AQUARIUM FISH BLACK LIST
AND
RECOMMENDATIONS FOR THE MANAGEMENT OF AQUARIUM FISH COLLECTION IN FRENCH POLYNESIA

Prepared by

Secretariat of the Pacific Community (SPC)

for

Direction des Ressources Marines et Minières de Polynésie Française

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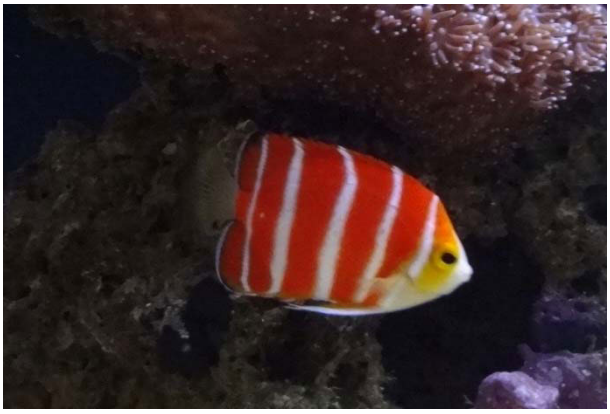
Neocirrhites armatus



Centropyge boylei

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Genicanthus bellus - Discovered in Tahiti, French Polynesia; described in 1975

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TABLE OF CONTENTS

LIST OF FIGURES

LIST OF ACRONYMS

UBA	Underwater Breathing Apparatus
SCUBA	Self-Contained Underwater breathing Apparatus
TAC	Total Allowable Catch
SPC	Secretariat of the Pacific Community
DRMM	Direction des Ressources Marines et Minières
TMA	Tahiti Marine Aquaculture
WHRFMA	West Hawai'i Regional Fishery Management Area

EXECUTIVE SUMMARY

The marine aquarium trade has been active in French Polynesia since the early 1970s. According to the law, the use of an Underwater Breathing Apparatus (UBA) to collect fish for the aquarium trade is strictly prohibited. However, information provided in recent online articles and obtained from reliable sources within the trade indicates that deep-water species have been collected in French Polynesia and exported to the U.S.A. and Japan for sale.

The main goal of this study was to develop a fish species "Black List" for French Polynesia; in other words to establish a list of fish species, which based on their depth distribution are banned from collection and/or export. This list was to include species known to occur in the Society Islands, Austral Islands and Tuamotu-Gambier Archipelago of French Polynesia that are of interest in the marine aquarium trade and for which sufficient information/data were available to develop such a list[1]. The Black List was developed based on communications with well-established and reputable aquarium trade fish collectors and exporters in the region, published and online data, and a detailed analysis of all gathered and available information which took into account the following key considerations:

1. information available on species depth distribution, with further consideration being given to the depth distribution of a given species' targeted size;
2. ease of collecting the species while free diving;
3. depth an experienced collector can be expected to reach to collect a given species; and
4. likelihood of habitat damage during collection.

Fish that are generally not traded by reputable exporters/importers because of very poor adaptability to captive conditions and food (i.e., they typically die) have been included in this Black List. Their inclusion is seen as contributing to French Polynesia maintaining a high standard in the aquarium trade. While the development of the Black List constituted the primary output of this report, a White List was developed in parallel[2] (i.e., species allowed for collection). Species on the White List were also ranked on a scale from 0-5 (with 0=low and 5=high priority) to inform and prioritise the development of a species-specific TAC system.

In addition to the immediate implementation of the Black List it is recommended that over the short term the following regulations be developed:

1. All collectors to apply for an annual license to *fish* for aquarium fish allowing the use of any size mesh for the collection of aquarium fish only. To obtain such a license a collector would have to sign a document agreeing to:
    - Provide Daily Catch Reports by species collected and by collection area as well as time spent underwater (i.e., provide information pertaining to day person went fishing; free diving location(s); number of fish for each species caught at each location; means used for collection; time spent free diving at each location);

[1] While some species in the Marquesas may also be of interest to the aquarium trade, the study did not extend to these islands due to the length of time and effort that would be required to gather relevant and available data to make informed recommendations (i.e., outside of the scope of the present study).

[2] Species not listed on the Black List or White List can still be collected

- Not collect fish in any way that may harm the environment, especially coral colonies and the reef framework, the target species, or surrounding fauna and flora (i.e., ban on any destructive collection means and the use of toxic chemicals of either natural or synthetic form);
- Not use UBA for the collection of aquarium fish;
- Not collect any fish species listed on the Black List;
- Maintain fish in good health at all times (i.e., handle fish according to best practices from the point of collection free diving to drop-off at the exporter's facility);
- Adhere to a size and bag (i.e., number) limit for fish species that are also a common food source that will be determined and communicated by DRMM; and
- Adhere to location specific annual TAC rates for species of concern (e.g., flame hawkfish, *Neocirrhites armatus*) that will be determined and communicated by DRMM;

2. DRMM to develop location and exporter-specific annual TAC rates for species of concern (e.g., flame hawkfish, *Neocirrhites armatus*); and
3. All exporters to apply for an annual license to *export* aquarium fish. To obtain such a license the exporter would have to sign a document agreeing to the following:
    - Have a facility that maintains all fish in good health from arrival from the sea to the point of export;
    - Allow facility inspections without prior notice; and
    - Submit to the DRMM:
        i. Number of fish by species and collector after each collecting trip and upon arrival at the facility (to be submitted on a monthly basis);
        ii. Number of fish by species for each shipment, with a record of export destination and airway bill number. A copy of the same document will need to be affixed to the shipment itself and checked by customs at export; and
        iii. Annual statistics: number of fish, by species and collector, that arrived at the facility; and number of fish by species and destination that were shipped.

It is recommended that over the long term an aquarium fish-specific set of regulations be developed giving strong consideration to allowing UBA for the collection of aquarium fish. Specific regulation recommendations may include:

1. UBA exemption for certified divers that hold a collection license;
2. A Black List that would only include species that are not suitable to be kept in aquaria or are in need of protection;
3. Use of nets by collectors that are no larger than 10 meters long, 2 meter high, and with mesh no larger than 20 mm stretched eye;
4. Support the establishment of a series of closed areas to protect target populations and reduce stakeholder conflicts;
5. No collection of fish between sun rise and sun set. This regulation should be reviewed for possible benefits and negatives only if an exemption is put in place for use of UBA. While UBA is banned this regulation should not be considered.

Should French Polynesia choose to re-develop Post-larval Capture and Collection (PCC) methods (e.g., crest nets, hoa nets, light traps for the collection of reef fish) with the objective to develop reef-eco tourism opportunities, and potentially some rare exports, specific regulations will need to be developed on a case by case basis to exempt relevant species from the developed "Black List".

A sustainable and well managed aquarium fishery could be successfully developed in French Polynesia. Due to the excellent resources in the region, the aquarium fishery has the potential to provide economic and employment benefits - in many cases to those who preserve a traditional lifestyle.

CONTEXT

The marine aquarium trade is a global multi-million dollar industry, worth an estimated US$200-330 million annually, and operating throughout the tropics (Wabnitz et al. 2003). A total of around 1,500 species of fish are traded worldwide with the best estimate of annual global trade ranging between 20 and 24 million individuals (Wabnitz et al. 2003).

The marine aquarium trade has been active in French Polynesia since the early 1970s. In 2013, French Polynesia exported a total of 14,598 fish for a total value of 9.7 million XPF (~US$97 000), while in 2003 local statistics show that a total 83,300 specimens were exported for a total value of 26.6 million CFP (Cedric Ponsonnet, DRMM, 2014, *pers. comm.).* The trade started with the wild collection of aquarium fish and has evolved more recently to include exports of wild giant clams (*Tridacna maxima*), with expansion in 2013 to exporting giant clams from spat collection[3]. Currently there are two operators that trade in aquarium fish: Te Hotu Miti who only exports fish and currently focuses collection activities around the main island of Tahiti; and Tahiti Marine Aquaculture whose businesses has centred around the exports of clams sourced from the wild and grown from spat collection in the Tuamotu Archipelago, and only recently has branched out to also export fish collected around Reao and Tatakoto. Tahiti Tropical Fish, another company currently exporting clams sourced from the wild and grown from spat collection in the Tuamotu Archipelago, has expressed interest in training local fishermen as collectors to export fish.

