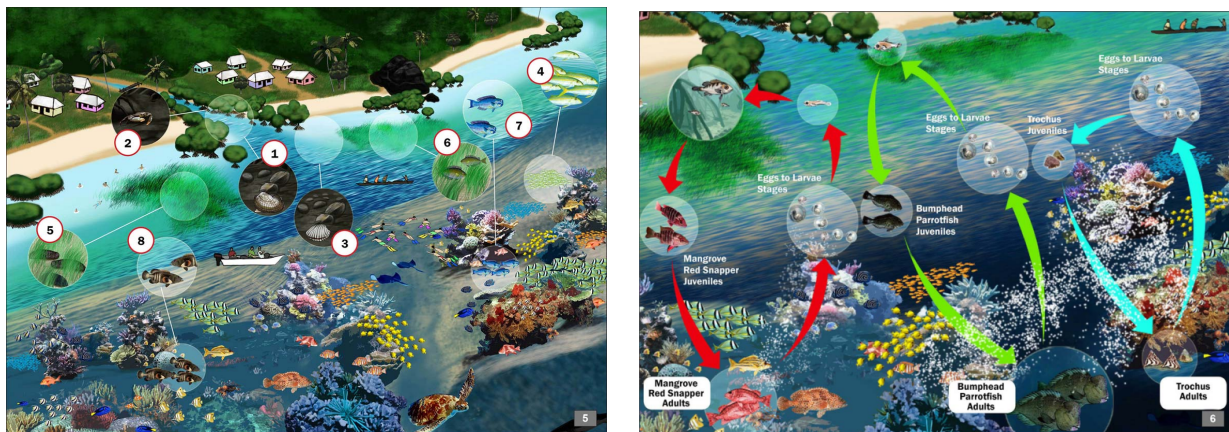


Figure 3. Each species needs different habitats (left), and many species use different habitats at different times in their lives.

Size at maturity

Description:

The size at which fish begin reproducing (size at maturity) is a critical biological parameter to inform fisheries management. Fish caught before reaching maturity don't have the opportunity to help replenish the population. If not enough adult fish remain in the population, the potential to replenish will eventually reach an unsustainable threshold leading to declines and even collapse. Minimum catch size limits that allow fish to reproduce before being caught are an important and commonly used tool to avoid such scenarios. This management strategy may be most effective for species whose sizes have declined over time. Slot size limits (a combination of minimum and maximum size limits) is a more complex approach to size-based fisheries management that also aims to protect the largest (and most productive, megaspawners) fish within the population, but it has proven difficult to implement.

How to use this information:

The most appropriate minimum size limit for each species will be based on their size at maturity and other biological parameters. Still, the size at maturity + 20% can be used as a good rule of thumb. For example, for a species whose average size at maturity is 10 inches, 12 inches would be a good first benchmark for a minimum size limit. It is important to note that the same species' size at maturity can vary slightly from island to island. The species fact sheets provide conservative regional values for average size at maturity and associated recommended minimum size limits. For stakeholders interested in further exploring this management option, platforms such as Fishkit allow users to refine size-limit selection processes using local information while providing an interactive framework for stakeholder engagement.

To learn more about Fishkit size limit builder: <https://fisheriestoolkit.org/quick-start-guide-size-limit-builder/>

Home Range

Description:

MPAs are a key and standard management tool that has proven successful at protecting biodiversity and supporting sustainable fisheries. No take zones protect species within their boundaries, allowing them to grow and reproduce. However, when adults and juveniles leave the boundary of a no take zone, they become vulnerable to fishing. Therefore, considering the scale of movement of the different species is critical for the effectiveness of no take zones in replenishing fish populations. A fish's home range is where individuals spend most of their time during their juvenile and adult phases. The species fact sheets provide the best available information regarding species home ranges and associated recommendations for minimum no take zone sizes for the most effective protection.

How to use this information:

Science recommends that no take zone should be more than twice the size of the home range of focal species to ensure that the no take zone includes the home range of enough fish. It is worth noting that some species may change habitats during their lives (e.g., from juvenile to adult) or temporarily migrate out of their home range to spawning sites. Additional measures (e.g., protection of spawning sites or times) may need to be considered to protect such focal species. Additionally, further and stronger management actions (size limits, catch limits...) will be needed when no take zones don't have enough

size to fully protect focal species. It is crucial to capture local knowledge from fishers and managers to understand if existing or planned no take zones are large enough to protect target species given their home ranges and other known local movements. An example of questions to ask stakeholders to capture this information would be: is there an no take zone large enough to protect this species given its home range?

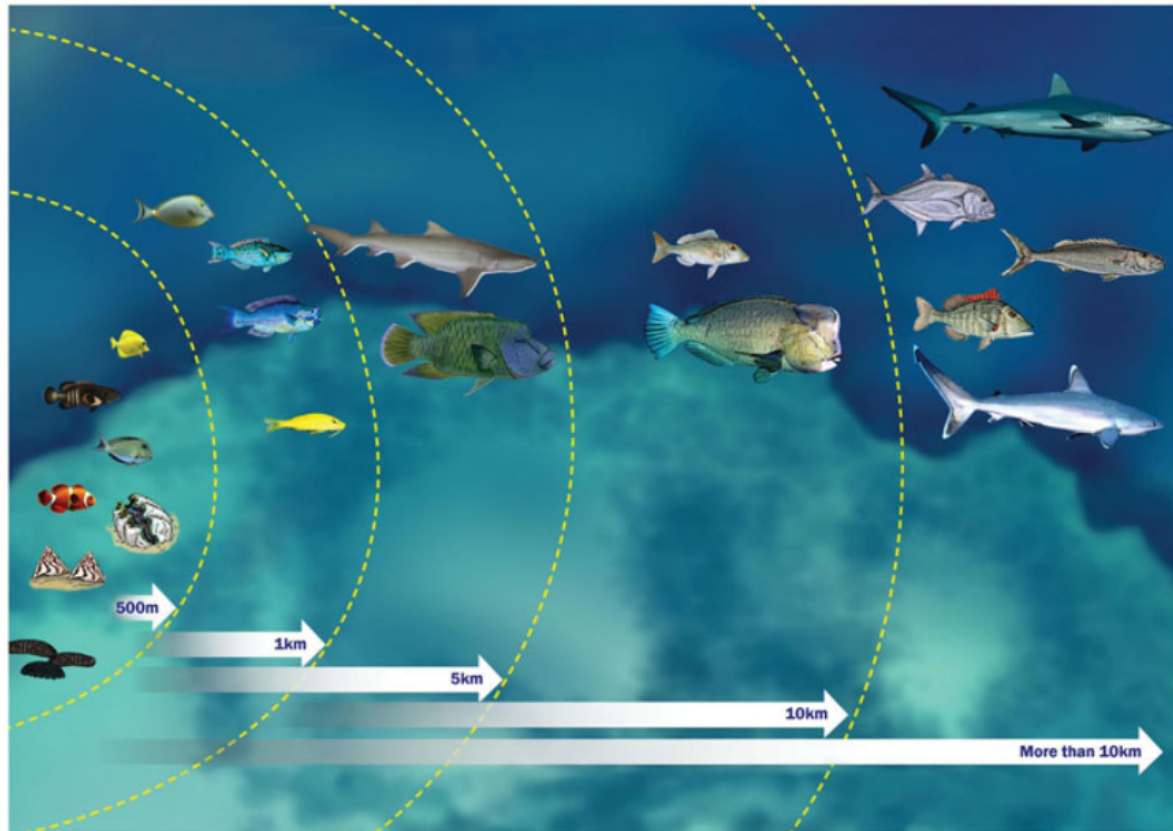


Figure 4. Examples of home size ranges for different species.

To learn more about fish home ranges and no take zone sizes:

<https://onlinelibrary.wiley.com/doi/full/10.1111/brv.12155>

Commercial value

The contribution of each individual species to regional commercial landings and its estimated annual economic value provide valuable information regarding the importance of each species to Micronesian fishing communities and economies. Values (average percent contribution to landings and annual regional dollar value) provided in the species fact sheets were derived from regional fish markets monitoring programs conducted over the past years and from other secondary sources of information.

Climate benefits

Description:

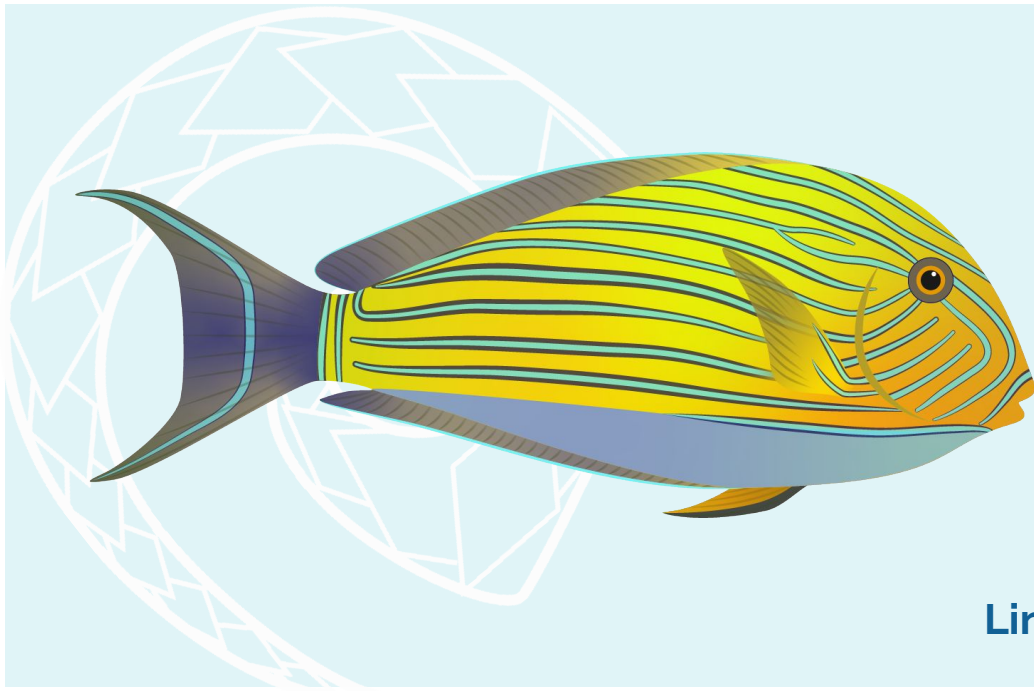
Coral reef mass bleaching and mortality events are expected to continue intensifying in the face of climate change, specifically as seawater gets warmer. Warm waters can stress corals, causing them to bleach (i.e., turn white), and making them susceptible to algae overgrowth. Algae can smother and kill corals and prevent new corals from settling and growing. While addressing climate change at a global level is complex, local managers can significantly impact coral reefs' health by enhancing their resilience to these stressors. Managing herbivorous fish populations (fish that eat seaweeds) can help build coral resilience. Herbivorous fish consume seaweed helping to avoid these impacts. Herbivores are especially important for coral recovery following mass mortality events (e.g., bleaching events) and maintaining healthy corals during periods between events.

How to use this information:

The species fact-sheets highlight herbivore species that are key for maintaining healthy coral reefs. Protecting those species should be a priority for managers aiming to maintain healthy coral reefs in the face of climate change.

To learn more about climate benefits of herbivore fishes:

<https://www.fisheries.noaa.gov/resource/peer-reviewed-research/can-herbivore-management-increase-persistence-indo-pacific-coral>



Fitishu *Chuukese*

Hyyok *Chamorro*

Kwi *Kosraean*

Kwi *Marshallese*

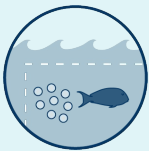
Belai *Palauan*

Pohnpeian

Wolol *Yapese*

Lined surgeonfish *English*

PREFERRED MANAGEMENT OPTIONS



No-Take Zones

Protected areas that are large enough to meet the movement needs of target species allow individuals to grow to adults and reproduce successfully.

Species of no concern

Additional management actions outside of no-take zones may not be currently needed given healthy populations. Continue monitoring to identify any potential changes on status.

See reverse side for details.

REGIONAL STATUS

NO CONCERN

No evidence of compromised populations

VULNERABILITY

LOW

LOCAL STOCK ASSESSMENT (SPR)

N/A

LOCAL KNOWLEDGE

How has your local population of this species changed over time?



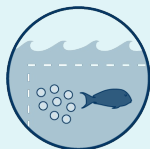
SPAWNING CONSIDERATIONS

Recommended to protect spawning locations and times



Time Closures

No clear time closures based on existing scientific knowledge



Area Closures

Consider creating a protected area at spawning sites

HABITATS NEEDED

Recommended to protect all important habitats for this species



Coral reefs

SIZE AT MATURITY: 7 inches



Recommended minimum size:
9 inches

HOME RANGE: 0.06 miles



Recommended to double home range for minimum no-take zone size:
0.1 miles

LOCAL KNOWLEDGE

Where and at what time of the year and/or moon phase does this species spawn in your area?

Are the habitats for these species protected?

Is there a no-take zone large enough to protect this species?

COMMERCIAL VALUE

- 3.6% of all commercial landings regionally
- Average **\$380,500** per year to the economy

CLIMATE BENEFITS

- ✓ **Herbivore**
- They graze on seaweed
- Key for maintaining coral reef health in the face of climate change and other stressors



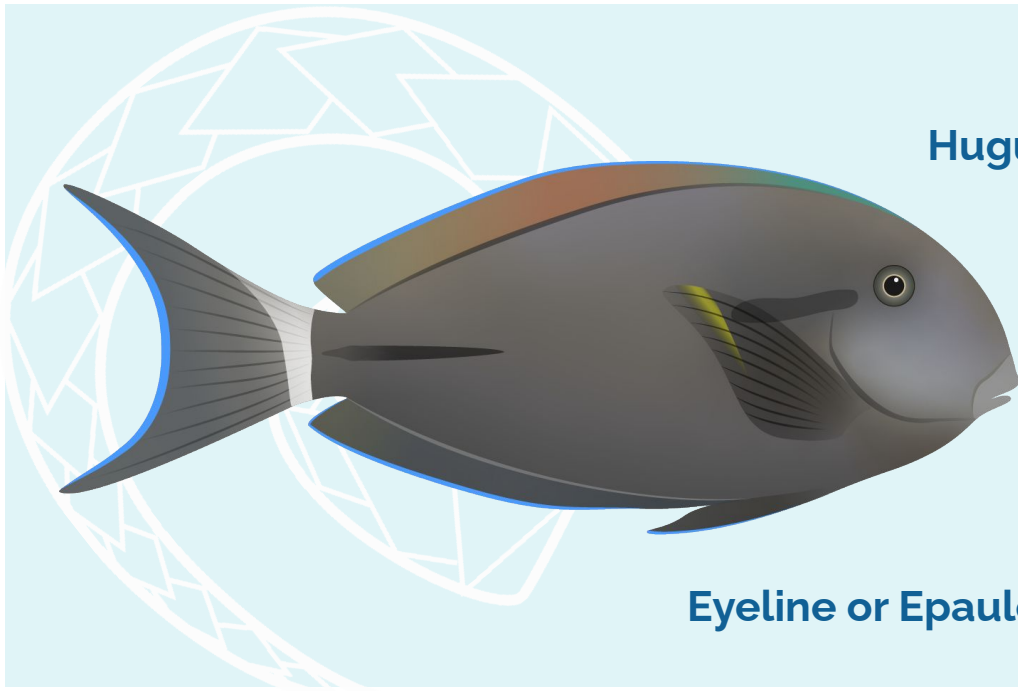
NOAA
CORAL REEF
CONSERVATION PROGRAM



MICRONESIA
CONSERVATION
TRUST



www.pimpac.org



Chuukese

Hugupau donkolo Chamorro

Kosraean

Marshallese

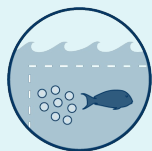
Palauan

Pohnpeian

Bilaw Yapese

Eyeline or Epaulette surgeonfish English

PREFERRED MANAGEMENT OPTIONS



No-Take Zones

Protected areas that are large enough to meet the movement needs of target species allow individuals to grow to adults and reproduce successfully.

