

Finfish production outlook



UIS BUSINESS SCHOOL

Ragnar Tveteras, Professor
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KONTALI

Ragnar Nystoyl, Head of Analysis
Kontali



Darryl Jory, Ph.D., Editor Emeritus
Global Aquaculture Alliance



Scope of Analysis

- **Most focus on internationally traded species:**
 - Typically imported to USA, Europe & Japan.
- **Production forecasts for 2019 and 2020 for all chosen species:**
 - But for some species only major producer countries/regions.
- **Production forecast for 2021 for some species.**

Sources

- Prices: NMFS, Norwegian Seafood Council, Kontali, Eurostat, FAO.
- Production volumes: FAO, Kontali, and many individuals and organizations who kindly responded to the GAA survey, sharing their time and knowledge.

Finfish Species Included in Survey

Freshwater species:

- Tilapia
- Catfish
 - Pangasius
 - Others
- Carps

Diadromous species:

- Atlantic salmon
- Coho salmon
- Trout
- Barramundi
- Milkfish

Marine species:

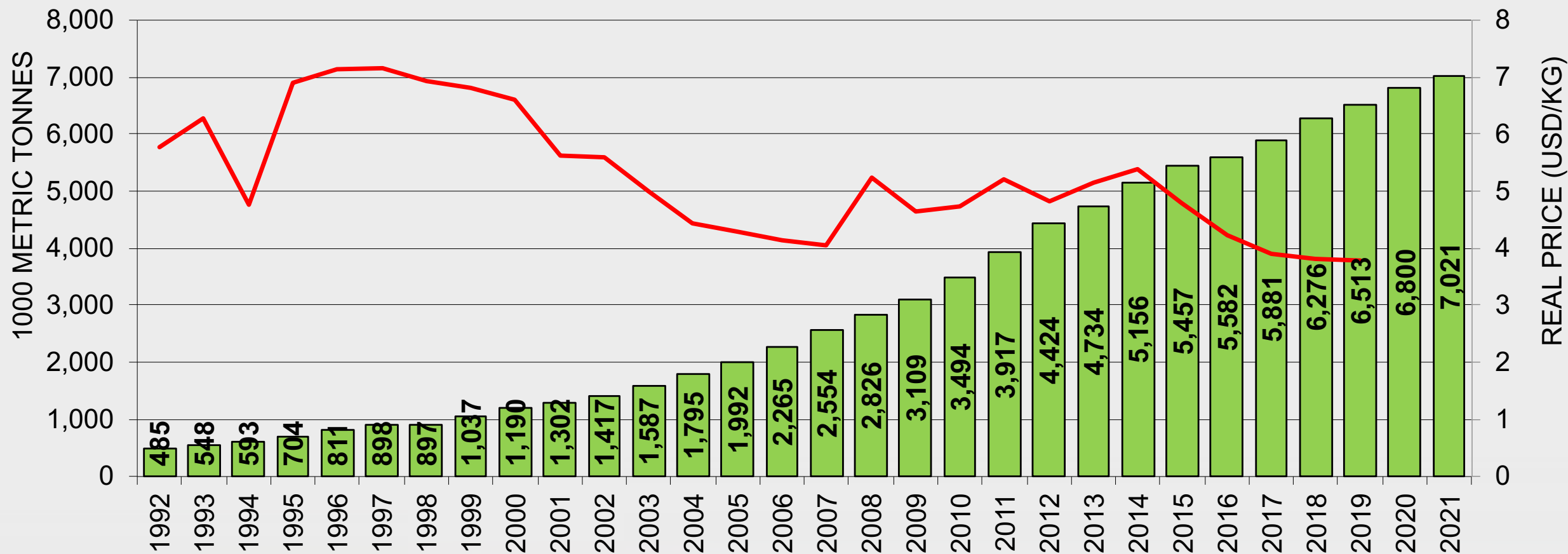
- Seabass & Sea Bream
- Cobia
- Turbot
- Bluefin Tuna
- Grouper
- Corvina