According to the law, the use of an Underwater Breathing Apparatus (UBA) to collect fish for the aquarium trade is strictly prohibited (Delibération n°88-183 AT du 8 décembre 1988 modifiée[4] - see particularly Art. 9). However, information provided in recent online articles and obtained from reliable sources within the trade indicates that deep-water species, for example *Centropyge boylei* (Figure 1)[5], have been collected in French Polynesia and exported to the U.S.A. and Japan for sale.

Figure 1 – *Centropyge boylei*

[3] http://www.spc.int/DigitalLibrary/Doc/FAME/InfoBull/FishNews/139/FishNews139_16_Remoissenet.pdf
[4] http://www.peche.pf/IMG/pdf/Deliberation_no_88-183_AT_du_08_12_1988_consolide.pdf
"Art. 9 - Est interdit d'utiliser pour l'exercice de la pêche sous-marine, tout équipement autonome ou non permettant à une personne immergée de respirer sans revenir à la surface, excepté pour la destruction de la «Taramea» *Acanthaster planci*.
[5] "*In Rarotonga in the Cook Islands the peppermint angelfish lives well beyond 300 feet deep where the water frequently approaches 70F degrees or less. Luckily, these new peppermint angelfish treasures were collected by Rufus Kimura at a similar South Pacific location where the water was much warmer at depth."* Read more: http://reefbuilders.com/2013/02/12/live-peppermint-angelfish-blue-harbor-japan/#ixzz2tFgsO2zB (note that while the articles do not specify where these fish come from, reliable sources within the industry indicate that the fish were caught in French Polynesia)

The species involved have not been recorded in depths of less than 50 meters and are usually found deeper. There are no records of the species involved being collected with standard SCUBA air; all reports indicate they have been collected with trimix gas or re-breather. Therefore, all information points to the fact that these species were collected illegally with the use of UBA. It is suspected that in most instances foreign divers came into the country and exported the fish via locally-based exporters. These events prompted the French Polynesian Direction des Ressources Marines et Minières (DRMM) to seek SPC's assistance in addressing the issue.

French Polynesia currently does not require exporters to submit species-specific packing lists, unlike most countries in the region, except for exports to the EU that require an animal's health certificate at the species-specific level. At the statistics level therefore, only the total number of fish exported in a given year is recorded for statistical purposes by Customs. While DRMM and SPC are working in partnership to fundamentally revisit the legal basis regulating the collection and export of aquarium species, recognizing that this is a long term solution, it was suggested that a "Black List" be drafted to address the issue of UBA-use for the collection of aquarium fish over the short term.

OBJECTIVES

The main goal of this study was to develop a fish species "Black List" for French Polynesia; in other words to establish a list of fish species, which based on their depth distribution should be prohibited from collection and/or export, to assist in enforcing the ban on collection of aquarium fish using UBA. This list was to include species known to occur in the Society Islands, Austral Islands and Tuamotu Archipelago of French Polynesia and that are of interest in the marine aquarium trade. The Marquesas islands were not included as part of this study as data are too few to permit a thorough assessment and the islands harbor a large number of endemic species. The Black List was developed based on the following key considerations:

1. Information available on species depth distribution, with further consideration being given to the depth distribution of a given species' targeted size;
2. Ease of collecting the species while free diving;
3. Depth an experienced collector can be expected to reach to collect a given species; and
4. Likelihood of habitat damage during collection.

Fish that are generally not traded by reputable exporters/importers because of very poor adaptability to captive conditions and food (i.e., they typically die) have been included in this Black List. Their inclusion is seen as contributing to French Polynesia maintaining a high standard in the aquarium trade.

In addition to addressing the main goal above, a review of aquarium fish collection regulations in various countries was also undertaken. The objective was to find which regulations may be applicable to the species and habitats found in French Polynesia to formulate a list of recommended regulations. Finally, a review of aquarium fish exported from French Polynesia was completed to identify species that had greater vulnerability to fishing pressure and should be carefully monitored.

Figure 2 -- An aquarium in Tahiti holding *Centropyge loricula* and *Nemateleotris magnifica* for export to the USA in 1973.

HISTORY OF AQUARIUM FISH BLACK LISTS & WHITE LISTS

In general, references to a "Black List" or "White List" are rarely seen in aquarium fisheries' regulations. What is seen with some frequency is a list (not referred to as a Black List) that typically includes species that cannot be collected for sale in the aquarium trade as they are targeted by food fisheries. From an environmental and sustainability standpoint, a cost-benefit analysis usually is not undertaken to compare impacts on reef ecosystem, and revenues derived, from removing a species for aquarium purposes compared to removal for food benefit. In addition, there is usually no analysis to substantiate if removing a species of fish at a small size, as is typically the case for the aquarium trade market, and in the numbers required for the aquarium fishery, has any effect on the population utilized for food (i.e., whether the conflict is real versus perceived).

Hawai'i has the typical food fish restrictions alluded to above. However, the State wanted to also develop a Black List specifically targeting the aquarium fishery. In developing the Black List, the concept of a White List was proposed to protect biodiversity, listing only the species that *could* be collected for the aquarium trade (i.e., fishermen can only catch species on the White List). Developing a "list" also had the advantage of making reference to a small number of species; making it easier to target resources to efficiently monitor those species to determine effects of fishing pressure and overall sustainability of the fishery. The White List, developed for the Big Island of Hawai'i, does not include a number of fish species found in high abundance on the reef and collected only occasionally, based on the principle of protecting biodiversity (e.g., *Chromis vanderbilti*). With this in mind it is not unreasonable to protect fish that would rarely be found in water shallow enough to collect commercially in French Polynesia. In doing so, other stakeholders, such as snorkeling tourists for example, would be able to see a fish normally found in deeper water.

While the original proposal of a Black List for the Big Island, Hawai'i, drew complaints from some aquarium fishermen, the White List resulted in grievances being filed by nearly all

aquarium fishermen. Most of them took issue with banning collection of a species without any scientific data to show it was being over-harvested and instead banning it under the precautionary approach to preserve biodiversity. It took over two years for these regulations to be passed, and when they did, it was supported by the Big Island Aquarium Fishermen association via a very slim majority vote. However, the majority of aquarium fishermen collecting fish throughout the State of Hawaii (including those holding licenses in Oahu for example and those that do not belong to the association) did not support it. Thus, in the case of the Big Island, if officials had stuck to drafting a Black List[6] instead of a White List, it would have been accepted with less opposition. In both instances, it was felt that "the List" should be constrained to a maximum of 40 species to limit enforcement identification issues. With no precedent established it is not possible to verify if this would have been the case, but it was an important consideration in developing a Black List for French Polynesia.

APPROACH UTILIZED AND KEY CONSIDERATIONS

The Black List provided in this report includes fish species that are likely to be collected with the illegal use of UBA, cannot be kept alive in aquariums, or whose collection is likely to result in significant habitat damage if/when collected free diving. This list only focuses on aquarium collection of adult and/or juvenile fish of interest for the aquarium trade and not post-larvae, the capture and collection of which, for species included in the herein developed Black List, French Polynesia may wish to exempt (given that UBA is not being utilized), provided a set of relevant guidelines and criteria are developed and met. If PCC techniques are to be used for the capture, collection and possible export of some species, a special permit will need to be obtained outlining project objectives and other information such as for example species of interest/targeted, funding body and grant number (if and where applicable), and provision of detailed information from collection to export (e.g., collection site, numbers collected, days raised at facility etc…) for traceability purposes. Based on documented results obtained over a number of years, specific black-list species may then be given consideration to be exempt for PCC purposes.