Species of no concern

Additional management actions outside of no-take zones may not be currently needed given healthy populations. Continue monitoring to identify any potential changes on status.

See reverse side for details.

REGIONAL STATUS

NO CONCERN

No evidence of compromised populations

VULNERABILITY

LOW

LOCAL STOCK ASSESSMENT (SPR)

N/A



LOCAL KNOWLEDGE

How has your local population of this species changed over time?

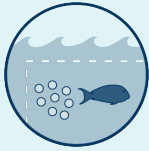
SPAWNING CONSIDERATIONS

Recommended to protect spawning locations and times



Time Closures

No clear time closures based on existing scientific knowledge



Area Closures

Consider creating a protected area at spawning sites

HABITATS NEEDED

Recommended to protect all important habitats for this species



Coral reefs

SIZE AT MATURITY: 7 inches



Recommended minimum size:
9 inches

HOME RANGE: 2 miles



Recommended to double home range for minimum no-take zone size:
4 miles

LOCAL KNOWLEDGE

Where and at what time of the year and/or moon phase does this species spawn in your area?

Are the habitats for these species protected?

Is there a no-take zone large enough to protect this species?

COMMERCIAL VALUE

- **1.5%** of all commercial landings regionally
- Average **\$159,000** per year to the economy

CLIMATE BENEFITS

- ✓ **Herbivore**
- They graze on seaweed
- Key for maintaining coral reef health in the face of climate change and other stressors



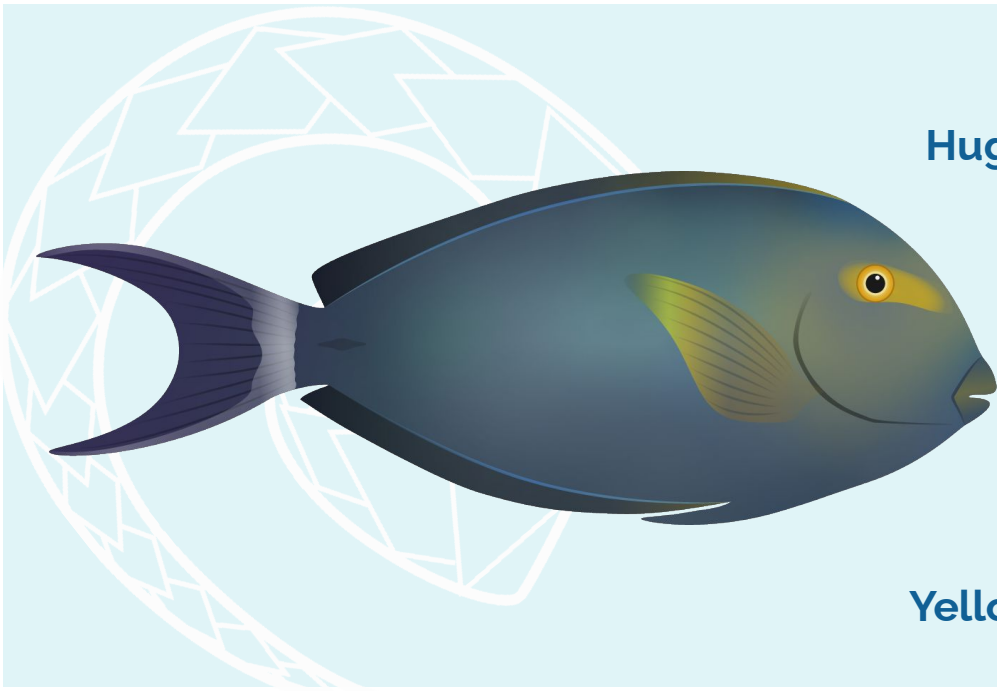
NOAA
CORAL REEF
CONSERVATION PROGRAM



MICRONESIA
CONSERVATION
TRUST



www.pimpac.org



Chuukese

Hugupau donkolo *Chamorro*

Kuhpaht *Kosraean*

Marshallese

Mesekuuk *Palauan*

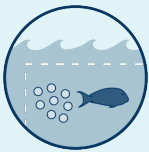
Pohnpeian

Maath *Yapese*

Yellowfin surgeonfish *English*

PREFERRED MANAGEMENT OPTIONS

1. No-Take Zones



Protected areas that are large enough to meet the movement needs of target species allow individuals to grow to adults and reproduce successfully.

2. Size Limits



Allow fish to grow enough to reproduce and replenish populations.

See reverse side for details.

REGIONAL STATUS

MODERATE CONCERN

Evidence of moderate overharvesting; fish are getting smaller

VULNERABILITY

MODERATE

LOCAL STOCK ASSESSMENT (SPR)

N/A

LOCAL KNOWLEDGE

How has your local population of this species changed over time?



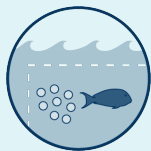
SPAWNING CONSIDERATIONS

Recommended to protect spawning locations and times



Time Closures

No clear time closures based on existing scientific knowledge



Area Closures

Consider creating a protected area at spawning sites

HABITATS NEEDED

Recommended to protect all important habitats for this species



Coral reefs



Sandy bottom

SIZE AT MATURITY: 9 inches



*Recommended **minimum size:**
11 inches*

HOME RANGE: 3 miles



*Recommended to double home range for **minimum no-take zone size:**
6 miles*

LOCAL KNOWLEDGE

Where and at what time of the year and/or moon phase does this species spawn in your area?

Are the habitats for these species protected?

Is there a no-take zone large enough to protect this species?

COMMERCIAL VALUE

- **1.1%** of all commercial landings regionally
- Average **\$116,500** per year to the economy

CLIMATE BENEFITS

- ✓ **Herbivore**
- They graze on seaweed
- Key for maintaining coral reef health in the face of climate change and other stressors



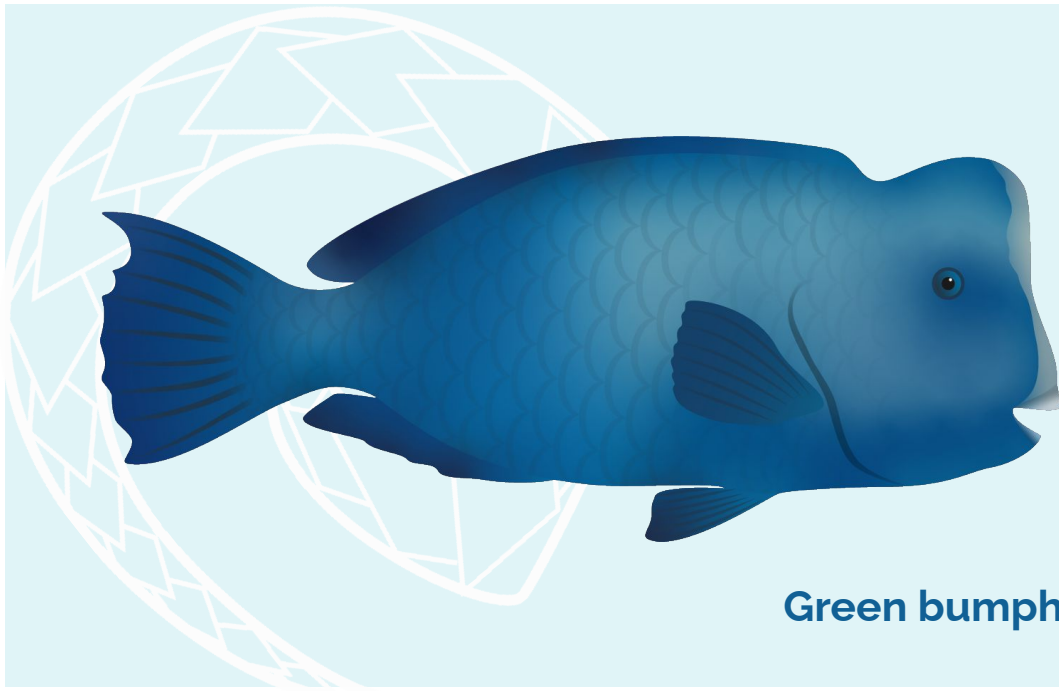
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Ukuche *Chuukese*

Atuhong *Chamorro*

Komokut *Kosraean*

Marshallese

Kemedukl *Palauan*

Pohnpeian

Gamiygul *Yapese*

Green bumphead parrotfish *English*

PREFERRED MANAGEMENT OPTIONS



Fishing Ban

Full protection to allow populations of very vulnerable species to recover,

Once the population recovers, careful and strong forms of management are needed to maintain viable populations of this very vulnerable species.

See reverse side for details.

REGIONAL STATUS

HIGH CONCERN

Evidence of strong overharvesting: highly depleted across the region

VULNERABILITY

HIGH

LOCAL STOCK ASSESSMENT (SPR)

N/A

LOCAL KNOWLEDGE

How has your local population of this species changed over time?



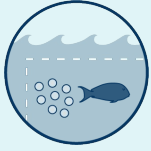
SPAWNING CONSIDERATIONS

Recommended to protect spawning locations and times



Time Closures

Consider fishing limits during new moon



Area Closures

Consider creating a protected area at spawning sites

HABITATS NEEDED

Recommended to protect all important habitats for this species



Coral reefs



Mangroves

SIZE AT MATURITY: 24 inches



Recommended minimum size:
28 inches

HOME RANGE: 6 miles



Recommended to double home range for minimum no-take zone size:
12 miles

LOCAL KNOWLEDGE

Where and at what time of the year and/or moon phase does this species spawn in your area?

Are the habitats for these species protected?

Is there a no-take zone large enough to protect this species?

COMMERCIAL VALUE

- 0.8% of all commercial landings regionally
- Average **\$82,000** per year to the economy

CLIMATE BENEFITS

- ✓ **Herbivore**
- They graze on seaweed
- Key for maintaining coral reef health in the face of climate change and other stressors



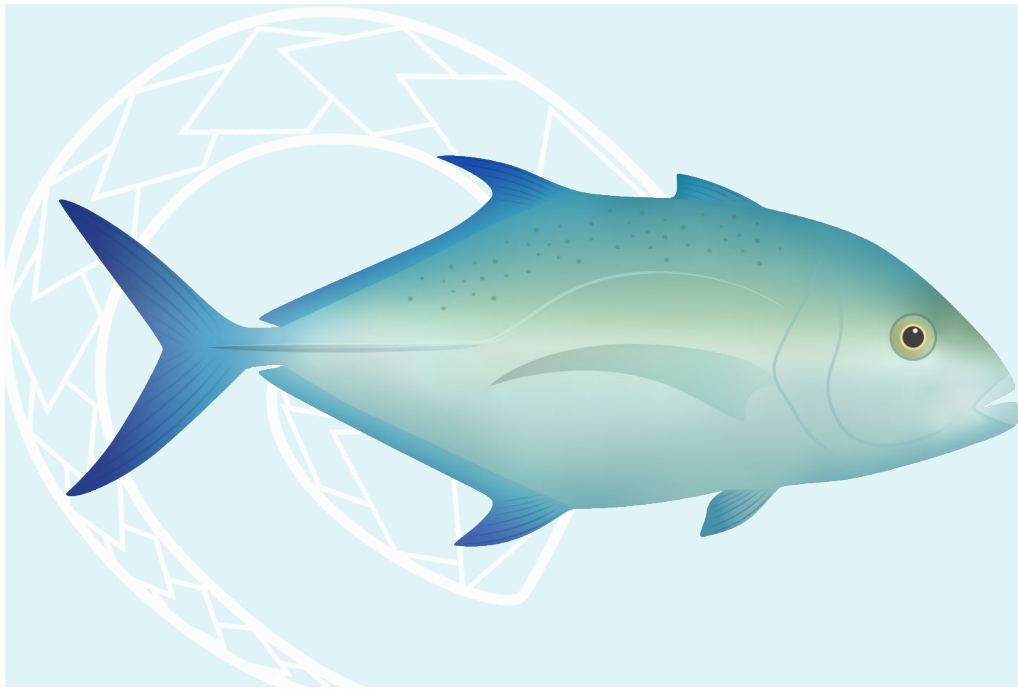
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Eetam *Chuukese*

Chamorro

Srapsrap *Kosraean*

Marshallese

Orwidel *Palauan*

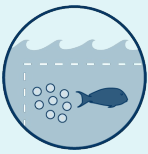
Oarong *Pohnpeian*

Ngol *Yapese*

Bluefin trevally *English*

PREFERRED MANAGEMENT OPTIONS

1. No-Take Zones



Protected areas that are large enough to meet the movement needs of target species allow individuals to grow to adults and reproduce successfully.

2. Size Limits



Allow fish to grow enough to reproduce and replenish populations.

See reverse side for details.

REGIONAL STATUS

LOW CONCERN

Evidence of light overharvesting; fish are getting smaller

VULNERABILITY

HIGH

LOCAL STOCK ASSESSMENT (SPR)

0.15 (Guam)

LOCAL KNOWLEDGE

How has your local population of this species changed over time?



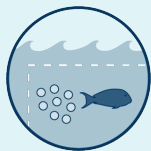
SPAWNING CONSIDERATIONS

Recommended to protect spawning locations and times



Time Closures

No clear time closures based on existing scientific knowledge



Area Closures

Consider creating a protected area at spawning sites

HABITATS NEEDED

Recommended to protect all important habitats for this species



Coral reefs



Mangroves



Sandy bottom



Seagrass

SIZE AT MATURITY: 10 inches



Recommended minimum size:
12 inches

HOME RANGE: 6 miles



Recommended to double home range for minimum no-take zone size:
12 miles

LOCAL KNOWLEDGE

Where and at what time of the year and/or moon phase does this species spawn in your area?

Are the habitats for these species protected?

Is there a no-take zone large enough to protect this species?



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COMMERCIAL VALUE

- **1.1%** of all commercial landings regionally
- Average **\$117,000** per year to the economy



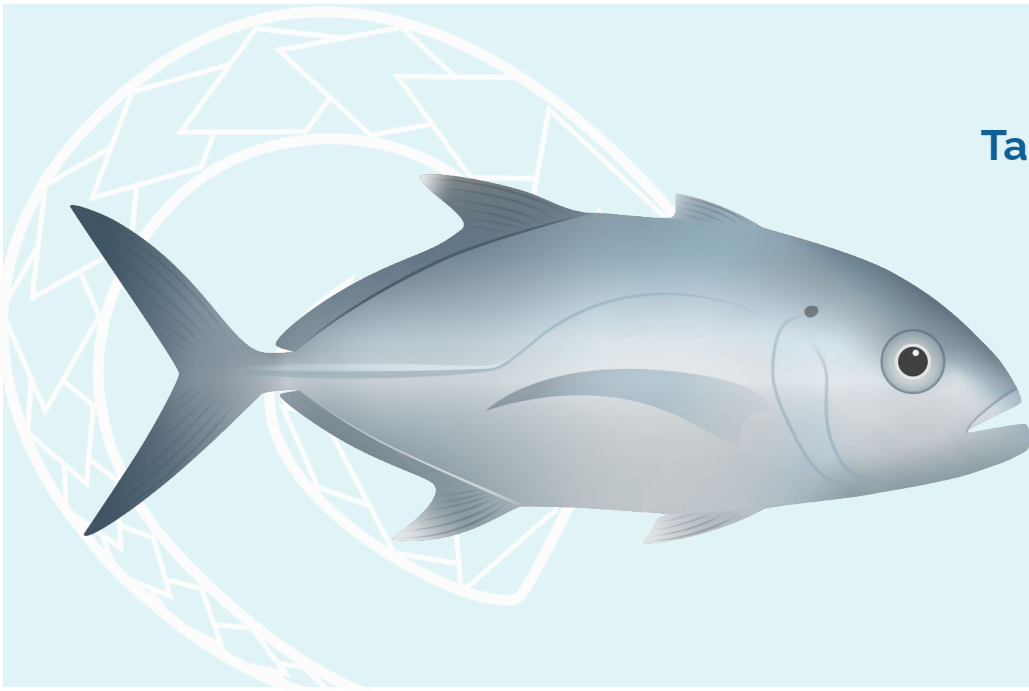
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Chep *Chuukese*

Tarakiton tailas *Chamorro*

Ahtwem *Kosraean*

Marshallese

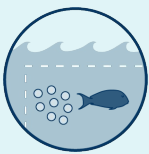
Esuch *Palauan*

Adam *Pohnpeian*

Yorong *Yapese*

Bigeye trevally *English*

PREFERRED MANAGEMENT OPTIONS



1. No-Take Zones

Protected areas that are large enough to meet the movement needs of target species allow individuals to grow to adults and reproduce successfully.