TILAPIA

Global Tilapia Aquaculture Production

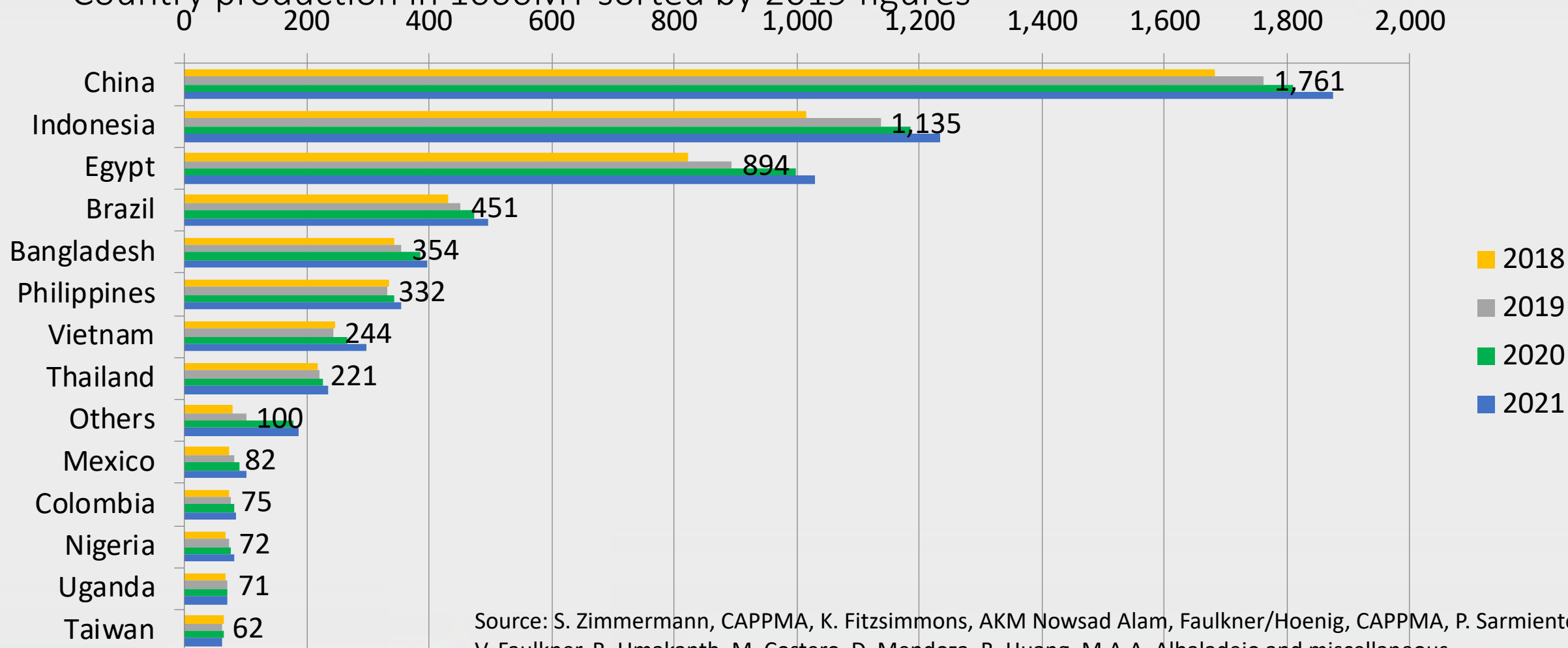
US import prices frozen fillet



Source: S. Zimmermann, CAPPMA, K. Fitzsimmons, AKM Nowsad Alam, Faulkner/Hoenig, CAPPMA, P. Sarmiento, V. Faulkner, R. Umakanth, M. Costero, D. Mendoza, B. Huang, M.A.A. Albaladejo and miscellaneous

Tilapia

Country production in 1000MT sorted by 2019 figures



Source: S. Zimmermann, CAPPMA, K. Fitzsimmons, AKM Nowsad Alam, Faulkner/Hoenig, CAPPMA, P. Sarmiento, V. Faulkner, R. Umakanth, M. Costero, D. Mendoza, B. Huang, M.A.A. Albaladejo and miscellaneous