The development of the Black List is the primary output of this report. In addition, a White List[7] was created (i.e., species allowed for collection) should there be a change in strategy (see Annex I). The White List serves the purpose to demonstrate the fish species that were considered for the Black List and the reasons these were not retained. The White List here includes species considered to be collectable while free diving only – species found to have been omitted can be considered to be included on the White List.

Gears most commonly used in the aquarium fishery and considered best practice will vary by species targeted but typically include very small and medium fence nets and hand or scoop nets with a stretched eye mesh of less than 20 mm[8]. A fence net is built with floats on top and weights along the bottom. The fish are directed into the net with a long (fiberglass) stick and

[6] With the idea of the Black List here supporting regulation already in place (i.e., not adding new regulations), listing species that clearly need protection or harvest control measures, and species for which the majority of the aquarium fish importers agree they cannot be kept alive in aquaria.

[7] Species not listed on the Black List or White List can still be collected

[8] Many countries ban small mesh netting but the use of large mesh netting for aquarium collection results in the following serious issues: (i) target and non-target species gill in the net and then die; and (ii) with a large mesh only larger aquarium fish can be collected resulting in the removal of mature individuals (i.e., breeding stock) that contribute to renewal of the population.

then taken off the net by hand or with a small scoop net. A small mesh ensures that non-target fish are generally not gilled or damaged. When nets are set they are never left unattended or indiscriminately on the bottom. This style of fishing and net allows the capture of smaller aquarium fish that are desired by the trade with minimal impact on non-target species and habitat. Traps are occasionally used but they are not prevalent in the aquarium fishery. Traps can be used to collect some species of Chaetodon and Labridae, but as they are not constantly monitored the fish often rub their mouths continuously against the edges, causing damage, with fish quality being low as a consequence. Predators (e.g., moray eels) often will enter the trap and eat the fish or scare them such that they damage themselves on the trap mesh. Each species of fish collected for aquariums has a preferred size range, but traps unfortunately catch any species of fish at any size without discrimination. The percentage of fish retained as desirable compared to the total number of fish caught by the trap and released, usually damaged, can be quite small. If traps are utilized they should have a rot-out panel so that if lost they do not continue to catch fish for years after being set.

Criteria for a species to be included on the White List were as follows:

- One published or online reference citing that the species is found at depths less than 10 meters;
- Two experienced collectors' opinion that it was viable to collect the species free diving without significant habitat damage; and
- At minimum one exporter located in another country regularly exporting commercial quantities of the species without the use of UBA.

Species on the White List were also ranked on a scale from 0-5 (with 0=low and 5=high priority) to inform and prioritise the development of a species-specific TAC system. The overall rank was arrived at based on a number of factors and considerations including the species range; density; whether the main population may be found below 10m; and market demand (see Annex II).

Data and Criteria

For a given fish species to be included in the Black List the criteria and data listed below were utilized:

1. One published reference or Fish Base (www.fishbase.org) citing the species' depth range to be greater than 10 meters. Fish that were found deeper than 10 meters were automatically assigned to the Black List. The majority of species on the Black List are only known from depths that fish unequivocally could not be collected from without the use of UBA (with many species requiring re-breathers).
2. Two experienced fish collectors' opinion that it is not viable to collect the species without UBA.
3. The species is not commonly collected without UBA by aquarium fishermen in other countries. It was verified that each species on the Black List is not collected commercially free diving in the Cook Islands, Hawaii, Fiji, New Caledonia, Kosrae, Eritrea, and Tonga. In addition every effort was made to determine if any country collected the listed species in commercial quantities free-diving.
4. Fish that are generally recognized as not being able to feed on currently available commercial diets for home aquaria. Species were only included on the Black List for this reason if there was consensus between three reputable importers, three reputable exporters, along with published or online information indicating these fish should not be

collected at this time. Thus, the standard used for a fish to be on the Black List for this specific reason was very high.

5. Species for which the targeted size class typically occurs at depths greater than 10 meters. Juveniles and adults of a number of species exhibit differential habitat preferences according to depth; thus depth of the targeted size of a given species was always taken into consideration in drafting the Black List. For example, in Hawai'i, juvenile yellow tangs (*Zebrasoma flavescens*), which are popular in, and targeted for, the aquarium l trade live in 10 meters of water and deeper. Once they reach breeding size they migrate to less than 10 meters of water. Indeed, adults of this species school by the hundreds in less than 10 meters of water in Hawai'i. Therefore, despite the published depth range for this species appearing to be suitable for free diving collection, specimens are not collected free diving, but with UBA because it is the smaller size classes living in deeper water that are targeted for the trade.

Assumptions

A "real world" approach was taken in formulating the Black List, which took into consideration the following assumptions:

Assumption One: *Published depth ranges cover the extremes a fish species has been recorded at and the main population will generally inhabit a depth that is greater than the shallowest depth recorded and less than the deepest depth recorded*.
One cannot collect aquarium fish in commercial quantities and on a regular basis if they are only found occasionally in shallow water.

Assumption Two: *At a certain depth or in difficult terrain a fish will be difficult to collect even by an experienced free diving collector. Lack of time to collect the fish carefully may result in significant habitat damage in the collection process*.
A viability assessment was conducted for collection of fish without UBA at a depth one can reasonably free dive to but for species that (i) may live in difficult terrain or (ii) are considered secretive. The reason for this is that it may only be possible to collect the species free diving by resorting to chemicals or damaging the reef. Fish that cannot be collected without harming the habitat should be included in the Black List.

Assumption Three: *Collection of live aquarium fish is not commercially viable in greater than ten meters of water.*
Most aquarium fisheries are unable to survive economically without UBA. Indeed, it is difficult to find examples of successful companies not utilizing UBA. Information was gathered from Ethiopian Live Fish Export Company in the Red Sea (Currently Eritrea) that employed 55 free divers and collected exclusively without UBA for a period of 11 years. The company therefore provided a large sample size from which to determine what depth range a skilled, proficient and efficient collector could work in. In addition, information was obtained from 15 free diving collectors from Aquarium Fish (Fiji), where approximately 50% of the fish are collected free diving. Thus, in total, we were able to look at 70 collectors not using UBA. Despite the fish collected in Eritrea and Fiji being different species, there was significant consistency in performance between the two companies and geographical areas. In both instances, free divers collected the majority of fish from 6 meters of water or less, with only a very small number of fish being collected between 7 and 10 meters. Collecting fish from water depths greater than 10 meters was not viable for either company. In addition, both companies raised the concern of

habitat damage with increasing water depth. In the Red Sea there was no option but to free dive; even so very little collection occurred between 7 and 10 meters. So a case that if deprived of UBA free divers would compensate by undertaking collection in deeper water could not be made.

Regardless of location, no example was found of a company operating without UBA and whose employees collect fish from 10 meters or more of water on a commercial basis (using sustainable non-destructive collection means and techniques only).

Assumption Four: *It is rare for an individual of a given species to be found and collected in water shallower than recorded in the literature*.
Recorded depth ranges can be based on a single specimen found outside the normal depth range that the population typically inhabits. While finding a specimen outside the recorded range is possible it would be rare. This being the case, listing the species on the Black List would have virtually no impact on the revenues or viability of the fishery. Therefore, the precautionary approach was used and the species included on the list. The majority of species on the Black List are found in depths greater than 25 meters and they unequivocally cannot be collected without UBA.