2. Size Limits

Allow fish to grow enough to reproduce and replenish populations.

See reverse side for details.

REGIONAL STATUS

LOW CONCERN

Evidence of light overharvesting; fish are getting smaller

VULNERABILITY

MODERATE

LOCAL STOCK ASSESSMENT (SPR)

N/A

LOCAL KNOWLEDGE

How has your local population of this species changed over time?



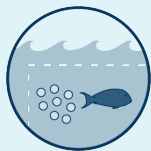
SPAWNING CONSIDERATIONS

Recommended to protect spawning locations and times



Time Closures

No clear time closures based on existing scientific knowledge



Area Closures

Consider creating a protected area at spawning sites

HABITATS NEEDED

Recommended to protect all important habitats for this species



Coral reefs



Mangroves



Sandy bottom



Seagrass

SIZE AT MATURITY: 10 inches



Recommended minimum size:
12 inches

HOME RANGE: 2 miles



Recommended to double home range for minimum no-take zone size:
4 miles

LOCAL KNOWLEDGE

Where and at what time of the year and/or moon phase does this species spawn in your area?

Are the habitats for these species protected?

Is there a no-take zone large enough to protect this species?



COMMERCIAL VALUE

- **1.5%** of all commercial landings regionally
- Average **\$157,000** per year to the economy



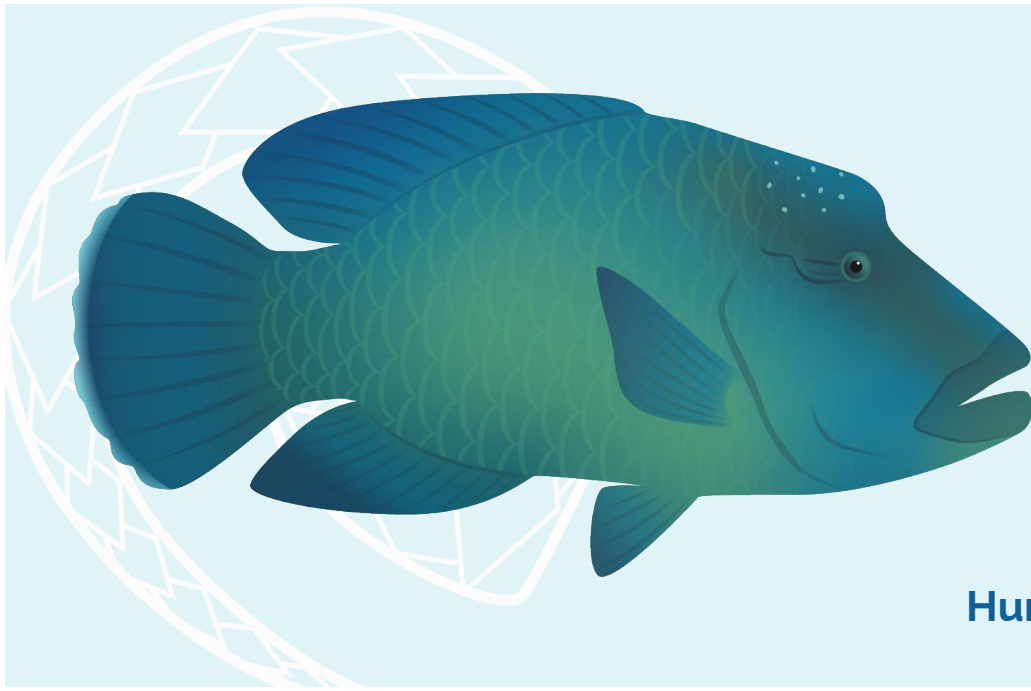
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Maam *Chuukese*

Tangison *Chamorro*

Kusruhl *Kosraean*

Marshallese

Maml *Palauan*

Pohnpeian

Numem *Yapese*

Humphead wrasse *English*

PREFERRED MANAGEMENT OPTIONS



Fishing Ban

Full protection to allow populations of very vulnerable species to recover.

Once the population recovers, careful and strong forms of management are needed to maintain viable populations of this very vulnerable species.

See reverse side for details.

REGIONAL STATUS

HIGH CONCERN

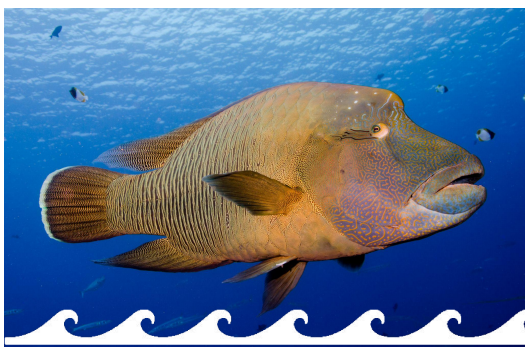
Evidence of strong overharvesting: highly depleted across the region

VULNERABILITY

VERY HIGH

LOCAL STOCK ASSESSMENT (SPR)

N/A



LOCAL KNOWLEDGE

How has your local population of this species changed over time?

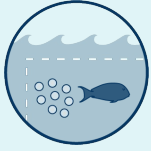
SPAWNING CONSIDERATIONS

Recommended to protect spawning locations and times



Time Closures

Consider fishing limits during new moon



Area Closures

Consider creating a protected area at spawning sites

HABITATS NEEDED

Recommended to protect all important habitats for this species



Coral reefs



Mangroves



Seagrass

SIZE AT MATURITY: 26 inches



Recommended minimum size:
31 inches

HOME RANGE: 6 miles



Recommended to double home range for minimum no-take zone size:
12 miles

LOCAL KNOWLEDGE

Where and at what time of the year and/or moon phase does this species spawn in your area?

Are the habitats for these species protected?

Is there a no-take zone large enough to protect this species?



COMMERCIAL VALUE

- 0.4% of all commercial landings regionally
- Average \$42,000 per year to the economy



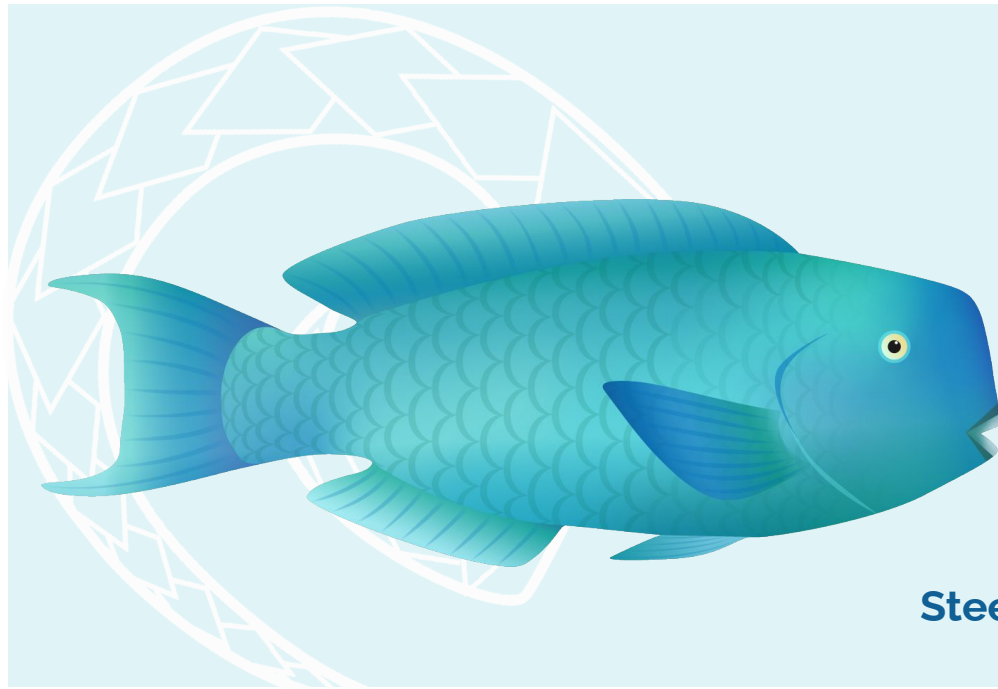
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Maraw *Chuukese*

Laggua *Chamorro*

Mwesrihk fhti *Kosraean*

Mera *Marshallese*

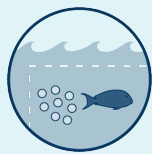
Otrod *Palauan*

Pohnpeian

Elbad *Yapese*

Steephead parrotfish *English*

PREFERRED MANAGEMENT OPTIONS



1. No-Take Zones

Protected areas that are large enough to meet the movement needs of target species allow individuals to grow to adults and reproduce successfully.



2. Catch Limits

Strict catch limits to maintain a viable population.

See reverse side for details.

REGIONAL STATUS

**MODERATE
CONCERN**

Evidence of moderate overharvesting; fewer fish

VULNERABILITY

MODERATE

LOCAL STOCK ASSESSMENT (SPR)

0.21 (Palau) -
0.36 (Guam)

LOCAL KNOWLEDGE

How has your local population of this species changed over time?



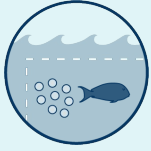
SPAWNING CONSIDERATIONS

Recommended to protect spawning locations and times



Time Closures

No clear time closures based on existing scientific knowledge



Area Closures

Consider creating a protected area at spawning sites

HABITATS NEEDED

Recommended to protect all important habitats for this species



Coral reefs

SIZE AT MATURITY: 12 inches



Recommended minimum size:
15 inches

HOME RANGE: 2 miles



Recommended to double home range for minimum no-take zone size:
4 miles

LOCAL KNOWLEDGE

Where and at what time of the year and/or moon phase does this species spawn in your area?

Are the habitats for these species protected?

Is there a no-take zone large enough to protect this species?

COMMERCIAL VALUE

- **2.8%** of all commercial landings regionally
- Average **\$292,000** per year to the economy

CLIMATE BENEFITS

- ✓ **Herbivore**
- They graze on seaweed
- Key for maintaining coral reef health in the face of climate change and other stressors



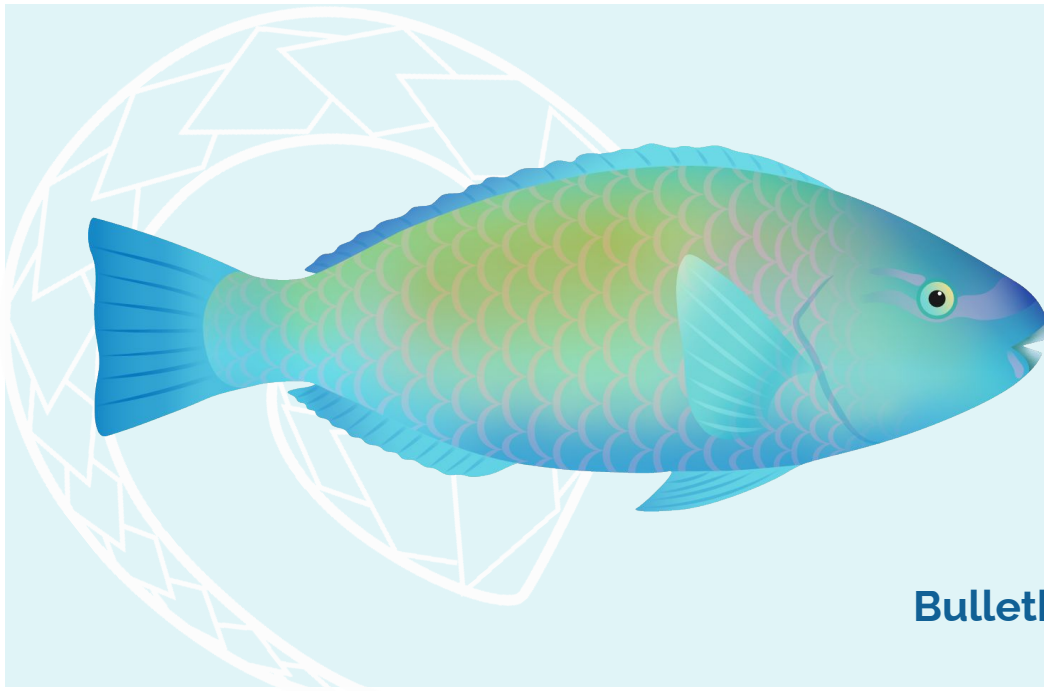
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Imw'on *Chuukese*

Chamorro

Kosraean

Marshallese

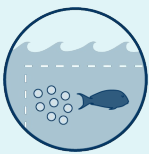
Palauan

Pohnpeian

Galunglung *Yapese*

Bullethead parrotfish *English*

PREFERRED MANAGEMENT OPTIONS



No-Take Zones

Protected areas that are large enough to meet the movement needs of target species allow individuals to grow to adults and reproduce successfully.

Species of no concern

Additional management actions outside of no-take zones may not be currently needed given healthy populations. Continue monitoring to identify any potential changes on status.

See reverse side for details.

REGIONAL STATUS

NO CONCERN

No evidence of compromised populations

VULNERABILITY

LOW

LOCAL STOCK ASSESSMENT (SPR)

N/A

LOCAL KNOWLEDGE

How has your local population of this species changed over time?



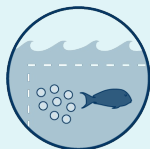
SPAWNING CONSIDERATIONS

Recommended to protect spawning locations and times



Time Closures

No clear time closures based on existing scientific knowledge



Area Closures

Consider creating a protected area at spawning sites

HABITATS NEEDED

Recommended to protect all important habitats for this species



Coral reefs



Seagrass

SIZE AT MATURITY: 6 inches



Recommended *minimum size*:
7 inches

HOME RANGE: 2 miles



Recommended to double home range for *minimum no-take zone size*:
4 miles

LOCAL KNOWLEDGE

Where and at what time of the year and/or moon phase does this species spawn in your area?

Are the habitats for these species protected?

Is there a no-take zone large enough to protect this species?

COMMERCIAL VALUE

- **0.4%** of all commercial landings regionally
- Average **\$42,000** per year to the economy

CLIMATE BENEFITS

- ✓ **Herbivore**
- They graze on seaweed
- Key for maintaining coral reef health in the face of climate change and other stressors



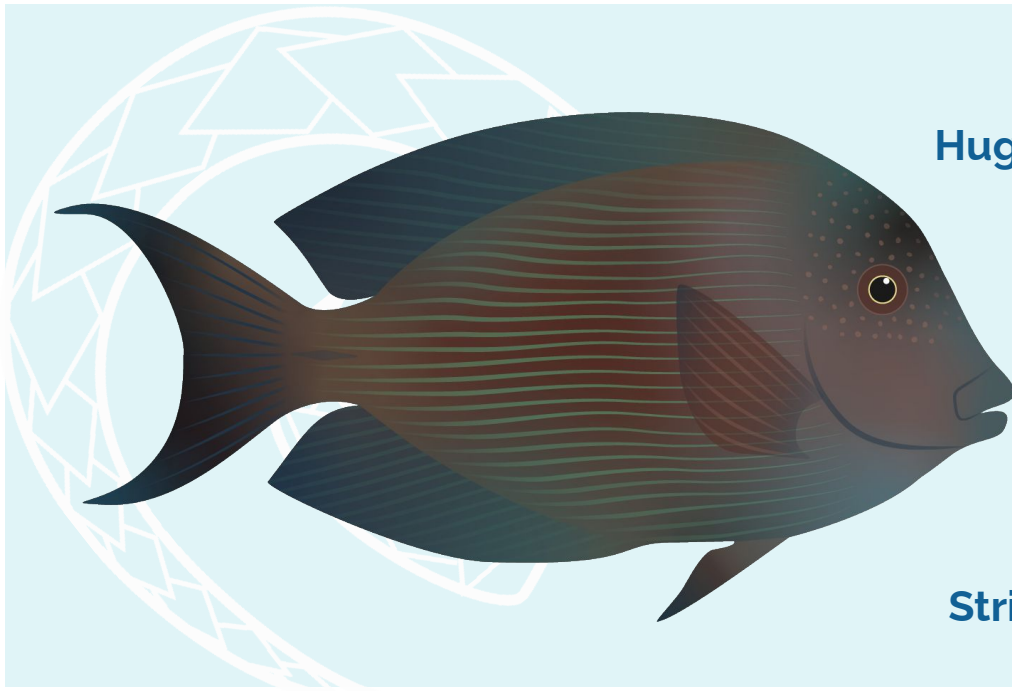
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Mwoch *Chuukese*

Hugupau attilong *Chamorro*

Pahtpaht *Kosraean*

Marshallese

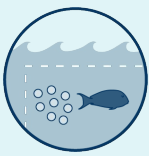
Palauan

Pohnpeian

Ngrar *Yapese*

Striped bristletooth *English*

PREFERRED MANAGEMENT OPTIONS



No-Take Zones

Protected areas that are large enough to meet the movement needs of target species allow individuals to grow to adults and reproduce successfully.