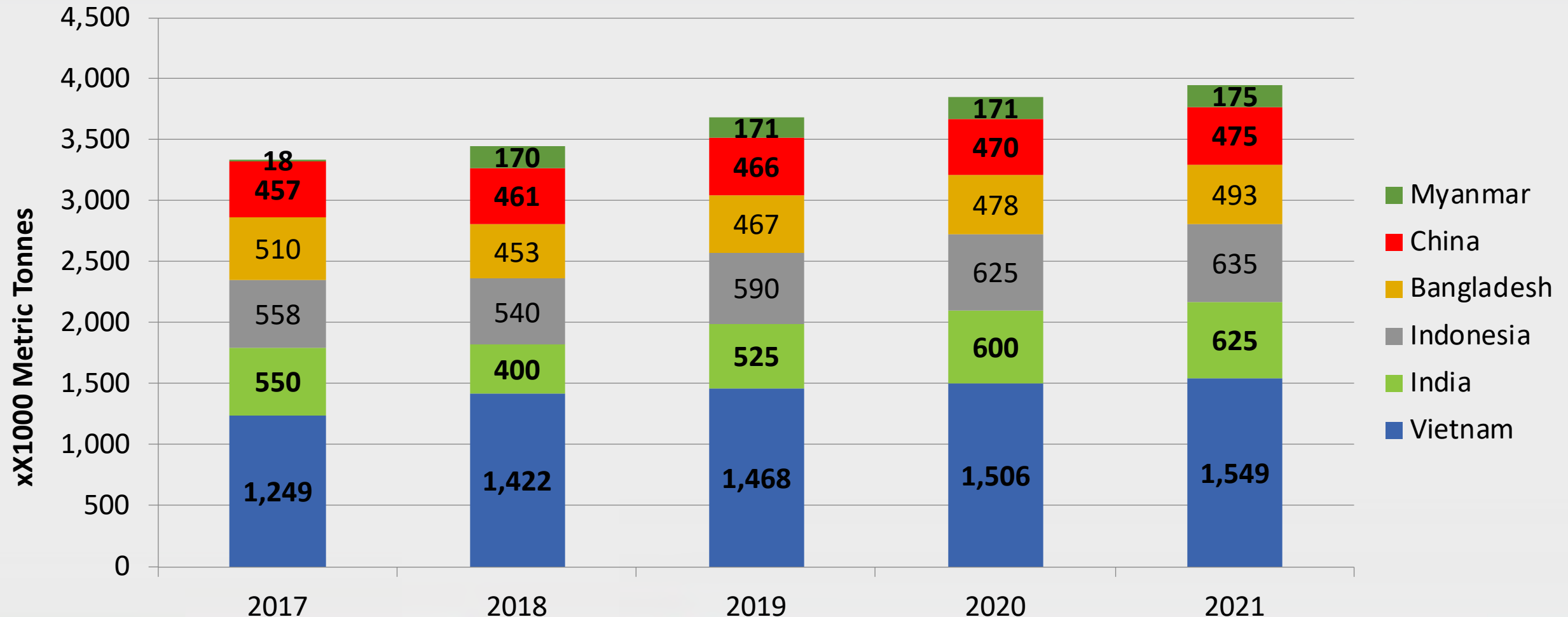


CATFISHES & PANGASIUS



Pangasius

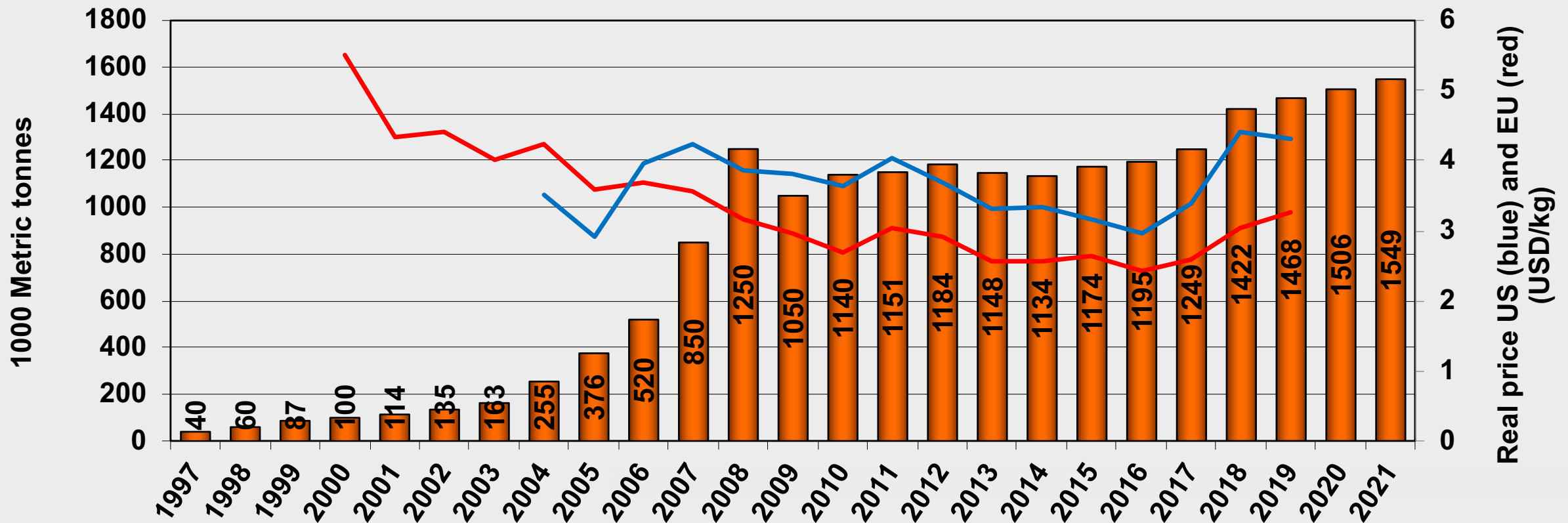
Production in selected countries