FRENCH POLYNESIA BLACK LIST

POMACANTHIDAE	Black List	Depth Range (Meters)	Opinion to Collect w/o UBA	COMMENTS
Centropyge boylei	✓	>50	Not Possible	While it may be possible to collect *C. loricula* free diving the commercial feasibility of this was investigated. It was found that exporters in the Marshall Is./Kiribati/Vanuatu/Kosrae (FSM) collect this species with the use of UBA. No examples of commercial collection free-diving could be found. It is the opinion of collectors polled that it would not be possible to collect these fish free diving on a regular basis and in quantity without significant damage to the reef. It is therefore recommended that it be placed on the black list. This applies to a slightly lesser degree to *C. fisheri* & *C. heraldi* & *P. diacanthus* but sufficiently so that they also should be back listed. *C. nigriocellus* is so elusive that it is rarely collected (even with UBA). Free diving collection is thought to be impossible.
Centropyge fisheri	✓	10-60	Not Viable	
Centropyge heraldi	✓	8-40	Not Viable	
Centropyge loricula	✓	4-60	Not Viable	
Centropyge multicolor	✓	20-90	Not Possible	
Centropyge multifasciatus	✓	15-70	Not Possible	
Centropyge narcosis	✓	>100	Not Possible	
*Centropyge nigriocellus**	✓	4-15	Not Possible	
Genicanthus (All Species)	✓	>12	Not Viable	
Pygoplites diacanthus	✓	1-48	Not Viable	

CHAETODONTIDAE	Black List	Depth Range (Meters)	Opinion to Collect w/o UBA	COMMENTS
*Chaetodon bennetti**	✓			Cannot be kept alive in aquaria
*Chaetodon trifascialis**	✓			Cannot be kept alive in aquaria
*Chaetodon lunulatus**	✓			Cannot be kept alive in aquaria
Chaetodon ornatissimus	✓	1-36		Cannot be kept alive in aquaria
Chaetodon reticulatus	✓	1-50		Cannot be kept alive in aquaria
*Chaetodon semeion**	✓	2-50		Cannot be kept alive in aquaria
Chaetodon tinkerii	✓	40-183	Not Possible	
Chaetodon trichrous	✓	>8	Not Viable	
*Hemitaurichthys polypepis***	✓	>8	Not Viable	The small size desired for aquaria is found deeper and is quite difficult to collect without UBA.

LABRIDAE	Black List	Depth Range (Meters)	Opinion to Collect w/o UBA	COMMENTS
Anampses melanurus	✓	15-40	Not Possible	*B. anthoides* while recorded in 6 meters of water is rarely found at this depth. It is a difficult to collect fish that is normally found at depths >20 meters. *Westmorella* sp. are extremely difficult to collect with nets and usually found in overhangs with little light and many holes. Collecting this fish with UBA is near impossible and collection free diving is more than highly unlikely. *C. scottorum* is rarely found at 3 meters and difficult to collect without UBA. Exporting countries such as Australia, Cook Is., Fiji, and Tonga all use UBA exclusively for the collection of this species. *C. scottorum, B. anthoides and Westmorrela* sp. are recommended to be included in the Black List.
*Bodianus anthoides**	✓	6-60	Not Viable	
Bodianus perdito	✓	10-50	Not Viable	
Cirrhilabrus claire	✓	>40	Not Possible	
Cirrhilabrus scottorum	✓	3-40	Not Viable	
Halichoeres melasmapomus	✓	20-55	Not Possible	
Pseudocheilinus ocellatus	✓	20-58	Not Possible	
*Pseudocheilinus tetrataenia**	✓	6-44	Not Viable	
*Pseudojuloides cerasinus**	✓	2-61	Not Viable	
Westmorella albofasciata	✓	10-42	Not Possible	
Westmorella nigropinnata	✓	1-30	Not Viable	

ACANTHURIDAE	Black List	Depth Range (Meters)	Opinion to Collect w/o UBA	COMMENTS
*Ctenochaetus hawaiiensis**	✓	5-40	Not Possible	*C. hawaiiensis* is mostly exported from Hawaii with a small number from Kosrae, FSM. While the fish is correctly recorded at depths as shallow as 5 meters these are the large adults. The juveniles for the aquarium trade are found usually in 12-40 meters. The juvenile lives in porites finger coral and is a very difficult fish to collect. Only UBA is used in the collection. This species should definitely should be included in the black list.

BALISTIDAE	Black List	Depth Range (Meters)	Collector Opinion	COMMENTS
Odonus niger	✓	5-40	Not Viable	*O. niger* and *P. fuscus* juveniles are usually found in water deeper than 10 meters and collection free diving is not commercially feasible. Both species will go in a hole (as all triggers do) and the need for UBA to wait until they come out is essential to collect these without chemicals. It is recomended that these two species be listed on the black list.
Pseudobalistes fuscus	✓	< 20	Not Viable	
Rhinecanthus lunula	✓	>10	Not Viable	
*Xanthichthys auromarginatus**	✓	24-147	Not Possible	

CIRRHITDAE	Black List	Depth Range (Meters)	Opinion to Collect w/o UBA	
Oxycirrhites typus	✓	10-100	Not Viable	

SERRANIDAE	Black List	Depth Range (Meters)	Opinion to Collect w/o UBA	COMMENTS
Pseudanthias flavicauda	✓	30-61	Not Possible	
Pseudanthias lori	✓	18-70	Not Possible	

MISCELLANEOUS	Black List	Depth Range (Meters)	Collector Opinion	COMMENTS
Belonoperca	✓	4-45	Not Possible	*N. magnifica* is a very difficult fish to collect without a slow and time consuming approach (or the use of chemicals). This fish is therefore unlikely to be collected free diving without the use of chemicals. For this reason it is recommended that it be included on the black list.
Belonoperca pylei	✓	68-122	Not Possible	
Liopropoma multilineatum	✓	25-46	Not Possible	
Liopropoma tonstrinum	✓	11-50	Not Possible	
Hoplolatilus starcki	✓	20-50	Not Possible	
Plectorhihnchus pictus	✓	>15	Not Viable	
Nematelleotris helfrichi	✓	29-69	Not Possible	
Nematelleotris magnifica	✓	>8	Not Viable	

Main Reference for Geograhical and Depth Ranges : Reef and Shore Fishes of the South Pacific John E. Randall

* Reference for Geograhical and Depth Ranges : Fishbase http://www.fishbase.org/

< or> Personal Observation Anthony Nahacky.

AQUARIUM FISHERY REGULATIONS

In general, nations that would like to develop an aquarium fishery do not ban the use of UBA for collection of fish (or other) species. In many cases, UBA is typically not allowed for taking marine life (e.g., fishing for food fish; sea cucumber collection) and an exemption is provided to individuals holding a license to fish for the aquarium trade. The reasons for an UBA exemption usually include:

- Negative impact on the habitat is greater if collection is done free diving as fishermen have less time to carefully collect the fish;
- Collection of fish in shallow water only (<10 meters) restricts proper rotation of fishing area and intensifies impact on a narrow section of reef;
- Species that are in high abundance and can be collected sustainably, but only with UBA, do not contribute to improving the economy of the nation;
- It is very difficult to compete against the many exporting countries and/or territories that allow UBA; and
- In countries/territories with limited income opportunities, the aquarium fishery allows individuals with minimal job prospects to earn an income. Typically, the fishery is also well suited to maintaining a traditional lifestyle.

Regulations that can be found in an Aquarium Fishery (that permits the use of UBA) typically include:

- Issuance of aquarium fishing and/or export permit/license (see Annex III for example from West Hawai'i);
- Size restrictions;
- Closed No Take Areas (i.e., areas that are off limits for aquarium fishermen. These are often sited to reduce conflict with the tourism industry, where such an industry is an important revenue earner);
- Catch and/or export reporting;
- List of "No Take" Species, Black List, or White List (see Annex II for example from West Hawai'i);
- No collection of fish between sunset and sunrise[9];
- Net & fishing gear restrictions;
- Ban of chemicals and other natural or artificial substances[10];
- Bag limits (i.e., restriction on the number of fish an aquarium fisherman can collect in a determined portion of time, usually a day);
- Limited entry;
- Total Allowable Catch (i.e., quota, usually by species and company);
- Minimum system requirements for keeping the fish on board a boat between collection and drop off site;
- Minimum system requirements for keeping the fish at a facility prior to shipping for export;

[9] Night collection allows fishermen to collect a fish that one might not be able to collect during the day and therefore more fish in a given area may be removed. This is a concern if UBA is permitted.