Species of no concern

Additional management actions outside of no-take zones may not be currently needed given healthy populations. Continue monitoring to identify any potential changes on status.

See reverse side for details.

REGIONAL STATUS

NO CONCERN

No evidence of compromised populations

VULNERABILITY

LOW

LOCAL STOCK ASSESSMENT (SPR)

N/A



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LOCAL KNOWLEDGE

How has your local population of this species changed over time?

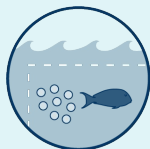
SPAWNING CONSIDERATIONS

Recommended to protect spawning locations and times



Time Closures

No clear time closures based on existing scientific knowledge



Area Closures

Consider creating a protected area at spawning sites

HABITATS NEEDED

Recommended to protect all important habitats for this species



Coral reefs

SIZE AT MATURITY: 4 inches



*Recommended **minimum size:**
5 inches*

HOME RANGE: 0.2 miles



*Recommended to double home range for **minimum no-take zone size:**
0.4 miles*

LOCAL KNOWLEDGE

Where and at what time of the year and/or moon phase does this species spawn in your area?

Are the habitats for these species protected?

Is there a no-take zone large enough to protect this species?

COMMERCIAL VALUE

- **0.3%** of all commercial landings regionally
- Average **\$28,000** per year to the economy

CLIMATE BENEFITS

- ✓ **Herbivore**
- They graze on seaweed
- Key for maintaining coral reef health in the face of climate change and other stressors



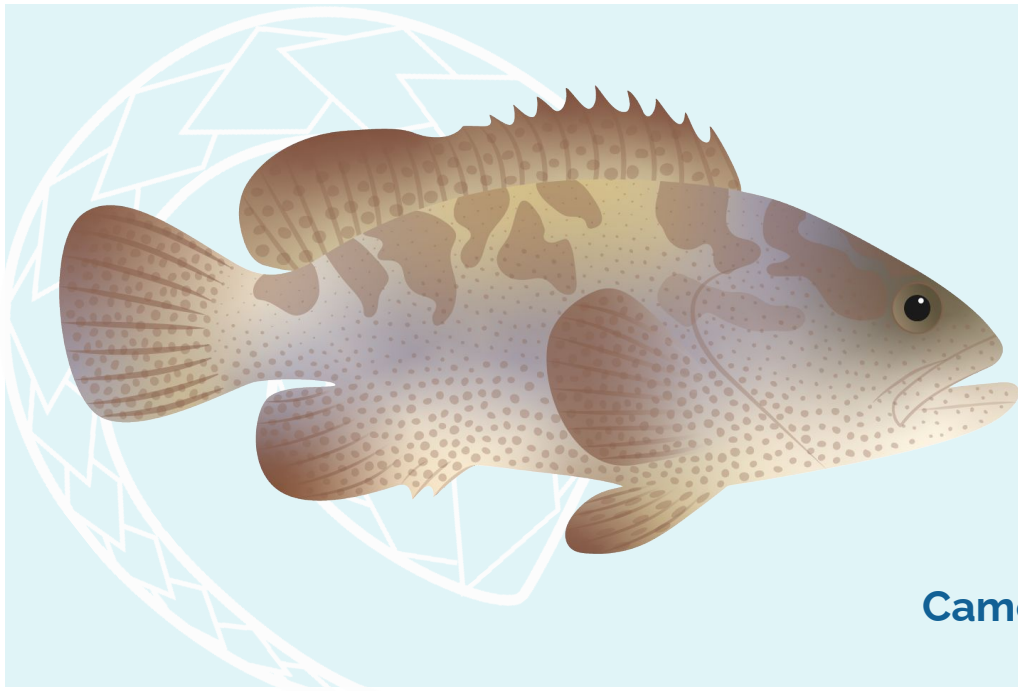
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Ikakkar *Chuukese*

Chamorro

Kosraean

Marshallese

Palauan

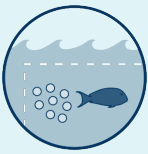
Widir *Pohnpeian*

Galgaman *Yapese*

Camouflage grouper *English*

PREFERRED MANAGEMENT OPTIONS

1. No-Take Zones



Protected areas that are large enough to meet the movement needs of target species allow individuals to grow to adults and reproduce successfully.

2. Spawning Protections



Protections during times fish are aggregating and excessively targeted should be considered.

See reverse side for details.

REGIONAL STATUS

HIGH CONCERN

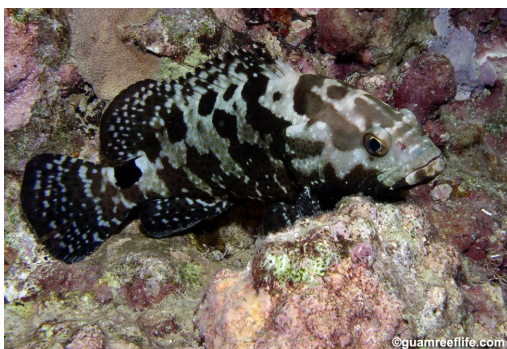
Evidence of strong overharvesting; excessive harvesting during specific times

VULNERABILITY

HIGH

LOCAL STOCK ASSESSMENT (SPR)

N/A

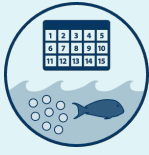


LOCAL KNOWLEDGE

How has your local population of this species changed over time?

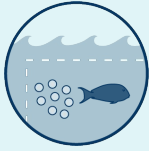
SPAWNING CONSIDERATIONS

Recommended to protect spawning locations and times



Time Closures

Consider fishing limits during new/full moon and high season (variable across islands)



Area Closures

Consider creating a protected area at spawning sites

HABITATS NEEDED

Recommended to protect all important habitats for this species



Coral reefs

SIZE AT MATURITY: 14 inches



Recommended minimum size:
17 inches

HOME RANGE: 2 miles



Recommended to double home range for minimum no-take zone size:
4 miles

LOCAL KNOWLEDGE

Where and at what time of the year and/or moon phase does this species spawn in your area?

Are the habitats for these species protected?

Is there a no-take zone large enough to protect this species?

COMMERCIAL VALUE

- 2.2% of all commercial landings regionally
- Average **\$234,000** per year to the economy



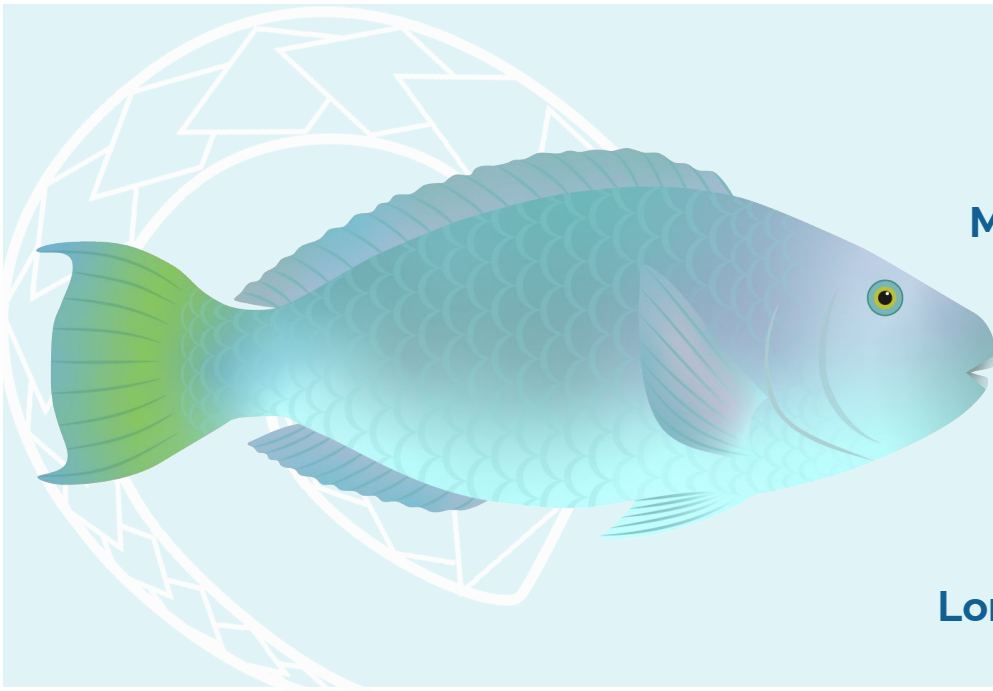
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Aar *Chuukese*

Gualik *Chamorro*

Mwesrik fasrfasr *Kosraean*

Marshallese

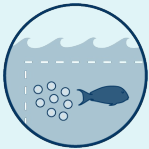
Berkism *Palauan*

Mwomw mei *Pohnpeian*

Nguywe' *Yapese*

Longnose parrotfish *English*

PREFERRED MANAGEMENT OPTIONS



1. No-Take Zones

Protected areas that are large enough to meet the movement needs of target species allow individuals to grow to adults and reproduce successfully.



2. Size Limits

Allow fish to grow enough to reproduce and replenish populations.



3. Spawning Protections

Protections during times fish are aggregating and excessively targeted should be considered.

See reverse side for details.

REGIONAL STATUS

**MODERATE
CONCERN**

Evidence of moderate overharvesting; fish are getting smaller

VULNERABILITY

LOW

LOCAL STOCK ASSESSMENT (SPR)

0.05 (Palau) -
0.52 (Guam)



LOCAL KNOWLEDGE

How has your local population of this species changed over time?

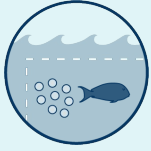
SPAWNING CONSIDERATIONS

Recommended to protect spawning locations and times



Time Closures

Consider fishing limits during high season



Area Closures

Consider creating a protected area at spawning sites

HABITATS NEEDED

Recommended to protect all important habitats for this species



Coral reefs



Seagrass

SIZE AT MATURITY: 13 inches



Recommended minimum size:
16 inches

HOME RANGE: 2 miles



Recommended to double home range for minimum no-take zone size:
4 miles

LOCAL KNOWLEDGE

Where and at what time of the year and/or moon phase does this species spawn in your area?

Are the habitats for these species protected?

Is there a no-take zone large enough to protect this species?

COMMERCIAL VALUE

- **7.0%** of all commercial landings regionally
- Average **\$731,500** per year to the economy

CLIMATE BENEFITS

- ✓ **Herbivore**
- They graze on seaweed
- Key for maintaining coral reef health in the face of climate change and other stressors



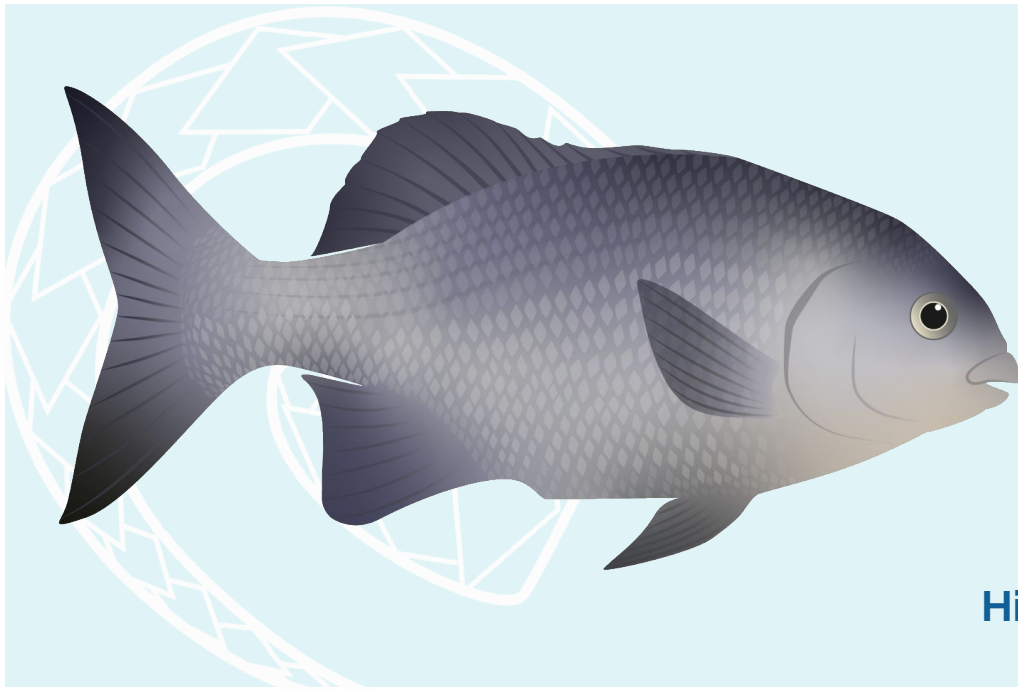
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Fit'a *Chuukese*

Guili *Chamorro*

Tohsracl *Kosraean*

Bajrok *Marshallese*

Palauan

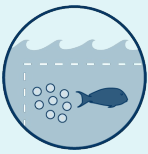
Kertakai *Pohnpeian*

Ngirye' *Yapese*

Highfin rudderfish *English*

PREFERRED MANAGEMENT OPTIONS

1. No-Take Zones



Protected areas that are large enough to meet the movement needs of target species allow individuals to grow to adults and reproduce successfully.



2. Size Limits

Allow fish to grow enough to reproduce and replenish populations.

See reverse side for details.

REGIONAL STATUS

LOW CONCERN

Evidence of light overharvesting; fish are getting smaller

VULNERABILITY

MODERATE

LOCAL STOCK ASSESSMENT (SPR)

N/A

LOCAL KNOWLEDGE

How has your local population of this species changed over time?



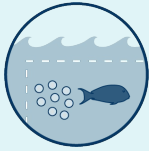
SPAWNING CONSIDERATIONS

Recommended to protect spawning locations and times



Time Closures

No clear time closures based on existing scientific knowledge



Area Closures

Consider creating a protected area at spawning sites

HABITATS NEEDED

Recommended to protect all important habitats for this species



Coral reefs

SIZE AT MATURITY: 10 inches



*Recommended **minimum size:**
12 inches*

HOME RANGE: 3 miles



*Recommended to double home range for **minimum no-take zone size:**
6 miles*

LOCAL KNOWLEDGE

Where and at what time of the year and/or moon phase does this species spawn in your area?

Are the habitats for these species protected?

Is there a no-take zone large enough to protect this species?