Sources: AKM Nowsad Alam, R. Umakanth, Nguyen Tan Duy Phong and miscellaneous

Pangasius

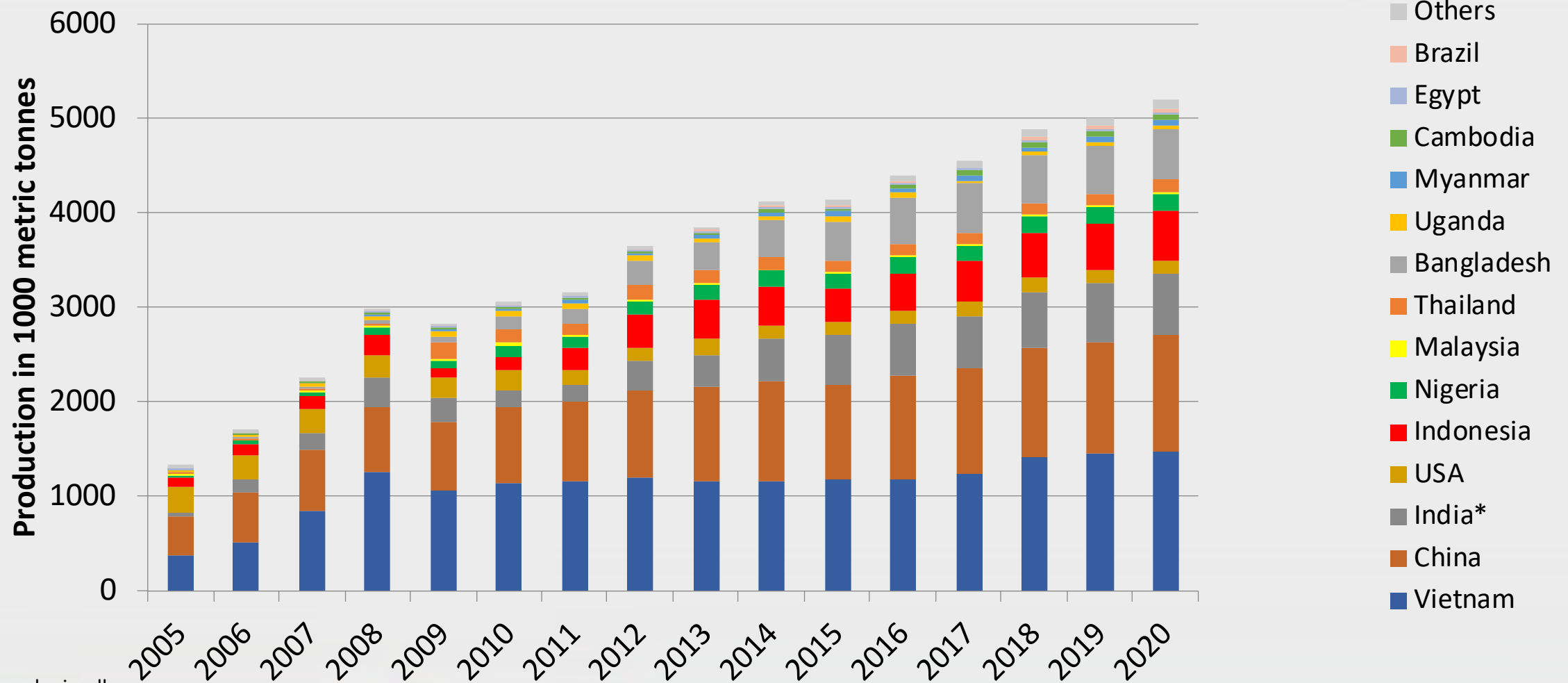
Production in Vietnam and US & EU real import prices frozen fillet (USD/kg)