[10] Chemicals and other natural or artificial substances may damage the coral or immediate habitat or disperse and continue to affect wildlife after the collector has left. Moreover, non-target marine life may be affected by the chemicals and preyed upon. Also, mortalities may result from the chemical utilized, therefore, more fish than necessary may be collected to account of potential losses, which in turn can increase total take. Lastly, the use of chemicals can be so efficient that a higher percentage of fish can be removed in a given area so that areas are rotated less and localized impact is greater.

- Damage to habitat during collection prohibited; and
- Boat registration required for this activity.

French Polynesia benefits from excellent aquarium fish resources with a wide variety of species highly desired by the aquarium trade; good and cost-effective flight connections to major importing markets; and an indigenous population well known for its skillfulness in the ocean. It is a nation that is well placed to develop a system of regulations that would allow for these resources to be utilized sustainably, for catches and exports to be monitored regularly, and therefore the fishery to be managed efficiently. Ensuring that exports operate through a well regulated fishery would decrease illegal activities to collect these species and benefit the industry's image. Adequate management should easily allow for tourism activities and aquarium fishing to both contribute to the economic well-being of French Polynesia without conflict, especially given the large reef areas and many islands that characterize French Polynesia. Closed areas (and/or specific open areas for aquarium collection) could be one tool of a suite of management measures to minimize any potential conflict between the aquarium fishery and tourism, and/or other stakeholders. The Great Barrier Reef is a good example of how careful management has successfully achieved operation of a lucrative sustainable aquarium fishery within a park that is considered one of the world's most popular tourist attractions.

SPECIES OF CONCERN

Flame hawkfish *(Neocirrhites armatus)*: To date this has been the most important commercial aquarium fish species collected and exported from French Polynesia. While sustainable collection is possible, this species it is more vulnerable than most collected for the aquarium trade, for four reasons. Firstly, *Neocirrhites armatus* only inhabits three species of Pocillopora corals: *P. eydouxi*, *P. elegans*, and *P. verrucosa*. Therefore, relative abundance of flame hawkfish appears to be generally limited by the availability of live *Pocillopora* corals (Donaldson 1989). As this species is very habitat specific it is important that the corals they inhabit not be damaged during collection. While it is a shallow water fish, it is generally most abundant in 5 to 10 meters of water and time consuming to collect. Without the use of UBA there is a concern that free diving collection would not allow the time needed to carefully collect the fish. Secondly, this species is considered to be a facultative monogamous[11], with 45.2% living as pairs (Donaldson 1989). If during collection only one individual is removed in an area where Pocillopora is sparse, the remaining individual may not be able to find another mate, with likely repercussions on overall population size and thus fishery sustainability. Thirdly, Carlson (1975) found strong site fidelity in this species for an observed population in Fiji. Male *Neocirrhites armatus* only moved 1.5 meters from their home Pocillopora to spawn, and find additional or replacement females). Fourthly, while pelagic spawning has not been confirmed, the species is most likely a pelagic spawner as most cirrhitids are (Donaldson 1987; Donaldson & Colin 1989).

Based on the above (especially points two and three), it is recommended to establish closed no-take sections of reef to allow for aquarium fish replenishment, and/or specifically open areas for the collection of aquarium fish. For perspective, Aquarium Fish (Fiji) Ltd. has collected *Neocirrhites armatus* sustainably from a company-monitored site at Frigate Passage, Fiji since 1984. Thirty years of sustainable collection was achieved by allowing at minimum three months between collection visits; not damaging the Pocillopora habitat; and having a reef area 30 kilometers southeast and one 20 kilometers west of this collection site at which the company did not allow collection (i.e., company specific policy).

In summary, this species can be sustainably caught for the aquarium trade, but given its life history, social behavior and habitat preferences its collection requires careful monitoring.

Figure 3 - Photo of *Neocirrhites armatus* in the *Pocillopora* coral it inhabits.

[11] Cases where males are sexually monogamous and do not make a large parental investment in the offspring

RECOMMENDATIONS FOR AQUARIUM FISH REGULATIONS

Currently, French Polynesia allows the export of aquarium fish and invertebrates, but has few regulations governing collection or export. This report's recommendation is to develop and implement a sustainable and well regulated aquarium fishery. This could be done according to the specific needs of French Polynesia, but with the intent of becoming a fishery that is regarded as that in Australia and/or the USA; in other words a fishery that is known for high quality fish, and regulations that promote sustainable practices. This step also would further the development of economic and employment benefits for the residents of French Polynesia.

The regulations suggested herein for consideration have been separated into short term and long term recommendations.

Short Term

To deter illegal use of UBA it is recommended that the Black List contained herein be implemented in French Polynesia and be enforced by random inspections of boats, facilities, and boxes at the point of export. The Black List should be supplied to the relevant authorities in the major importing countries so these are aware what species cannot be legally exported from French Polynesia. Many countries will not accept the import of items illegally exported (e.g., antiquities or certain species of parrots). This also applies to fish. For example, there have been reports in the past of clarion angelfish (*Holacanthus clarionensis*) being illegally collected in Mexico and seized in the USA. If species on the Black List are illegal to collect and export from French Polynesia, the relevant associated legal document/regulation can be sent to the USA Fish & Wildlife Service and they will not allow the import of those species from French Polynesia into the USA.
Relevant contact details are:

Fish & Wildlife Service- Office of Law Enforcement
4401 North Fairfax Dr. - MS:LE 3000
Arlington Virginia, USA 22203
Attn: James Ashburner

In addition to the immediate implementation of the Black List it is recommended that regulations be developed requiring:

1. All collectors to apply for an annual license to *fish* for aquarium fish allowing the use of any size mesh for the collection of aquarium fish only. To obtain such a license a collector would have to sign a document agreeing to:
    - Provide Daily Catch Reports by species collected and by collection area as well as time spent underwater (i.e., provide information pertaining to day person went fishing; free diving location(s); number of fish for each species caught at each location; means used for collection; time spent free diving at each location);
    - Not collect fish in any way that may harm the environment, especially coral colonies and the reef framework, the target species, or surrounding fauna and flora (i.e., ban on any destructive collection means and the use of toxic chemicals of either natural or synthetic form);
    - Not use UBA for the collection of aquarium fish;
    - Not collect any fish species listed on the Black List;

- Maintain fish in good health at all times (i.e., handle fish according to best practices from the point of collection free diving to drop-off at the exporter's facility);
- Adhere to a size and bag (i.e., number) limit for fish species that are also a common food source that will be determined and communicated by DRMM; and
- Adhere to location specific annual TAC rates for species of concern (e.g., flame hawkfish, *Neocirrhites armatus*) that will be determined and communicated by DRMM;

2. DRMM to develop location and exporter-specific annual TAC rates for species of concern (e.g., flame hawkfish, *Neocirrhites armatus*); and
3. All exporters to apply for an annual license to *export* aquarium fish. To obtain such a license the exporter would have to sign a document agreeing to the following:
    - Have a facility that maintains all fish in good health from arrival from the sea to the point of export;
    - Allow facility inspections without prior notice; and
    - Submit to the DRMM number of fish by species for each shipment, with a record of export destination and airway bill number. A copy of the same document will need to be affixed to the shipment itself and checked by customs at export.

Long Term

It is recommended that over the long term an aquarium fish-specific set of regulations be developed giving strong consideration to allowing UBA for the collection of aquarium fish.

Specific regulation recommendations may include:

1. UBA exemption for certified divers that hold a collection license;
2. A Black List that would only include species that are not suitable to be kept in aquaria or are in need of protection;
3. Use of nets by collectors that are no larger than 10 meters long, 2 meter high, and with mesh no larger than 20 mm stretched eye;
4. Support the establishment of a series of closed areas to protect target populations and reduce stakeholder conflicts;
5. No collection of fish between sun rise and sun set. This regulation should be reviewed for possible benefits and negatives only if an exemption is put in place for use of UBA. While UBA is banned this regulation should not be considered;

Figure 4 -Coral-feeding butterfly (*Chaetodon ornatissimus*)
on the Black List as currently cannot be kept alive in most aquaria

SUMMARY AND KEY POINTS

It is recommended that catch (if possible) and export data be obtained for all species of aquarium fish collected. In addition, collection (and export) data for *Neocirrhites armatus* should be carefully monitored. It is also important that closed areas for aquarium collection be designated. Fish species that reputable exporters and importers refuse to collect or import due to their poor survival rates/high mortality rates in aquarium conditions should not be collected.