COMMERCIAL VALUE

- **3.2%** of all commercial landings regionally
- Average **\$339,000** per year to the economy

CLIMATE BENEFITS

- ✓ **Herbivore**
- They graze on seaweed
- Key for maintaining coral reef health in the face of climate change and other stressors



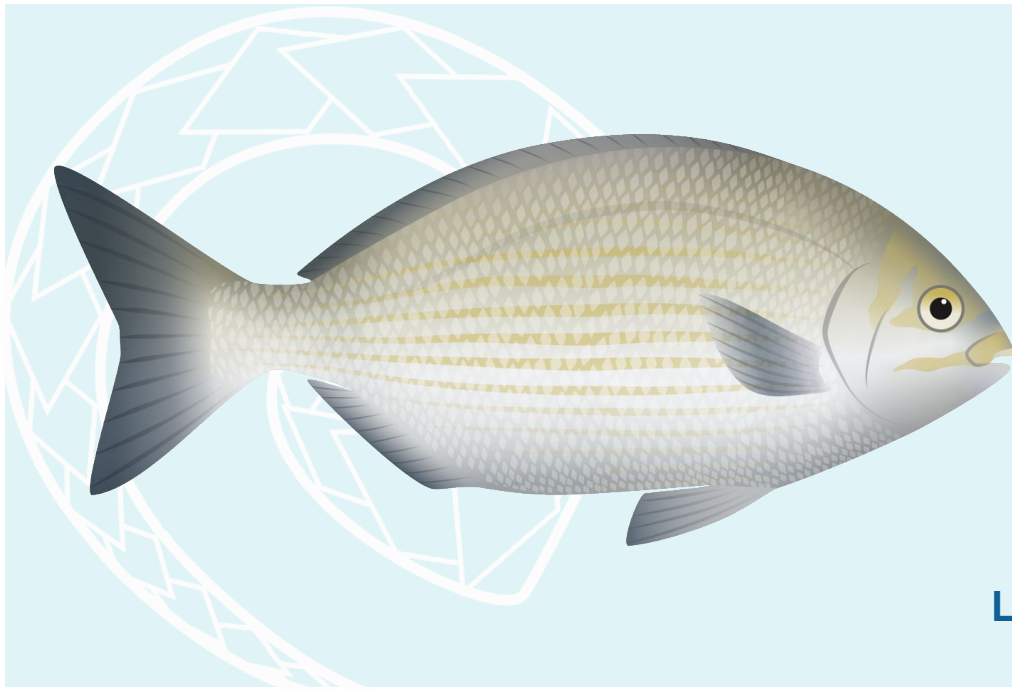
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Ren nupuk *Chuukese*

Guili *Chamorro*

Eloh *Kosraean*

Marshallese

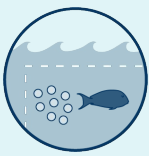
Komud *Palauan*

Pohnpeian

Gumiy ni broo *Yapese*

Lowfin rudderfish *English*

PREFERRED MANAGEMENT OPTIONS



1. No-Take Zones

Protected areas that are large enough to meet the movement needs of target species allow individuals to grow to adults and reproduce successfully.



2. Size Limits

Allow fish to grow enough to reproduce and replenish populations.

See reverse side for details.

REGIONAL STATUS

LOW CONCERN

Evidence of light overharvesting; fish are getting smaller

VULNERABILITY

HIGH

LOCAL STOCK ASSESSMENT (SPR)

N/A

LOCAL KNOWLEDGE

How has your local population of this species changed over time?



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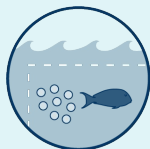
SPAWNING CONSIDERATIONS

Recommended to protect spawning locations and times



Time Closures

No clear time closures based on existing scientific knowledge



Area Closures

Consider creating a protected area at spawning sites

HABITATS NEEDED

Recommended to protect all important habitats for this species



Coral reefs

SIZE AT MATURITY: 10 inches



*Recommended **minimum size:**
12 inches*

HOME RANGE: 3 miles



*Recommended to double home range
for **minimum no-take zone size:**
6 miles*

LOCAL KNOWLEDGE

Where and at what time of the year and/or moon phase does this species spawn in your area?

Are the habitats for these species protected?

Is there a no-take zone large enough to protect this species?

COMMERCIAL VALUE

- 2.1% of all commercial landings regionally
- Average \$222,500 per year to the economy

CLIMATE BENEFITS

- ✓ Herbivore
- They graze on seaweed
- Key for maintaining coral reef health in the face of climate change and other stressors



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Etik *Chuukese*

Lililuk *Chamorro*

Kosraean

Marshallese

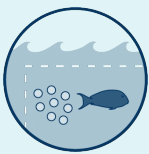
Palauan

Kadek *Pohnpeian*

Nguruu *Yapese*

Longface emperor *English*

PREFERRED MANAGEMENT OPTIONS



1. No-Take Zones

Protected areas that are large enough to meet the movement needs of target species allow individuals to grow to adults and reproduce successfully.



2. Size Limits

Allow fish to grow enough to reproduce and replenish populations

See reverse side for details.

REGIONAL STATUS

**MODERATE
CONCERN**

Evidence of moderate overharvesting; fish are getting smaller

VULNERABILITY

MODERATE

LOCAL STOCK ASSESSMENT (SPR)

0.1 (Palau) -
0.18 (Guam)

LOCAL KNOWLEDGE

How has your local population of this species changed over time?



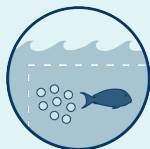
SPAWNING CONSIDERATIONS

Recommended to protect spawning locations and times



Time Closures

No clear time closures based on existing scientific knowledge



Area Closures

Consider creating a protected area at spawning sites

HABITATS NEEDED

Recommended to protect all important habitats for this species



Coral reefs



Seagrass

SIZE AT MATURITY: 16 inches



*Recommended **minimum size:**
19 inches*

HOME RANGE: 3 miles



*Recommended to double home range for **minimum no-take zone size:**
6 miles*

LOCAL KNOWLEDGE

Where and at what time of the year and/or moon phase does this species spawn in your area?

Are the habitats for these species protected?

Is there a no-take zone large enough to protect this species?

COMMERCIAL VALUE

- **1.3%** of all commercial landings regionally
- Average **\$139,500** per year to the economy



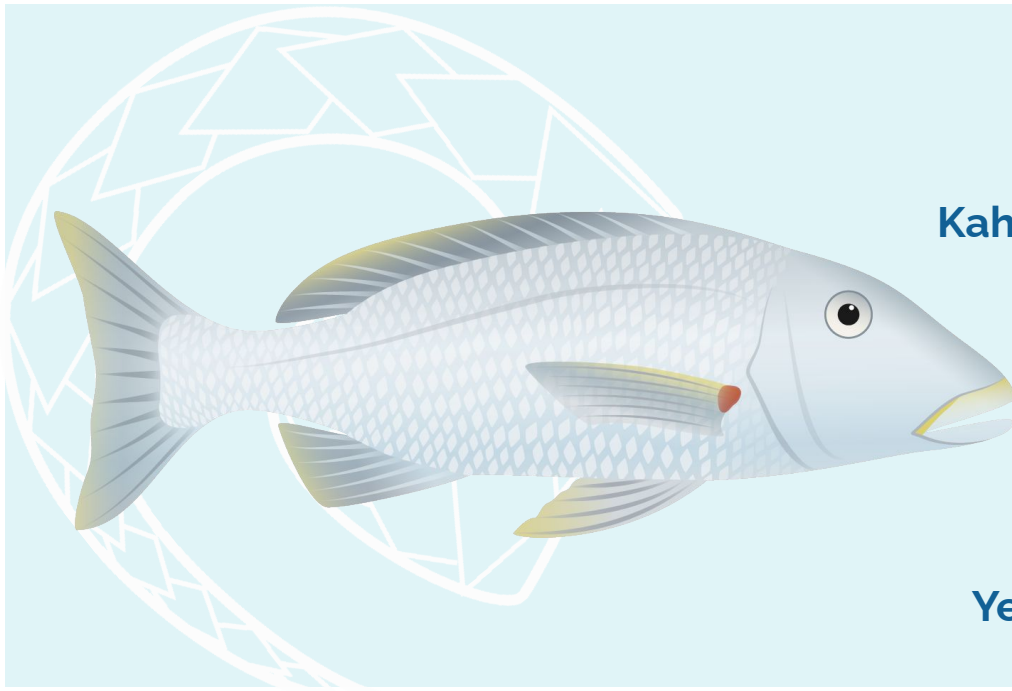
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Meetiin *Chuukese*

Lililuk *Chamorro*

Kahtuhk rangrang *Kosraean*

Marshallese

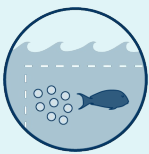
Mechur *Palauan*

Medi *Pohnpeian*

Gadgad *Yapese*

Yellowlip emperor *English*

PREFERRED MANAGEMENT OPTIONS



1. No-Take Zones

Protected areas that are large enough to meet the movement needs of target species allow individuals to grow to adults and reproduce successfully.



2. Size Limits

Allow fish to grow enough to reproduce and replenish populations

See reverse side for details.

REGIONAL STATUS

**MODERATE
CONCERN**

Evidence of moderate overharvesting: fish are getting smaller

VULNERABILITY

HIGH

LOCAL STOCK ASSESSMENT (SPR)

0.13 (Palau) -
0.31 (Guam)

LOCAL KNOWLEDGE

How has your local population of this species changed over time?



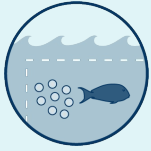
SPAWNING CONSIDERATIONS

Recommended to protect spawning locations and times



Time Closures

No clear time closures based on existing scientific knowledge



Area Closures

Consider creating a protected area at spawning sites

HABITATS NEEDED

Recommended to protect all important habitats for this species



Coral reefs



Seagrass

SIZE AT MATURITY: 12 inches



Recommended minimum size:
14 inches

HOME RANGE: 3 miles



Recommended to double home range for minimum no-take zone size:
6 miles

LOCAL KNOWLEDGE

Where and at what time of the year and/or moon phase does this species spawn in your area?

Are the habitats for these species protected?

Is there a no-take zone large enough to protect this species?



COMMERCIAL VALUE

- 1.4% of all commercial landings regionally
- Average **\$145,500** per year to the economy



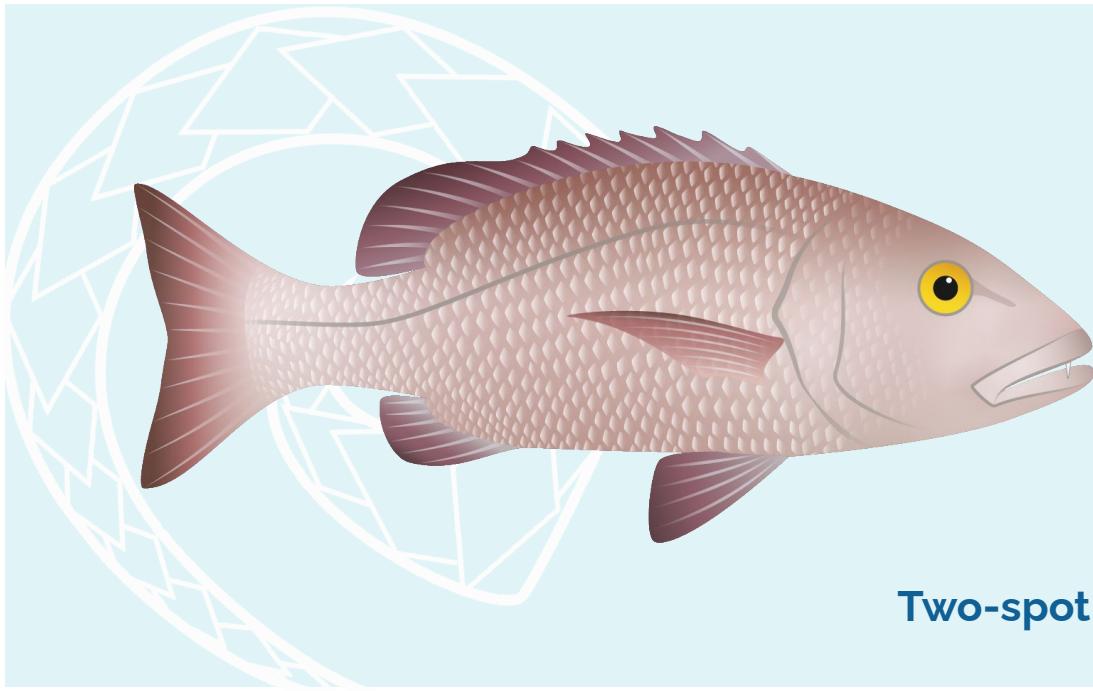
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Meew *Chuukese*

Tagafi *Chamorro*

Kuh *Kosraean*

Marshallese

Palauan

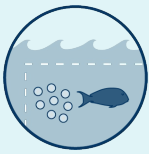
Kihr *Pohnpeian*

Goychaf *Yapese*

Two-spot red snapper *English*

PREFERRED MANAGEMENT OPTIONS

1. No-Take Zones



Protected areas that are large enough to meet the movement needs of target species allow individuals to grow to adults and reproduce successfully.

2. Spawning Protections



Protections during times fish are aggregating and excessively targeted should be considered.

See reverse side for details.

REGIONAL STATUS

HIGH CONCERN

Evidence of strong overharvesting: excessive harvesting during specific times

VULNERABILITY

HIGH

LOCAL STOCK ASSESSMENT (SPR)

0.27 (Palau)

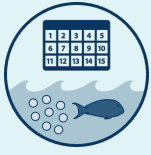
LOCAL KNOWLEDGE

How has your local population of this species changed over time?



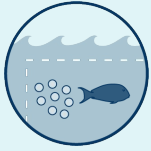
SPAWNING CONSIDERATIONS

Recommended to protect spawning locations and times



Time Closures

Consider fishing limits during full moon



Area Closures

Consider creating a protected area at spawning sites

HABITATS NEEDED

Recommended to protect all important habitats for this species



Coral reefs

SIZE AT MATURITY: 13 inches



Recommended minimum size:
15 inches

HOME RANGE: 2 miles



Recommended to double home range for minimum no-take zone size:
4 miles

LOCAL KNOWLEDGE

Where and at what time of the year and/or moon phase does this species spawn in your area?

Are the habitats for these species protected?

Is there a no-take zone large enough to protect this species?

COMMERCIAL VALUE

- **1.6%** of all commercial landings regionally
- Average **\$165,000** per year to the economy



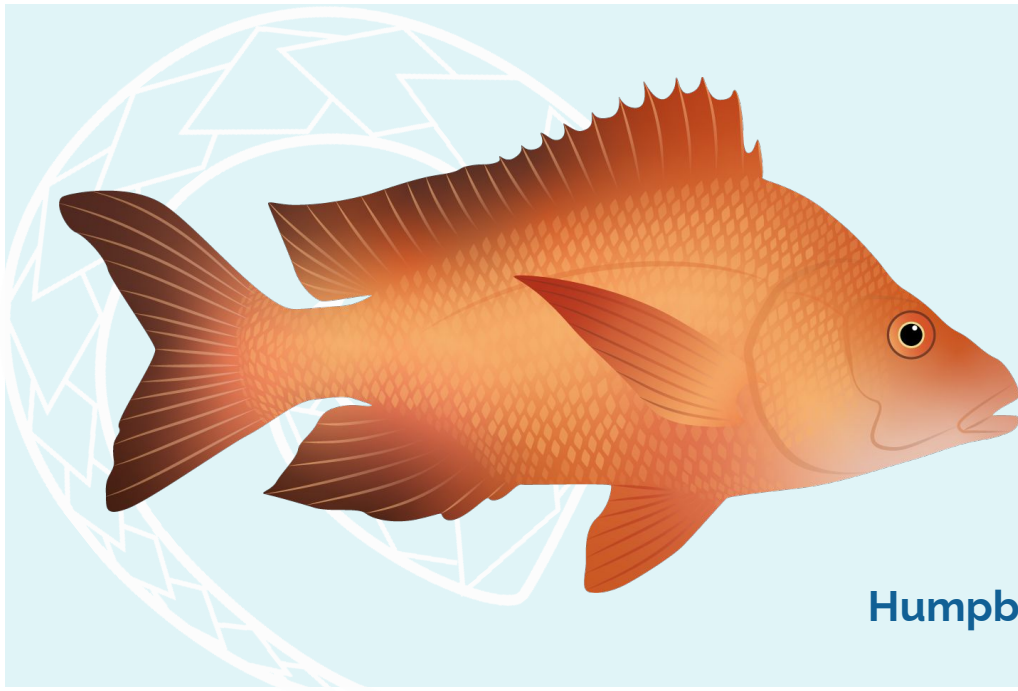
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Masachcha *Chuukese*

Fafaet *Chamorro*

Tahp *Kosraean*

Jato *Marshallese*

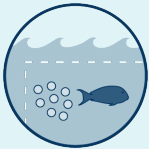
Keremlal *Palauan*

Pwalahl *Pohnpeian*

Gadaw *Yapese*

Humpback red snapper *English*

PREFERRED MANAGEMENT OPTIONS



1. No-Take Zones

Protected areas that are large enough to meet the movement needs of target species allow individuals to grow to adults and reproduce successfully.