Sources: Nguyen Tan Duy Phong and miscellaneous

Total production of Catfish species

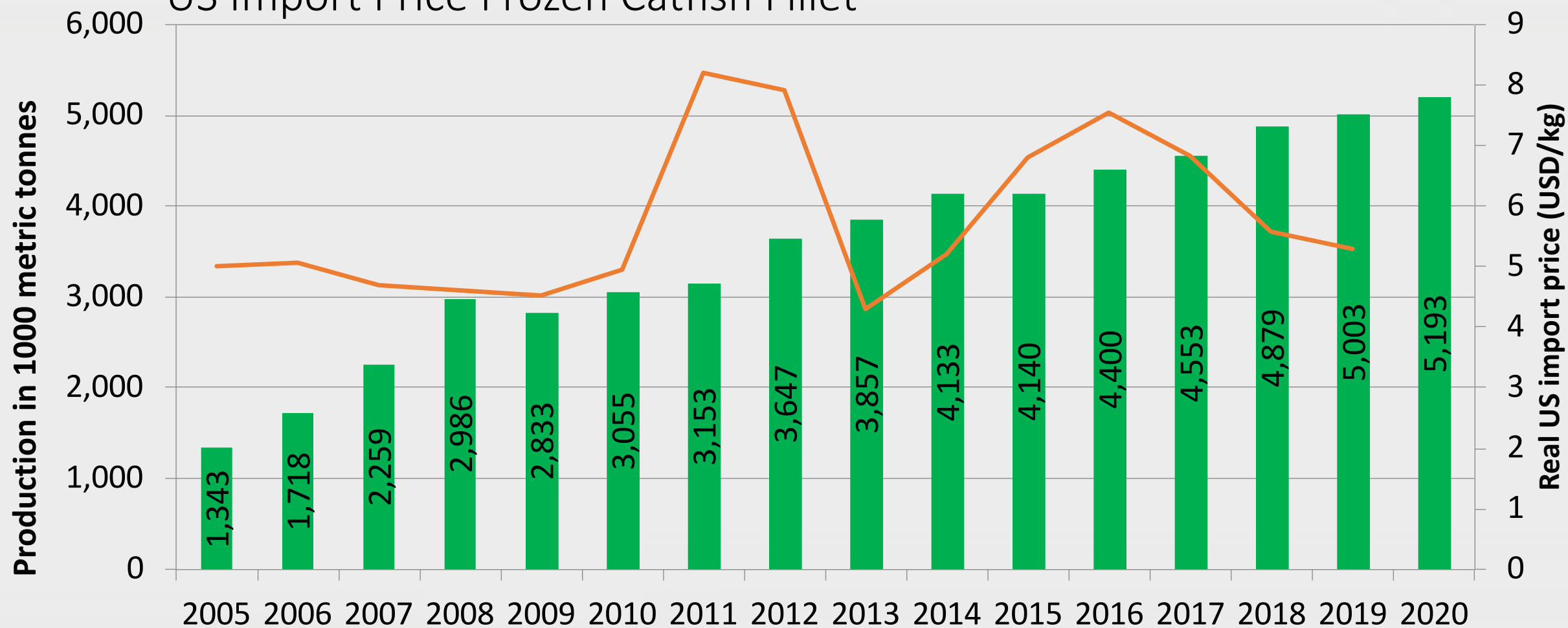
Incl. Pangasius



Sources: Kontali and miscellaneous

Total production of Catfish species

US Import Price Frozen Catfish Fillet