While the proposed Black List does contain species for which collectors are likely to be able to collect a specimen or two free diving, placing these fish on the list has a negligible economic impact on collectors and exporters. Inclusion of these species on the list will help to both prevent damage to coral reefs and also to enforce the current prohibition of UBA for collection of aquarium fish.

Currently, French Polynesia has little regulation of its aquarium fishery. This has recently resulted in a spike in illegal activities. Implementation of the Black List and the proposed "short term" regulations would be an important first step toward sustainably managing this lucrative fishery. Over the long term it is recommended that a set of regulations be developed and enforced, with due consideration being given to the use of UBA (for certified divers only). This will allow fish to be carefully collected with minimal habitat damage. In addition, supplying species that may currently be illegally collected with UBA through a regulated fishery should decrease unregulated illegal activities to acquire those species. This in turn should result in a sustainable and high quality aquarium fishery with economic benefits for residents of French Polynesia.

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ANNEX I - FRENCH POLYNESIA WHITE LIST

POMACANTHIDAE	White List	Depth Range (Meters)	Collect w/o UBA	Collector Opinion Difficulty		COMMENTS
*Centropyge bispinosa**	✓	5-45	Yes	Difficult		Collected Free Diving in Small Quantities
Centropyge flavissima	✓	0.5-40	Yes	Easy		Collected Free Diving in Fiji and elsewhere
Pomacanthus imperator	✓	0.5-60	Yes	Easy		Collected Free Diving in Fiji and elsewhere
CHAETODONTIDAE	**White List**	**Depth Range (Meters)**	**Collect w/o UBA**	**Collector Opinion Difficulty**		**COMMENTS**
*Chaetodon auriga**	✓	1-40	Yes	Easy		Collected Free Diving in Fiji and elsewhere
*Chaetodon citrinellus**	✓	1-36	Yes	Easy		Collected Free Diving in Fiji and elsewhere
*Chaetodon ephippium**	✓	0-30	Yes	Easy		Collected Free Diving in Fiji and elsewhere
*Chaetodon flavirostris**	✓	2-20	Yes	Easy		Collected Free Diving in Fiji and elsewhere
Chaetodon lineolatus	✓	2-171	Yes	Moderate		Collected Free Diving in Fiji and elsewhere
*Chaetodon lunula**	✓	0-30	Yes	Easy		Collected Free Diving in Fiji and elsewhere
*Chaetodon mertensii**	✓	10-120	Yes	Moderate		Collected Free Diving in Small Quantities
*Chaetodon pelewensis**	✓	1-30	Yes	Moderate		Collected Free Diving in Small Quantities
Chaetodon rafflesi	✓	<10	Yes	Easy		Collected Free Diving in Fiji and elsewhere
Chaetodon ulietensis	✓	2-50	Yes	Easy		Collected Free Diving in Fiji and elsewhere
*Chaetodon unimaculatus**	✓	1-60	Yes	Moderate		Collected Free Diving in Fiji and elsewhere
*Chaetodon vagabundus**	✓	5-30	Yes	Easy		Collected Free Diving in Fiji and elsewhere
*Forcipiger flavissimus**	✓	2-145	Yes	Difficult		Collected Free Diving in Small Quantities
Forcipiger longirostris	✓	5-60	Yes	Difficult		Collected Free Diving in Small Quantities
Heniochus acuminatus	✓	2-75	Yes	Difficult		Collected Free Diving in Small Quantities
*Heniochus chrysostomus**	✓	2-40	Yes	Easy		Collected Free Diving in Fiji and elsewhere
*Heniochus monoceros**	✓	2-30	Yes	Difficult		Collected Free Diving in Fiji and elsewhere
*Heniochus varius**	✓	2-30	Yes	Easy		Collected Free Diving in Fiji and elsewhere
*Zanclus cornutus**	✓	3-182	Yes	Easy		Collected Free Diving in Fiji and elsewhere
LABRIDAE	**White List**	**Depth Range (Meters)**	**Collect w/o UBA**	**Collector Opinion Difficulty**		**COMMENTS**
Anampses caeruleopunctatus	✓	3-30	Yes	Moderate		Collected Free Diving in Small Quantities
Anampses meleagrides	✓	<20	Yes	Difficult		Collected Free Diving in Small Quantities
*Anampses twistii**	✓	5-30	Yes	Difficult		Collected Free Diving in Small Quantities
*Bodianus axillaris**	✓	>2-40	Yes	Difficult		Collected Free Diving in Small Quantities
*Bodianus bilunulatus**	✓	3-100	Yes	Difficult		Collected Free Diving in Small Quantities
Bodianus loxozonus	✓	3-50	Yes	Difficult		Collected Free Diving in Small Quantities
Cirrhilabrus exquistus	✓	2-32	Yes	Difficult		Collected Free Diving in Small Quantities
*Coris aygula**	✓	2-30	Yes	Easy		Collected Free Diving in Fiji and elsewhere
*Coris gaimardi**	✓	1-50	Yes	Easy		Collected Free Diving in Fiji and elsewhere
*Gomphosus varius**	✓	2-30	Yes	Moderate		Collected Free Diving in Fiji and elsewhere
*Halichoeres hortulanus **	✓	1-30	Yes	Easy		Collected Free Diving in Fiji and elsewhere
*Halichoeres marginatus**	✓	0-30	Yes	Easy		Collected Free Diving in Fiji and elsewhere
Halichoeres ornatissimus	✓	6-30	Yes	Difficult		Collected Free Diving in Fiji and elsewhere
*Hemigymnus fasciatus**	✓	1-25	Yes	Difficult		Collected Free Diving in Small Quantities
*Hologymnosus annulatus**	✓	8-40	Yes	Difficult		Collected Free Diving in Small Quantities
*Labroides bicolor**	✓	2-20	Yes	Difficult		Collected Free Diving in Small Quantities
*Labroides dimidiatus**	✓	1-30	Yes	Easy		Collected Free Diving in Fiji and elsewhere
*Labroides rubrolabiatus**	✓	1-32	Yes	Moderate		Collected Free Diving in Small Quantities
*Macropharyngodon pardalis**	✓	0-30	Yes	Easy		Collected Free Diving in Fiji and elsewhere
*Novaculichthys taeniorus**	✓	3-25	Yes	Easy		Collected Free Diving in Fiji and elsewhere
Pseudocheilinus evanidus	✓	6-61	Yes	Difficult		Collected Free Diving in Small Quantities
Pseudocheilinus hexataenia	✓	1-30	Yes	Easy		Collected Free Diving in Fiji and elsewhere
Pseudocheilinus tetrataenia	✓	1-30	Yes	Difficult		Lives shallow but difficult to collect.
*Thalassoma amblycephalum**	✓	1-15	Yes	Easy		Collected Free Diving in Fiji and elsewhere
*Thalassoma lutescens**	✓	1-30	Yes	Easy		Usually collected with UBA but possible to collect Free Diving
*Thalassoma purpureum**	✓	0-10	Yes	Easy		Collected Free Diving in Fiji and elsewhere
Thalassoma quinquevittatum	✓	0.5-40	Yes	Easy		Usually collected with UBA but possible to collect Free Diving
*Thalassoma trilobatum**	✓	0-10	Yes	Easy		Usually collected with UBA but possible to collect Free Diving