2. Size Limits

Allow fish to grow enough to reproduce and replenish populations.



3. Spawning Protections

Protections during times fish are aggregating and excessively targeted should be considered.

See reverse side for details.

REGIONAL STATUS

**MODERATE
CONCERN**

Evidence of moderate overharvesting: fish are getting smaller

VULNERABILITY

MODERATE

LOCAL STOCK ASSESSMENT (SPR)

0.1 (Palau) -
0.53 (Guam)

LOCAL KNOWLEDGE

How has your local population of this species changed over time?



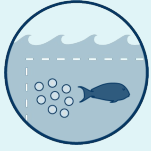
SPAWNING CONSIDERATIONS

Recommended to protect spawning locations and times



Time Closures

Consider fishing limits during full moon



Area Closures

Consider creating a protected area at spawning sites

HABITATS NEEDED

Recommended to protect all important habitats for this species



Coral reefs



Seagrass

SIZE AT MATURITY: 10 inches



Recommended *minimum size*:
12 inches

HOME RANGE: 2 miles



Recommended to double home range for *minimum no-take zone size*:
4 miles

LOCAL KNOWLEDGE

Where and at what time of the year and/or moon phase does this species spawn in your area?

Are the habitats for these species protected?

Is there a no-take zone large enough to protect this species?

COMMERCIAL VALUE

- **4.6%** of all commercial landings regionally
- Average **\$478,500** per year to the economy



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Chuukese

Chamorro

Kuh rangrang *Kosraean*

Marshallese

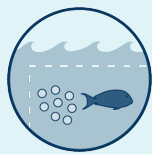
Palauan

Pohnpeian

Rangwoel *Yapese*

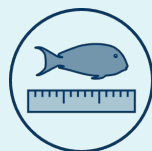
Blubberlip snapper *English*

PREFERRED MANAGEMENT OPTIONS



1. No-Take Zones

Protected areas that are large enough to meet the movement needs of target species allow individuals to grow to adults and reproduce successfully.



2. Size Limits

Allow fish to grow enough to reproduce and replenish populations.

See reverse side for details.

REGIONAL STATUS

**MODERATE
CONCERN**

Evidence of moderate overharvesting: fish are getting smaller

VULNERABILITY

MODERATE

LOCAL STOCK ASSESSMENT (SPR)

N/A

LOCAL KNOWLEDGE

How has your local population of this species changed over time?



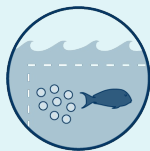
SPAWNING CONSIDERATIONS

Recommended to protect spawning locations and times



Time Closures

No clear time closures based on existing scientific knowledge



Area Closures

Consider creating a protected area at spawning sites

HABITATS NEEDED

Recommended to protect all important habitats for this species



Coral reefs



Mangroves

SIZE AT MATURITY: 15 inches



Recommended minimum size:
17 inches

HOME RANGE: 2 miles



Recommended to double home range for minimum no-take zone size:
4 miles

LOCAL KNOWLEDGE

Where and at what time of the year and/or moon phase does this species spawn in your area?

Are the habitats for these species protected?

Is there a no-take zone large enough to protect this species?

COMMERCIAL VALUE

- **0.5%** of all commercial landings regionally
- Average **\$49,500** per year to the economy



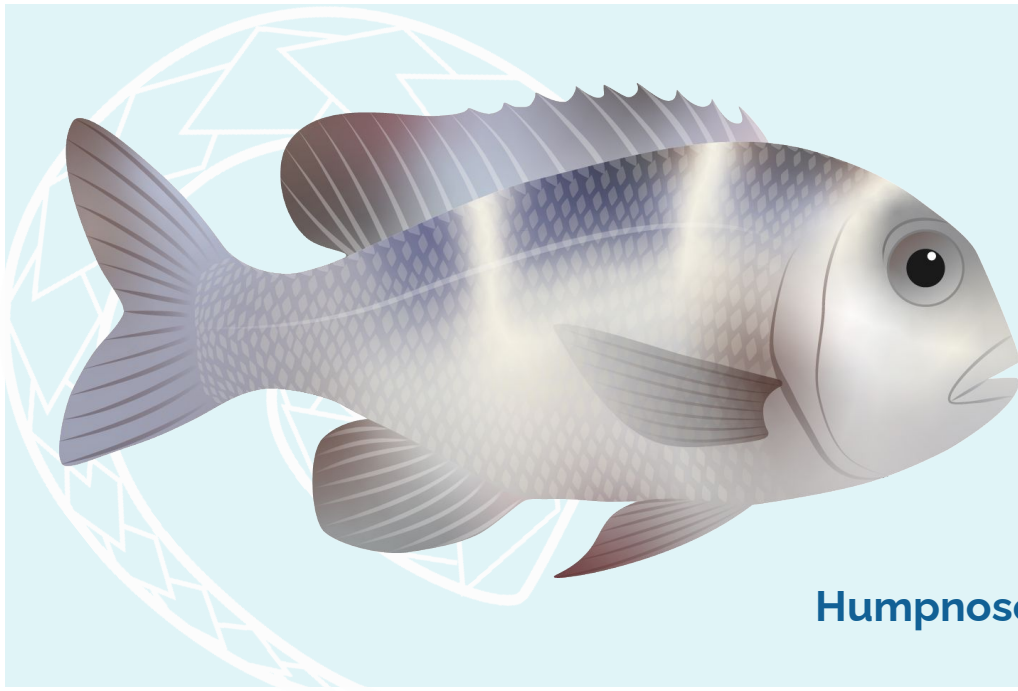
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Maasamas *Chuukese*

Matan hagon *Chamorro*

Mwet kosr *Kosraean*

Mojani *Marshallese*

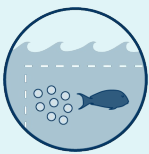
Besechamel *Palauan*

Pohnpeian

Wachamal *Yapese*

Humpnose big-eye bream *English*

PREFERRED MANAGEMENT OPTIONS



1. No-Take Zones

Protected areas that are large enough to meet the movement needs of target species allow individuals to grow to adults and reproduce successfully.



2. Size Limits

Allow fish to grow enough to reproduce and replenish populations.

See reverse side for details.

REGIONAL STATUS

**MODERATE
CONCERN**

Evidence of moderate overharvesting; fish are getting smaller

VULNERABILITY

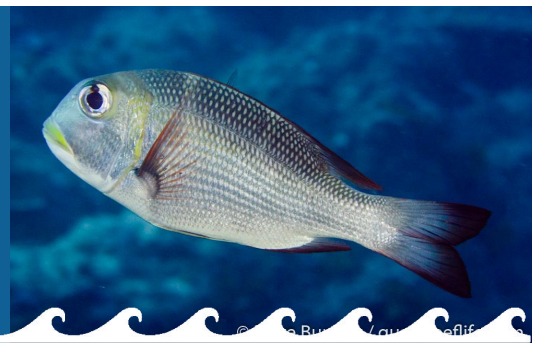
MODERATE

LOCAL STOCK ASSESSMENT (SPR)

0.31 (Guam)

LOCAL KNOWLEDGE

How has your local population of this species changed over time?



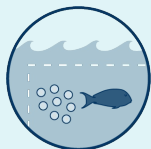
SPAWNING CONSIDERATIONS

Recommended to protect spawning locations and times



Time Closures

No clear time closures based on existing scientific knowledge



Area Closures

Consider creating a protected area at spawning sites

HABITATS NEEDED

Recommended to protect all important habitats for this species



Coral reefs

SIZE AT MATURITY: 11 inches



Recommended minimum size:
14 inches

HOME RANGE: 3 miles



Recommended to double home range for minimum no-take zone size:
6 miles

LOCAL KNOWLEDGE

Where and at what time of the year and/or moon phase does this species spawn in your area?

Are the habitats for these species protected?

Is there a no-take zone large enough to protect this species?



COMMERCIAL VALUE

- 2.5% of all commercial landings regionally
- Average **\$259,500** per year to the economy



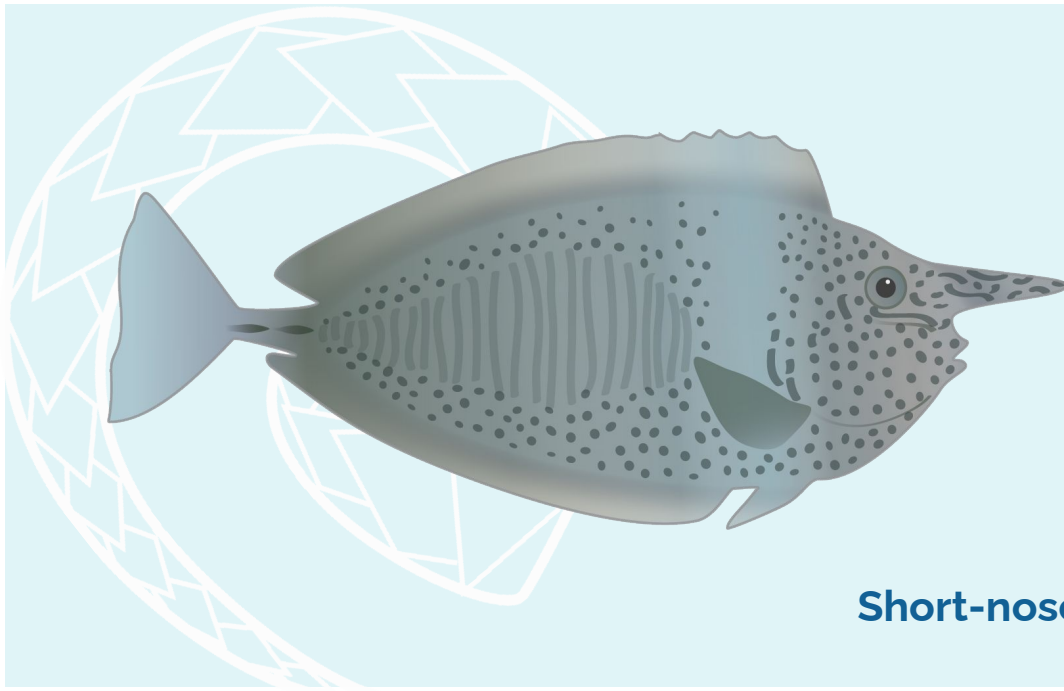
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Woot'u'ut *Chuukese*

Chamorro

Kosraean

Marshallese

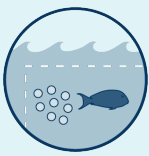
Palauan

Pohnpeian

Rrnaw *Yapese*

Short-nosed unicornfish *English*

PREFERRED MANAGEMENT OPTIONS



No-Take Zones

Protected areas that are large enough to meet the movement needs of target species allow individuals to grow to adults and reproduce successfully.

Species of no concern

Additional management actions outside of no-take zones may not be currently needed given healthy populations. Continue monitoring to identify any potential changes on status.

See reverse side for details.

REGIONAL STATUS

NO CONCERN

No evidence of compromised populations

VULNERABILITY

MODERATE

LOCAL STOCK ASSESSMENT (SPR)

N/A

LOCAL KNOWLEDGE

How has your local population of this species changed over time?



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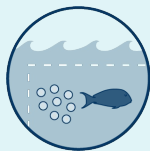
SPAWNING CONSIDERATIONS

Recommended to protect spawning locations and times



Time Closures

No clear time closures based on existing scientific knowledge



Area Closures

Consider creating a protected area at spawning sites

HABITATS NEEDED

Recommended to protect all important habitats for this species



Coral reefs

SIZE AT MATURITY: 14 inches



Recommended minimum size:
16 inches

HOME RANGE: 3 miles



Recommended to double home range for minimum no-take zone size:
6 miles

LOCAL KNOWLEDGE

Where and at what time of the year and/or moon phase does this species spawn in your area?

Are the habitats for these species protected?

Is there a no-take zone large enough to protect this species?

COMMERCIAL VALUE

- **0.8%** of all commercial landings regionally
- Average **\$84,500** per year to the economy



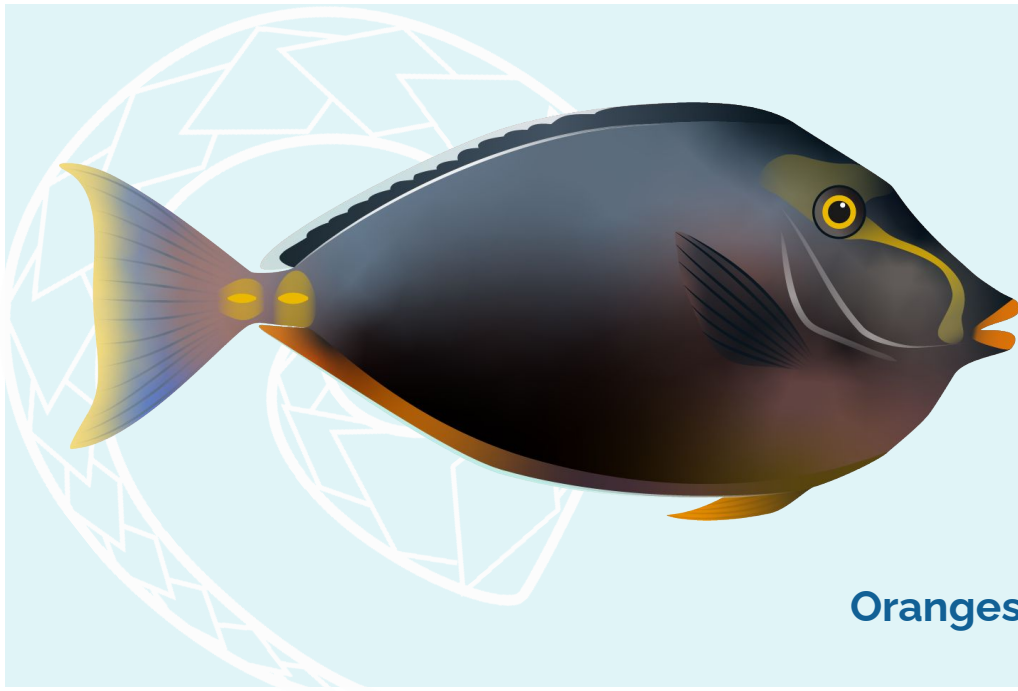
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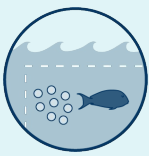
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Pwuna *Chuukese*
Hangon *Chamorro*
Fihlack *Kosraean*
Bwilak *Marshallese*
Erangel *Palauan,*
Pohnpeian
Erngal *Yapese*

Orangespine unicornfish *English*

PREFERRED MANAGEMENT OPTIONS



No-Take Zones

Protected areas that are large enough to meet the movement needs of target species allow individuals to grow to adults and reproduce successfully.

Species of no concern

Additional management actions outside of no-take zones may not be currently needed given healthy populations. Continue monitoring to identify any potential changes on status.

See reverse side for details.

REGIONAL STATUS

NO CONCERN

No evidence of compromised populations

VULNERABILITY

MODERATE

LOCAL STOCK ASSESSMENT (SPR)

0.26 (Palau)

LOCAL KNOWLEDGE

How has your local population of this species changed over time?



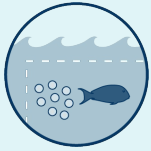
SPAWNING CONSIDERATIONS

Recommended to protect spawning locations and times



Time Closures

No clear time closures based on existing scientific knowledge



Area Closures

Consider creating a protected area at spawning sites

HABITATS NEEDED

Recommended to protect all important habitats for this species



Coral reefs

SIZE AT MATURITY: 8 inches



*Recommended **minimum size:**
10 inches*

HOME RANGE: 3 miles



*Recommended to double home range
for **minimum no-take zone size:**
6 miles*

LOCAL KNOWLEDGE

Where and at what time of the year and/or moon phase does this species spawn in your area?

Are the habitats for these species protected?