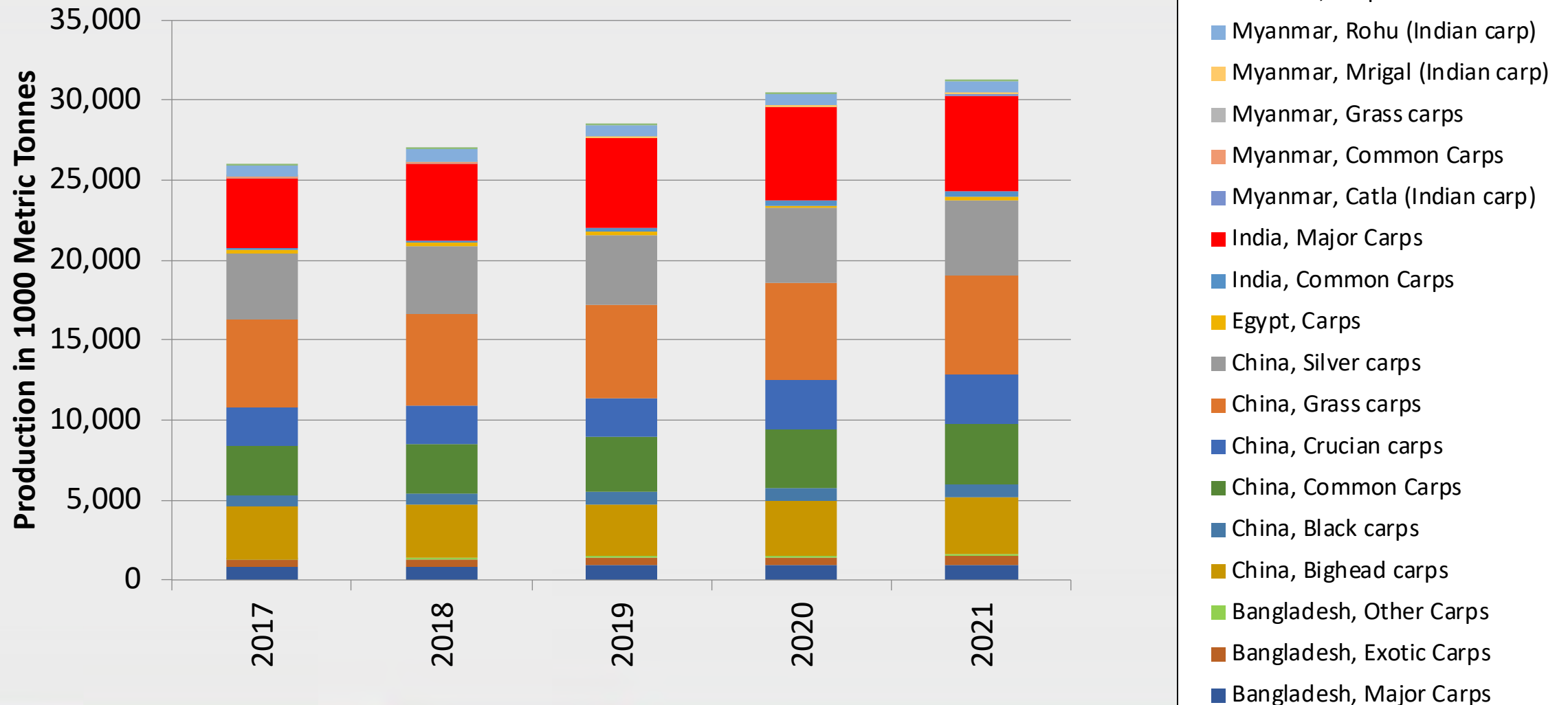


Sources: Kontali and miscellaneous

CARPS



Major Carp species in GAA survey



Sources: CAPPMA, R. Umakanth, AKM Nowsad Alam, miscellaneous

Salmonids

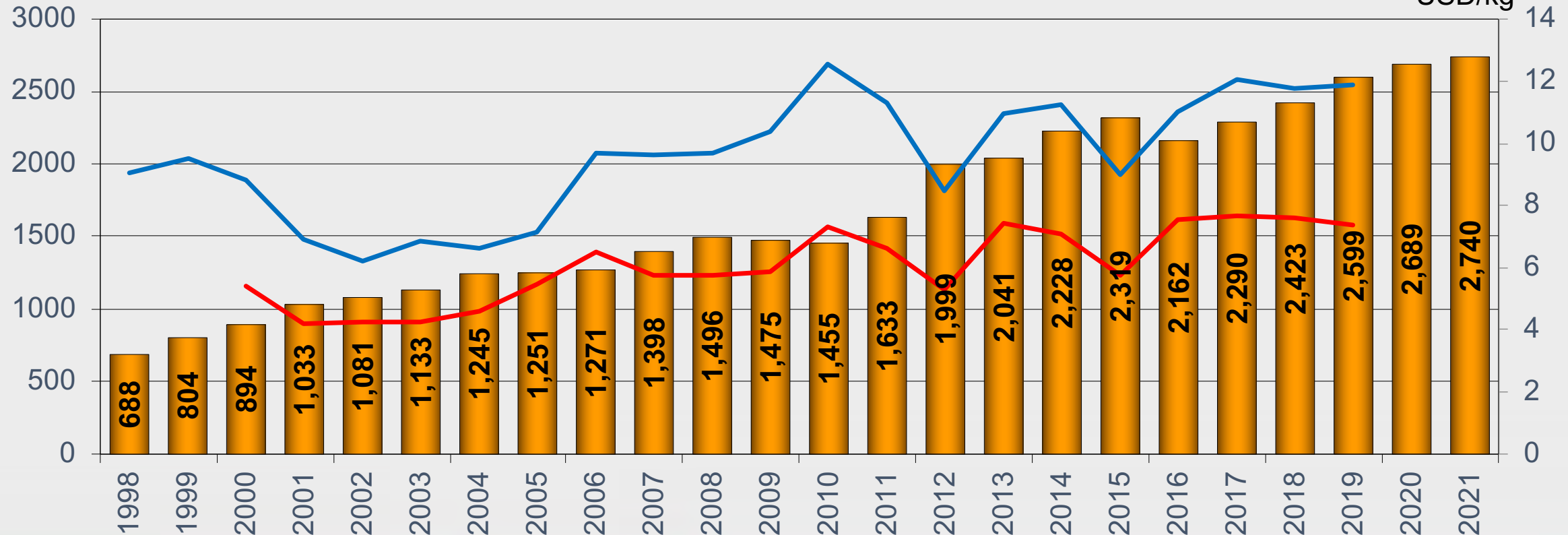