POMACENTRIDAE	White List	Depth Range (Meters)	Collect w/o UBA	Collector Opinion Difficulty		COMMENTS
Amphiprion chrysopterus	✓	1-30	Yes	Easy		Collected Free Diving in Fiji and elsewhere
Chromis atripectoralis	✓	2-15	Yes	Easy		Collected Free Diving in Fiji and elsewhere
Chromis viridis	✓	<10	Yes	Easy		Collected Free Diving in Fiji and elsewhere
Chrysiptera galba	✓	1-21	Yes	Difficult		Usually collected with UBA but possible to collect Free Diving
Dascyllus aruanus	✓	<12	Yes	Easy		Collected Free Diving in Fiji and elsewhere
Dascyllus flavicaudus	✓	3-40	Yes	Easy		Collected Free Diving in Fiji and elsewhere
Dascyllus reticulatus	✓	1-50	Yes	Easy		Collected Free Diving in Fiji and elsewhere
*Dascyllus trimaculatus**	✓	1-55	Yes	Easy		Collected Free Diving in Fiji and elsewhere
ACANTHURIDAE	White List	Depth Range (Meters)	Collect w/o UBA	Collector Opinion Difficulty		COMMENTS
*Acanthurus achilles**	✓	0-10	Yes	Difficult		Collected Free Diving in Small Quantities
*Acanthurus guttatus**	✓	1-6	Yes	Difficult		Collected Free Diving in Small Quantities
Acanthurus lineatus	✓	1-3	Yes	Easy		Collected Free Diving in Fiji and elsewhere
*Acanthurus nigricans**	✓	1-67	Yes	Difficult		Collected Free Diving in Small Quantities
*Acanthurus olivaceus**	✓	3-46	Yes	Difficult		Collected Free Diving in Fiji and elsewhere
*Acanthurus pyroferus**	✓	5-40	Yes	Difficult		Collected Free Diving in Small Quantities
*Acanthurus triostegus**	✓	0-90	Yes	Easy		Collected Free Diving in Fiji and elsewhere
*Zebrassoma scopas**	✓	1-60	Yes	Easy		Collected Free Diving in Small Quantities
*Zebrassoma veliferum**	✓	2-30	Yes	Easy		
Zebrassoma rostratum	✓	<25	Yes	Difficult		Usually collected with UBA but possible to collect Free Diving
*Naso lituratus**	✓	5-30	Yes	Difficult		Collected Free Diving in Small Quantities
OSTRACIIDAE & TETRAODONTIDAE	White List	Depth Range (Meters)	Collect w/o UBA	Collector Opinion Difficulty		COMMENTS
*Ostracion cubicus**	✓	1-50	Yes	Easy		Collected Free Diving in Hawaii and elsewhere
*Ostracion meleagris**	✓	1-30	Yes	Easy		Collected Free Diving in Hawaii and elsewhere
Ostracion whitley	✓	3-27	Yes	Easy		Collected Free Diving in Hawaii and elsewhere
*Arothron meleagris**	✓	1-73	Yes	Easy		Collected Free Diving in Hawaii and elsewhere
*Canthigaster amboinensis**	✓	1-16	Yes	Easy		Collected Free Diving in Fiji and elsewhere
*Canthigaster bennetti**	✓	1-15	Yes	Easy		Collected Free Diving in Fiji and elsewhere
Canthigaster janthinoptera	✓		Yes	Easy		
Canthigaster solandri	✓	<15	Yes	Easy		Collected Free Diving in Fiji and elsewhere
Canthigaster valentini	✓	1-55	Yes	Easy		Collected Free Diving in Fiji and elsewhere
BALISTIDAE	White List	Depth Range (Meters)	Collect w/o UBA	Collector Opinion Difficulty		COMMENTS
Balistapus undulatus	✓	1-50	Yes	Easy		Collected Free Diving in Fiji and elsewhere
Melichthys niger	✓	1-75	Yes	Moderate		Usually collected with UBA but possible to collect Free Diving
Melichthys vidua	✓	4-145	Yes	Moderate		Usually collected with UBA but possible to collect Free Diving
Rhinecanthus aculeatus	✓	0-50	Yes	Easy		Collected Free Diving in Fiji and elsewhere
Rhinecathus rectangulus	✓	<10	Yes	Easy		Collected Free Diving in Fiji and elsewhere
CIRRHITDAE	White List	Depth Range (Meters)	Collect w/o UBA	Collector Opinion		COMMENTS
Neocirrhites armatus	✓	1-10	Yes	Difficult		Usually collected with UBA but possible to collect Free Diving
*Parracirrhites arcatus**	✓	1-33	Yes	Easy		Usually collected with UBA but possible to collect Free Diving
*Parracirrhites forsteri**	✓	1-35	Yes	Difficult		Usually collected with UBA but possible to collect Free Diving
Parracirrhites nisus	✓	<10	Yes	Difficult		Usually collected with UBA but possible to collect Free Diving
SERRANIDAE	White List	Depth Range (Meters)	Collect w/o UBA	Collector Opinion		COMMENTS
*Pseudanthias dispar**	✓	1-15	Yes	Difficult		Usually collected with UBA but possible to collect Free Diving
Pseudanthias mooreanus	✓	6-46	Yes	Difficult		Usually collected with UBA but possible to collect Free Diving
Pseudanthias olivaceus	✓	1-33.5	Yes	Difficult		Usually collected with UBA but possible to collect Free Diving
Pseudanthias pascalus	✓	5-60	Yes	Difficult		Usually collected with UBA but possible to collect Free Diving
MISCELLANEOUS	White List	Depth Range (Meters)	Collect w/o UBA	Collector Opinion Difficulty		COMMENTS
*Cetoscarus ocelatus**	✓	1-30	Yes	Difficult		Usually collected with UBA but possible to collect Free Diving
*Pterois radiata**	✓	<20	Yes	Easy		Usually collected with snorkel at night
Dendrochirus biocellatus	✓	<10	Yes	Easy		Usually collected with snorkel at night

Main Reference for Geograhical and Depth Ranges : Reef and Shore Fishes of the South Pacific John E. Randall

* Reference for Geograhical and Depth Ranges : Fishbase http://fishbase.org/ < or> Personal Observation Anthony Nahacky

ANNEX II - WHITE LIST SPECIES RANKED FOR TAC DEVELOPMENT

Species	Rank
Pseudocheilinus tetrataenia	5
Zebrassoma rostratum	5
Neocirrhites armatus	5
*Chaetodon flavirostris**	4
Pseudocheilinus hexataenia	4
Chrysiptera galba	4
Parracirrhites nisus	4
Pseudanthias mooreanus	4
*Centropyge bispinosa**	3
Centropyge flavissima	3
Pomacanthus imperator	3
*Chaetodon lunula**	3
*Coris aygula**	3
*Labroides rubrolabiatus**	3
*Thalassoma lutescens**	3
Amphiprion chrysopterus	3
Dascyllus flavicaudus	3
*Acanthurus achilles**	3
*Acanthurus pyroferus**	3
*Zebrassoma veliferum**	3
Canthigaster solandri	3
Rhinecanthus aculeatus	3
Rhinecathus rectangulus	3
*Chaetodon auriga**	2
*Chaetodon ephippium**	2
Chaetodon lineolatus	2
*Chaetodon mertensii**	2
*Chaetodon pelewensis**	2
Chaetodon rafflesi	2
Chaetodon ulietensis	2
*Chaetodon unimaculatus**	2
*Chaetodon vagabundus**	2
Heniochus acuminatus	2
*Zanclus cornutus**	2
*Coris gaimardi**	2

Species	Rank
Halichoeres ornatissimus	2
*Macropharyngodon pardalis**	2
*Acanthurus guttatus**	2
Acanthurus lineatus	2
*Acanthurus nigricans**	2
*Acanthurus olivaceus**	2
*Naso lituratus**	2
*Ostracion cubicus**	2
*Ostracion meleagris**	2
Ostracion whitley	2
*Arothron meleagris**	2
*Canthigaster amboinensis**	2
Canthigaster valentini	2
Melichthys vidua	2
*Cetoscarus ocelatus**	2
*Pterois radiata**	2
Dendrochirus biocellatus	2
*Chaetodon citrinellus**	1
*Heniochus chrysostomus**	1
*Heniochus monoceros**	1
*Heniochus varius**	1
*Gomphosus varius**	1
*Hemigymnus fasciatus**	1
*Labroides bicolor**	1
*Labroides dimidiatus**	1
*Novaculichthys taeniorus**	1
*Thalassoma amblycephalum**	1
Chromis atripectoralis	1
Chromis viridis	1
*Dascyllus trimaculatus**	1
*Zebrassoma scopas**	1
Canthigaster janthinoptera	1
Balistapus undulatus	1
*Parracirrhites forsteri**	1
Pseudanthias olivaceus	1