Is there a no-take zone large enough to protect this species?

COMMERCIAL VALUE

- **4.3%** of all commercial landings regionally
- Average **\$454,500** per year to the economy

CLIMATE BENEFITS

- ✓ **Herbivore**
- They graze on seaweed
- Key for maintaining coral reef health in the face of climate change and other stressors



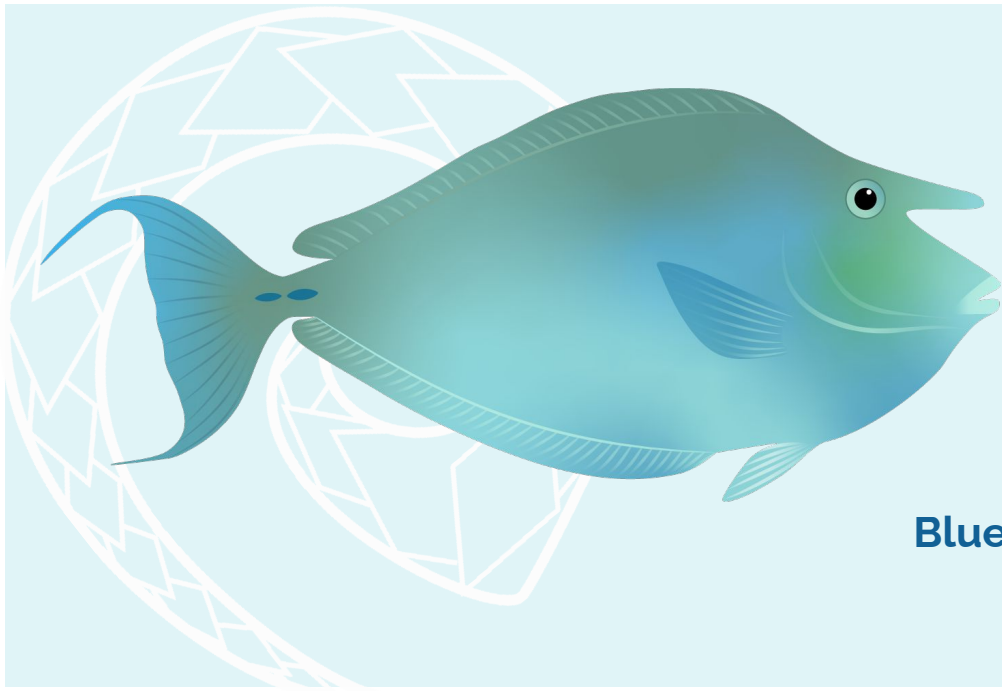
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Pe'e'chew *Chuukese*

Tataga *Chamorro*

Ik-koac *Kosraean*

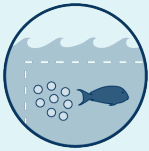
Mone *Marshallese*

Um *Palauan, Yapese*

Pwulak *Pohnpeian*

Bluespine unicornfish *English*

PREFERRED MANAGEMENT OPTIONS



1. No-Take Zones

Protected areas that are large enough to meet the movement needs of target species allow individuals to grow to adults and reproduce successfully.



2. Size Limits

Allow fish to grow enough to reproduce and replenish populations.



3. Spawning Protections

Protections during times fish are aggregating and excessively targeted should be considered.

See reverse side for details.

REGIONAL STATUS

**MODERATE
CONCERN**

Evidence of moderate overharvesting; fish are getting smaller and excessive harvesting during specific times

VULNERABILITY

MODERATE

LOCAL STOCK ASSESSMENT (SPR)

0.2 (Palau) -
0.34 (Guam)

LOCAL KNOWLEDGE

How has your local population of this species changed over time?



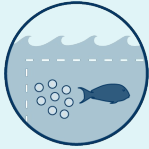
SPAWNING CONSIDERATIONS

Recommended to protect spawning locations and times



Time Closures

Consider fishing limits during new moon and high season



Area Closures

Consider creating a protected area at spawning sites

HABITATS NEEDED

Recommended to protect all important habitats for this species



Coral reefs



Seagrass

SIZE AT MATURITY: 11 inches



Recommended minimum size:
14 inches

HOME RANGE: 3 miles



Recommended to double home range for minimum no-take zone size:
6 miles

LOCAL KNOWLEDGE

Where and at what time of the year and/or moon phase does this species spawn in your area?

Are the habitats for these species protected?

Is there a no-take zone large enough to protect this species?

COMMERCIAL VALUE

- **10.5%** of all commercial landings regionally
- Average **\$1,094,000** per year to the economy

CLIMATE BENEFITS

- ✓ **Herbivore**
- They graze on seaweed
- Key for maintaining coral reef health in the face of climate change and other stressors



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Feinisi *Chuukese*

Sakmoneten pento *Chamorro*

Futfut *Kosraean*

Marshallese

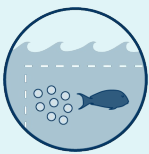
Bang *Palauan*

Pohnpeian

Mbing *Yapese*

Dash and dot goatfish *English*

PREFERRED MANAGEMENT OPTIONS



No-Take Zones

Protected areas that are large enough to meet the movement needs of target species allow individuals to grow to adults and reproduce successfully.

Species of no concern

Additional management actions outside of no-take zones may not be currently needed given healthy populations. Continue monitoring to identify any potential changes on status.

See reverse side for details.

REGIONAL STATUS

NO CONCERN

No evidence of compromised populations

VULNERABILITY

MODERATE

LOCAL STOCK ASSESSMENT (SPR)

N/A



LOCAL KNOWLEDGE

How has your local population of this species changed over time?

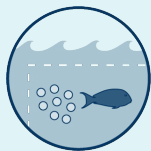
SPAWNING CONSIDERATIONS

Recommended to protect spawning locations and times



Time Closures

No clear time closures based on existing scientific knowledge



Area Closures

Consider creating a protected area at spawning sites

HABITATS NEEDED

Recommended to protect all important habitats for this species



Coral reefs



Seagrass



Sandy bottom

SIZE AT MATURITY: 6 inches



*Recommended **minimum size:**
7 inches*

HOME RANGE: 0.5 miles



*Recommended to double home range for **minimum no-take zone size:**
1 mile*

LOCAL KNOWLEDGE

Where and at what time of the year and/or moon phase does this species spawn in your area?

Are the habitats for these species protected?

Is there a no-take zone large enough to protect this species?



COMMERCIAL VALUE

- 2.5% of all commercial landings regionally
- Average **\$258,000** per year to the economy



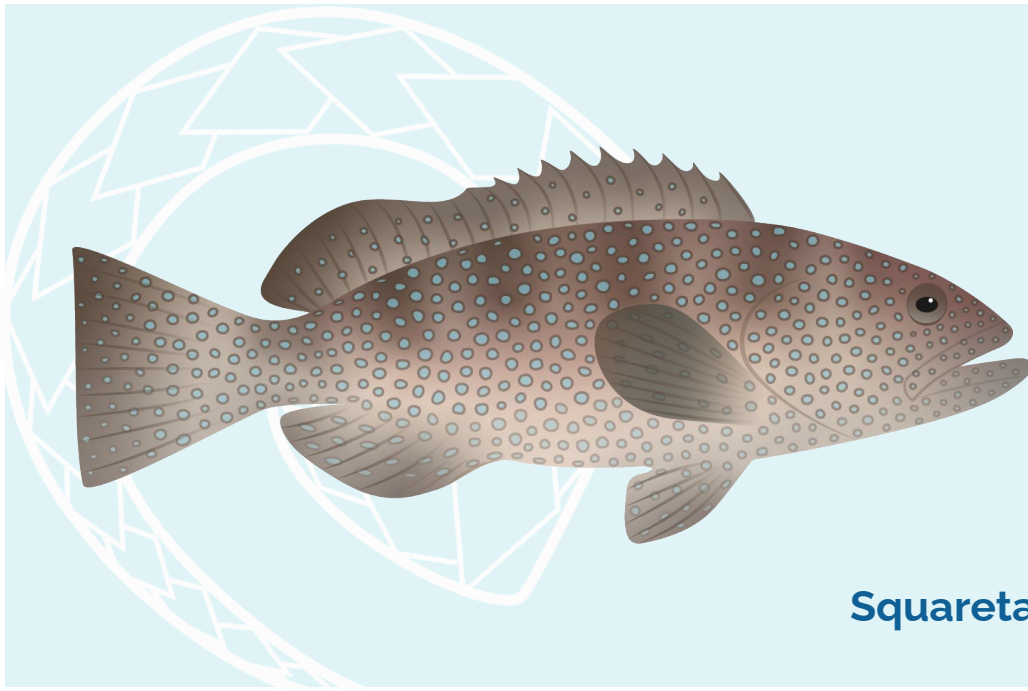
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Sewi *Chuukese*

Chamorro

Kosraean

Jauwe *Marshallese*

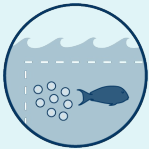
Tiau *Palauan*

Sawi *Pohnpeian*

Ruchiol *Yapese*

Squaretail coral grouper *English*

PREFERRED MANAGEMENT OPTIONS



1. No-Take Zones

Protected areas that are large enough to meet the movement needs of target species allow individuals to grow to adults and reproduce successfully.



2. Spawning Protections

Protections during times fish are aggregating and excessively targeted should be considered.



3. Size Limits

Allow fish to grow enough to reproduce and replenish populations.

See reverse side for details.

REGIONAL STATUS

**MODERATE
CONCERN**

Evidence of moderate overharvesting: fish are getting smaller and excessive harvesting during specific times

VULNERABILITY

MODERATE

LOCAL STOCK ASSESSMENT (SPR)

0.05 (Palau)



LOCAL KNOWLEDGE

How has your local population of this species changed over time?

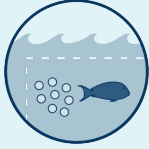
SPAWNING CONSIDERATIONS

Recommended to protect spawning locations and times



Time Closures

Consider fishing limits during new/full moon and high season (variable across islands)



Area Closures

Consider creating a protected area at spawning sites

HABITATS NEEDED

Recommended to protect all important habitats for this species



Coral reefs

SIZE AT MATURITY: 15 inches



Recommended minimum size:
18 inches

HOME RANGE: 0.5 miles



Recommended to double home range for minimum no-take zone size:
1 mile

LOCAL KNOWLEDGE

Where and at what time of the year and/or moon phase does this species spawn in your area?

Are the habitats for these species protected?

Is there a no-take zone large enough to protect this species?

COMMERCIAL VALUE

- 3% of all commercial landings regionally
- Average **\$315,500** per year to the economy



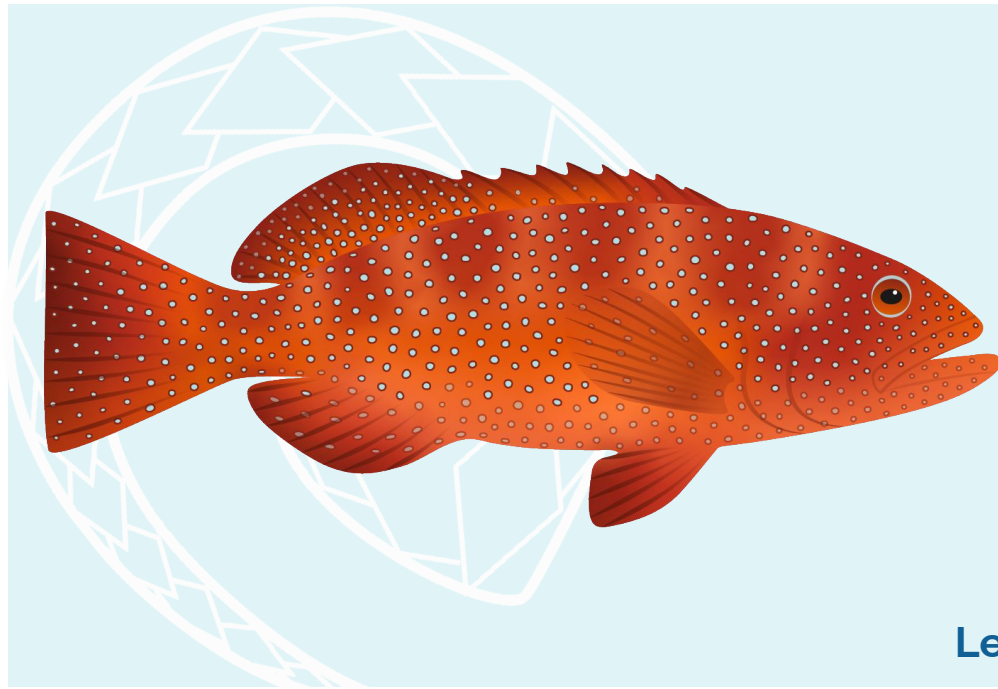
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Sewi *Chuukese*

Chamorro

Kosraean

Marshallese

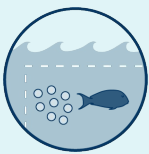
**Bekeerekard
el tiau** *Palauan*

Sawi *Pohnpeian*

Ruchiol *Yapese*

Leopard coral trout *English*

PREFERRED MANAGEMENT OPTIONS



1. No-Take Zones

Protected areas that are large enough to meet the movement needs of target species allow individuals to grow to adults and reproduce successfully.



2. Size Limits

Allow fish to grow enough to reproduce and replenish populations.

See reverse side for details.

REGIONAL STATUS

**MODERATE
CONCERN**

Evidence of moderate overharvesting: fish are getting smaller

VULNERABILITY

HIGH

LOCAL STOCK ASSESSMENT (SPR)

0.01 (Palau)

LOCAL KNOWLEDGE

How has your local population of this species changed over time?



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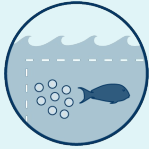
SPAWNING CONSIDERATIONS

Recommended to protect spawning locations and times



Time Closures

Consider fishing limits during new/full moon and high season (variable across islands)



Area Closures

Consider creating a protected area at spawning sites

HABITATS NEEDED

Recommended to protect all important habitats for this species



Coral reefs

SIZE AT MATURITY: 15 inches



Recommended minimum size:
17 inches

HOME RANGE: 2 miles



Recommended to double home range for minimum no-take zone size:
4 miles

LOCAL KNOWLEDGE

Where and at what time of the year and/or moon phase does this species spawn in your area?

Are the habitats for these species protected?

Is there a no-take zone large enough to protect this species?

COMMERCIAL VALUE

- **0.6%** of all commercial landings regionally
- Average **\$67,000** per year to the economy



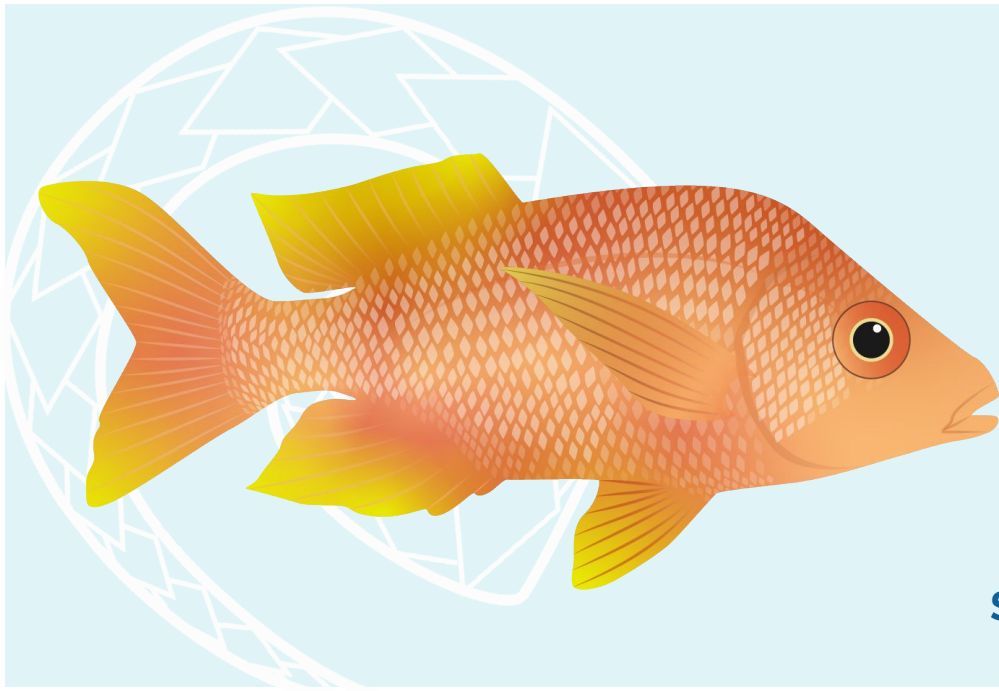
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Haara *Chuukese*

Saksak fetda *Chamorro*

Sruhlah *Kosraean*

Jera *Marshallese*

Desachel *Palauan*

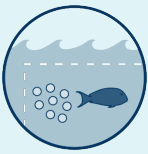
Pohnpeian

Yoch *Yapese*

Sabre squirrelfish *English*

PREFERRED MANAGEMENT OPTIONS

1. No-Take Zones



Protected areas that are large enough to meet the movement needs of target species allow individuals to grow to adults and reproduce successfully.