Atlantic Salmon Production

Real EU27 import price fresh whole gutted and real US import price fresh fillet

Production in 1000 metric tonnes

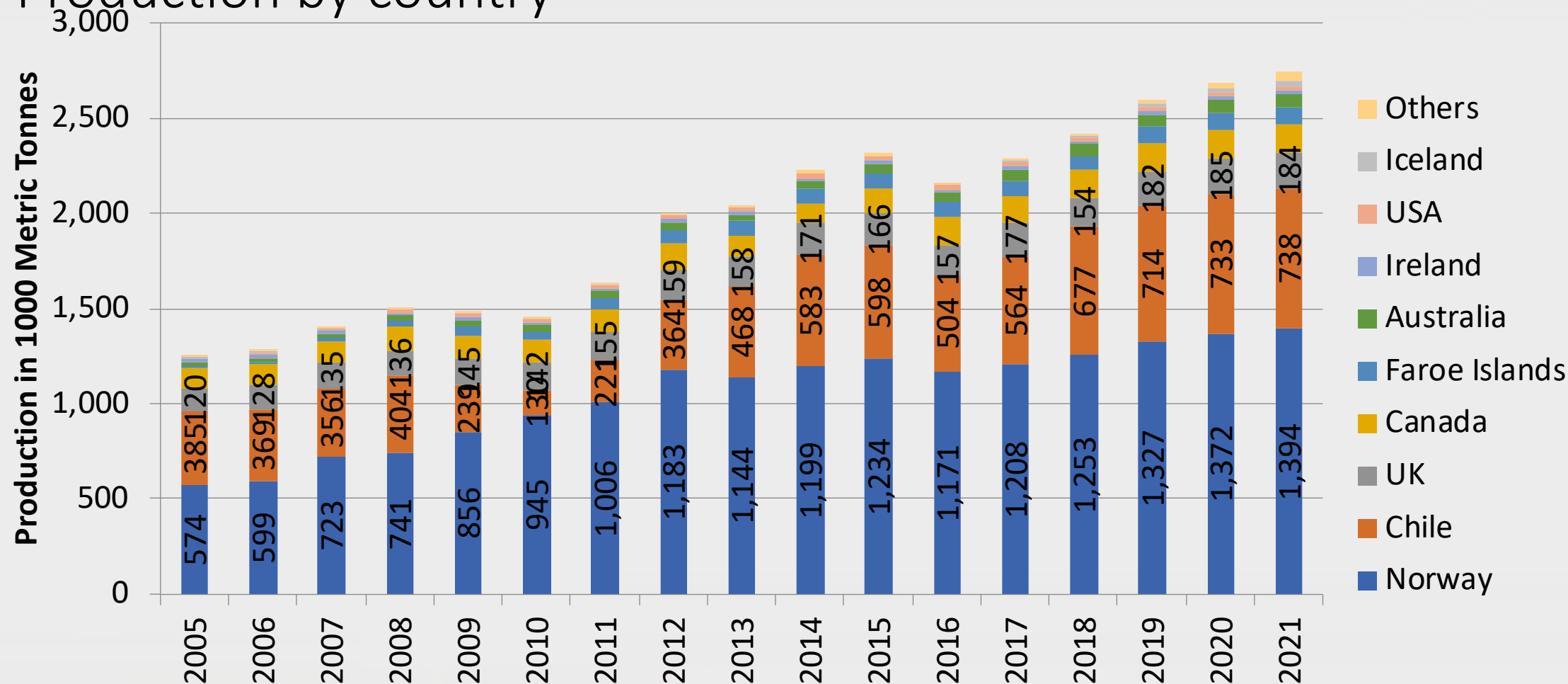
Real import prices EU27 fresh whole (red) and US fresh fillet (blue) in USD/kg