All other species on the White List but not listed here were assigned a rank of 0
Main Reference for Geographical and Depth Ranges: Reef and Shore Fishes of the South Pacific John E. Randall
* Reference for Geographical and Depth Ranges: Fishbase http://fishbase.org/ < or> Personal Observation Anthony Nahacky

ANNEX III – HAWAI'I AQUARIUM PERMIT CONDITIONS AND WHITE LIST

Department of Land and Natural Resources (DLNR) Division of Aquatic Resources (DAR) State of Hawai'i

West Hawai'i Aquarium Permit Specific Terms and Conditions

The West Hawai'i aquarium permit authorizes persons to engage in aquarium collecting activities for the species listed below and to use fine meshed traps and nets, except throw nets, to collect those species in the West Hawai'i Regional Fishery Management Area (WHRFMA), which includes all state coastal waters from 'Upolu Pt. in the north to Ka Lae in the South.

No person shall engage in aquarium collecting activities within the West Hawai'i Regional Fishery Management Area without first having been issued and possessing a West Hawai'i aquarium permit ***in addition to a valid State of Hawai`i aquarium fish permit.***

I understand that:

1. Permits are valid for one year from the date of issuance unless revoked sooner, and are non-transferable.
2. The specific terms and conditions of the State of Hawai'i aquarium fish permit also apply to the WHRFMA
3. Aquarium collectors (commercial and noncommercial) may take or possess only the following 40 "White List" fish species.
4. It is prohibited to take or possess more than 5 Yellow Tang larger than 4.5 inches in total length (TL) or more than 5 Yellow Tang smaller than 2 inches TL per day.
5. It is prohibited to take or possess more than 5 Kole larger than 4 inches TL per day.
6. It is prohibited to take or possess more than 10 Achilles Tang of any size per day.
7. It is prohibited to possess aquarium collecting gear or possess fish taken for aquarium purposes on a vessel after sunset or before sunrise without prior phone notification to the DAR Kona office (327-6226). Such notification will allow the possession of more than one day's bag limit for Yellow Tang, Kole and Achilles Tang on multiple day trips.
8. Aquarium collection is prohibited within Fish Replenishment Areas (FRAs), Fisheries Management Areas (FMAs) and Marine Life Conservation Districts (MLCDs) noted in the table and maps at the end of these terms and conditions.
9. It is prohibited to take or possess aquarium collecting gear or fish collected for aquarium purposes on a vessel that is adrift, anchored or moored within any of the areas prohibiting aquarium collecting.
10. All aquarium collecting vessels shall be registered every year with the DAR Kona office. The current vessel identification number issued by either DLNR or the U.S. Coast Guard shall serve as the registration number for each vessel.
11. All aquarium collecting vessels shall permanently affix the capital letters "AQ" to both sides of the vessel. The "AQ" letters shall be no less than 6 inches high and 3 inches wide in either black or a color that contrasts with the-background color of the vessel.
12. I must fly a "stiffened" flag or pennant from the aquarium vessel with the letter "A" as specified by DLNR. The flag or pennant shall be displayed and clearly visible from both sides of the vessel at all times while aquarium collecting gear or collected aquarium fish or both are onboard. The flag or pennant shall be provided at cost to West Hawai'i aquarium permittees by DAR.
13. I must display a dive flag at all times on the vessel when divers are in the water.
14. In the event an aquarium collecting vessel becomes inoperable while at sea, the operator of the vessel shall immediately notify the DLNR's Division of Conservation and Resources Enforcement (DOCARE) or United States Coast Guard or both by VHF radio or by cellular phone.
15. It is prohibited to possess or use any net or container employed underwater to capture or hold fish taken for aquarium purposes that is not labeled with the commercial marine license (CML) number (or numbers) of the person (or persons) owning, possessing or using the equipment.
16. It is prohibited to engage in or attempt to engage in SCUBA spearfishing and/or possess both SCUBA gear and a spear or speared aquatic life.
17. I must carry both the West Hawai'i aquarium permit and the State of Hawai'i aquarium fish permit while engaged in collecting fish for aquarium purposes within the WHRFMA.
18. I must submit each month's daily aquarium fishing trip reports before every 10th day of the following month.
19. If I do not have a valid commercial marine license, I may not take more than a total of five of the White list fish specimens per person per day. Recreational aquarium collectors may not sell collected fish.

Common Name	Hawaiian/Local Name	Scientific Name
Yellow Tang	Lau'ipala	*Zebrasoma flavescens*
Goldring Surgeonfish	Kole	*Ctenochaetus strigosus*
Chevron Tang	Hawaiian Kole	*Ctenochaetus hawaiiensis*
Achilles Tang	Paku'iku'i	*Acanthurus achilles*
Goldrim Surgeonfish		*Acanthurus nigricans*
Orangeband Surgeonfish	Na'ena'e	*Acanthurus olivaceus*
Eyestripe Surgeonfish	Palani	*Acanthurus dussumieri*
Brown Surgeonfish	MaTi'i	*Acanthurus nigrofuscus*
Thompson's Surgeonfish		*Acanthurus thompsoni*
Orangespine Unicornfish	Umauma lei	*Naso lituratus*
Multiband Butterflyfish	Kikakapu	*Chaetodon multicinctus*
Fourspot Butterflyfish	Lauhau	*Chaetodon quadrimaculatus*
Milletseed Butterflyfish	Lauwiliwili	*Chaetodon miliaris*
Tinker's Butterflyfish		*Chaetodon tinkeri*
Blacklip Butterflyfish		*Chaetodon Kleinii*
Pyramid Butterflyfish		*Hemitaurichthys polylepis*
Forcepsfish	Lauwiliwili nukunuku 'oi'oi	*Forcipiger flavissimus*
Saddle Wrasse	Hinalea lauwili	*Thalassoma duperrey*
Flame Wrasse		*Cirrhilabrus jordani*
Shortnose Wrasse		*Macropharyngodon geoffroyi*
Ornate Wrasse	Ld'o	*Halichoeres ornatissimus*
Fourline Wrasse		*Pseudocheilinus tetrataenia*
Eightline Wrasse		*Pseudocheilinus octotaenia*
Smalltail Wrasse		*Pseudojuloides cerasinus*
Bird Wrasse	Hindlea 'i'iwi	*Gomphosus varius*
Psychedelic Wrasse		*Anampses chrysocephalus*
Yellowtail Coris	Hindlea 'akilolo	*Coris gaimardi*
Potter's Angelfish		*Centropyge potteri*
Fisher's Angelfish		*Centropyge fisheri*
Redbarred Hawkfish	Piliko'a	*Cirrhitops fasciatus*
Blackside Hawkfish		*Paracirrhites forsteri*
Black Durgon	Humuhumu 'ele'ele	*Melichthys niger*
Lei Triggerfish	Humuhumu lei	*Sufflamen bursa*
Gilded Triggerfish		*Xanthichthys auromarginatus*
Spotted Boxfish	Moa	*Ostracion meleagris*
Hi Whitespotted Toby		*Canthigaster jactator*
Hi Dascyllus	'Alo'ilo'i	*Dascyllus albisella*
Hi Longfin Anthias		*Pseudanthias hawaiiensis*
Bluestripe Snapper	Ta'ape	*Lutjanus kasmira*
Peacock Grouper	Roi	*Cephalopholis argus*

I understand and agree to abide by all the terms and conditions of this permit. In addition to other penalties provided by law, DLNR may revoke my West Hawai'i aquarium permit for any infraction of these rules or the terms and conditions of the permit. Any person whose permit has been revoked shall not be eligible to reapply for a West Hawai'i aquarium permit (commercial or recreational) until one year from the date of revocation.

Signature Date