2. Size Limits



Allow fish to grow enough to reproduce and replenish populations.

See reverse side for details.

REGIONAL STATUS

LOW CONCERN

Evidence of light overharvesting: fish are getting smaller

VULNERABILITY

MODERATE

LOCAL STOCK ASSESSMENT (SPR)

N/A



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LOCAL KNOWLEDGE

How has your local population of this species changed over time?

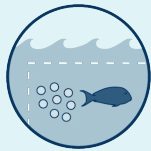
SPAWNING CONSIDERATIONS

Recommended to protect spawning locations and times



Time Closures

Consider fishing limits during full moon



Area Closures

Consider creating a protected area at spawning sites

HABITATS NEEDED

Recommended to protect all important habitats for this species



Coral reefs

SIZE AT MATURITY: 8 inches



Recommended minimum size:
10 inches

HOME RANGE: .06 miles



Recommended to double home range for minimum no-take zone size:
.12 miles

LOCAL KNOWLEDGE

Where and at what time of the year and/or moon phase does this species spawn in your area?

Are the habitats for these species protected?

Is there a no-take zone large enough to protect this species?

COMMERCIAL VALUE

- **0.9%** of all commercial landings regionally
- Average **\$97,000** per year to the economy



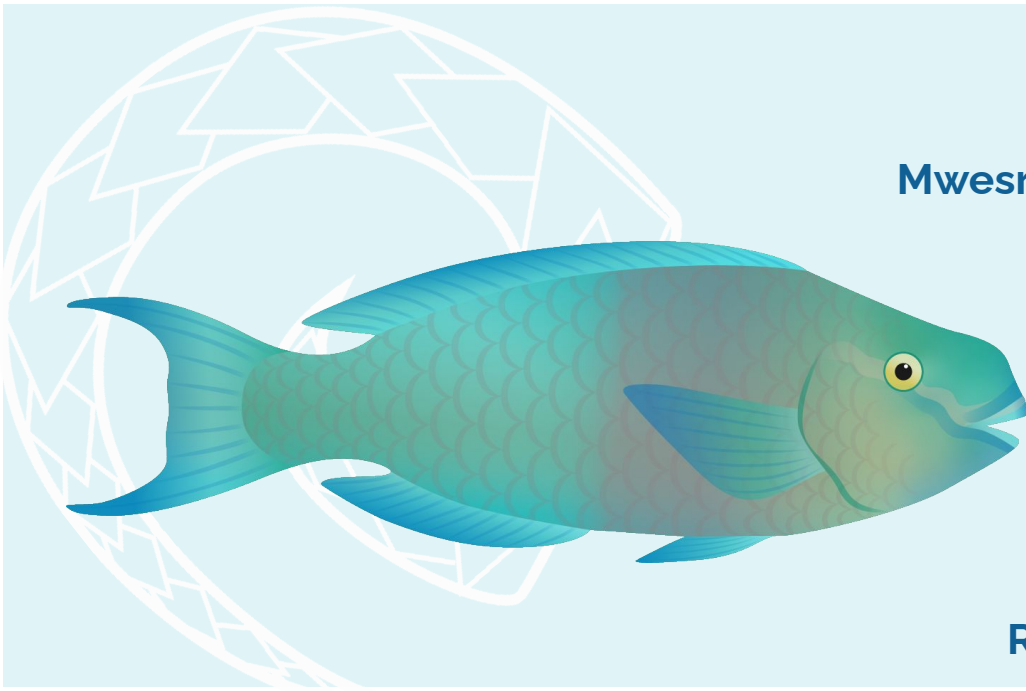
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Aapo *Chuukese*

Laggua *Chamorro*

**Mwesrihk in-ngoasr
sruhsrah** *Kosraean*

Marshallese

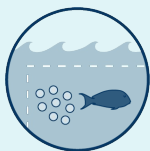
Butiliang *Palauan*

Pohnpeian

Alabal *Yapese*

Redlip parrotfish *English*

PREFERRED MANAGEMENT OPTIONS



1. No-Take Zones

Protected areas that are large enough to meet the movement needs of target species allow individuals to grow to adults and reproduce successfully.



2. Catch Limits

Strict catch limits to maintain a viable population.



3. Size Limits

Allow fish to grow enough to reproduce and replenish populations.

See reverse side for details.

REGIONAL STATUS

**MODERATE
CONCERN**

Evidence of moderate overharvesting: fewer fish and fish are getting smaller

VULNERABILITY

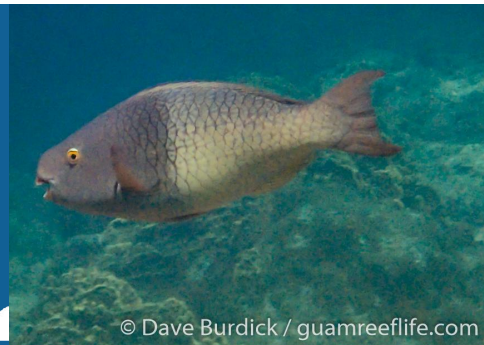
LOW

LOCAL STOCK ASSESSMENT (SPR)

0.07 (Palau) -
0.21 (Guam)

LOCAL KNOWLEDGE

How has your local population of this species changed over time?



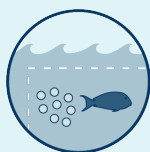
SPAWNING CONSIDERATIONS

Recommended to protect spawning locations and times



Time Closures

No clear time closures based on existing scientific knowledge



Area Closures

Consider creating a protected area at spawning sites

HABITATS NEEDED

Recommended to protect all important habitats for this species



Coral reefs



Seagrass

SIZE AT MATURITY: 12 inches



Recommended minimum size:
15 inches

HOME RANGE: 2 miles



Recommended to double home range for minimum no-take zone size:
4 miles

LOCAL KNOWLEDGE

Where and at what time of the year and/or moon phase does this species spawn in your area?

Are the habitats for these species protected?

Is there a no-take zone large enough to protect this species?

COMMERCIAL VALUE

- 2.9% of all commercial landings regionally
- Average **\$298,000** per year to the economy

CLIMATE BENEFITS

- ✓ **Herbivore**
- They graze on seaweed
- Key for maintaining coral reef health in the face of climate change and other stressors



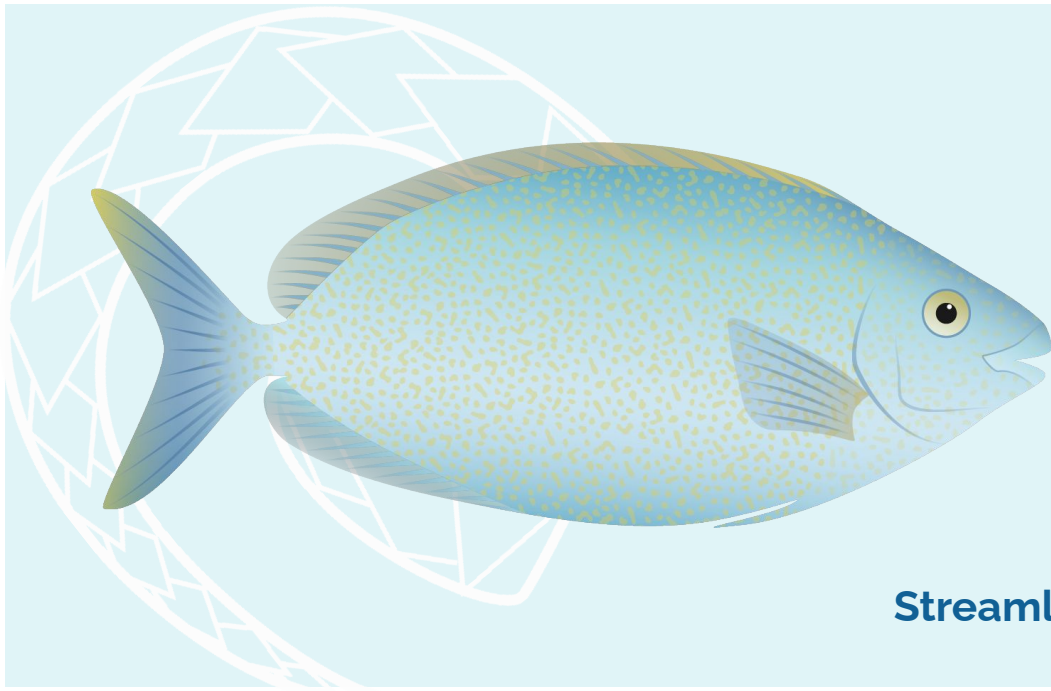
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Ikeinin *Chuukese*

Hiting kalau *Chamorro*

Nuesron *Kosraean*

Mole *Marshallese*

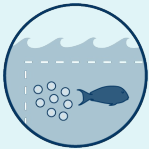
Palauan

Pohnpeian

Biywod *Yapese*

Streamlined spinefoot *English*

PREFERRED MANAGEMENT OPTIONS



1. No-Take Zones

Protected areas that are large enough to meet the movement needs of target species allow individuals to grow to adults and reproduce successfully.



2. Spawning Protections

Protections during times fish are aggregating and excessively targeted should be considered.



3. Size Limits

Allow fish to grow enough to reproduce and replenish populations.

See reverse side for details.

REGIONAL STATUS

LOW CONCERN

Evidence of light overharvesting; fish are getting smaller and excessive harvesting during specific times

VULNERABILITY

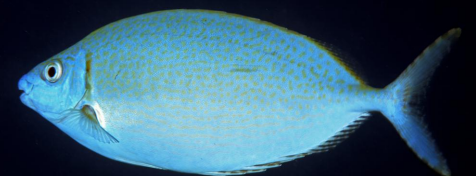
LOW

LOCAL STOCK ASSESSMENT (SPR)

N/A

LOCAL KNOWLEDGE

How has your local population of this species changed over time?



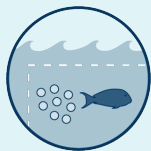
SPAWNING CONSIDERATIONS

Recommended to protect spawning locations and times



Time Closures

Consider fishing limits during full moon



Area Closures

Consider creating a protected area at spawning sites

HABITATS NEEDED

Recommended to protect all important habitats for this species



Coral reefs



Seagrass

SIZE AT MATURITY: 9 inches



Recommended *minimum size*:
10 inches

HOME RANGE: 2 miles



Recommended to double home range for *minimum no-take zone size*:
4 miles

LOCAL KNOWLEDGE

Where and at what time of the year and/or moon phase does this species spawn in your area?

Are the habitats for these species protected?

Is there a no-take zone large enough to protect this species?

COMMERCIAL VALUE

- 2.2% of all commercial landings regionally
- Average **\$225,500** per year to the economy

CLIMATE BENEFITS

- ✓ **Herbivore**
- They graze on seaweed
- Key for maintaining coral reef health in the face of climate change and other stressors



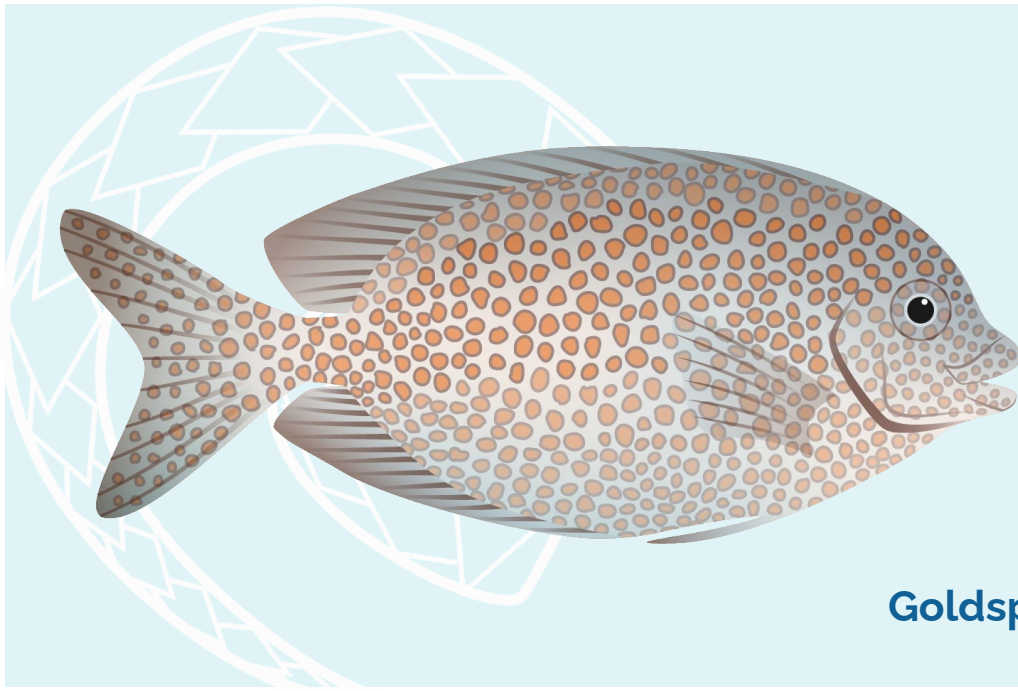
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Nipinini *Chuukese*

Tabi *Chamorro*

Mweosra *Kosraean*

Moramor *Marshallese*

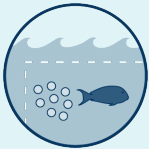
Palauan

Pohnpeian

Ayit *Yapese*

Goldspotted spinefoot *English*

PREFERRED MANAGEMENT OPTIONS



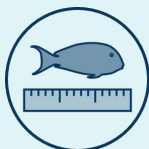
1. No-Take Zones

Protected areas that are large enough to meet the movement needs of target species allow individuals to grow to adults and reproduce successfully.



2. Spawning Protections

Protections during times fish are aggregating and excessively targeted should be considered.



3. Size Limits

Allow fish to grow enough to reproduce and replenish populations.

See reverse side for details.

REGIONAL STATUS

LOW CONCERN

Evidence of light overharvesting; fish are getting smaller and excessive harvesting during specific times

VULNERABILITY

LOW

LOCAL STOCK ASSESSMENT (SPR)

N/A

LOCAL KNOWLEDGE

How has your local population of this species changed over time?



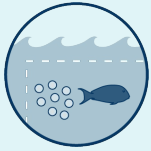
SPAWNING CONSIDERATIONS

Recommended to protect spawning locations and times



Time Closures

Consider fishing limits during new moon



Area Closures

Consider creating a protected area at spawning sites

HABITATS NEEDED

Recommended to protect all important habitats for this species



Coral reefs



Seagrass

SIZE AT MATURITY: 8 inches



Recommended *minimum size*:
10 inches

HOME RANGE: 2 miles



Recommended to double home range for *minimum no-take zone size*:
4 miles

LOCAL KNOWLEDGE

Where and at what time of the year and/or moon phase does this species spawn in your area?

Are the habitats for these species protected?

Is there a no-take zone large enough to protect this species?

COMMERCIAL VALUE

- **1.3%** of all commercial landings regionally
- Average **\$131,000** per year to the economy

CLIMATE BENEFITS

- ✓ **Herbivore**
- They graze on seaweed
- Key for maintaining coral reef health in the face of climate change and other stressors



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