Sources: FAO, Kontali, NSC/Eurostat (prices). Note: Prices until 2018 are annual averages. Prices in 2019 are January-July average.

Atlantic Salmon

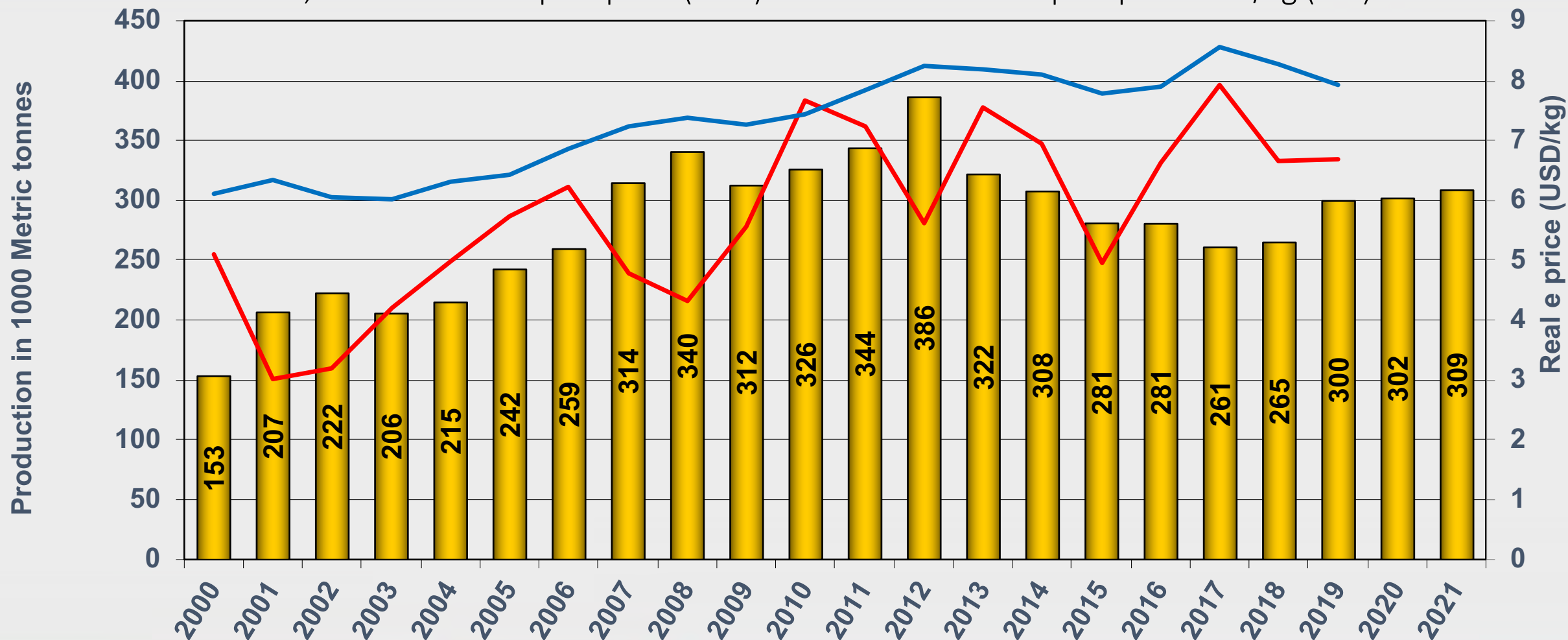
Production by country



Source: Kontali

Large Rainbow Trout

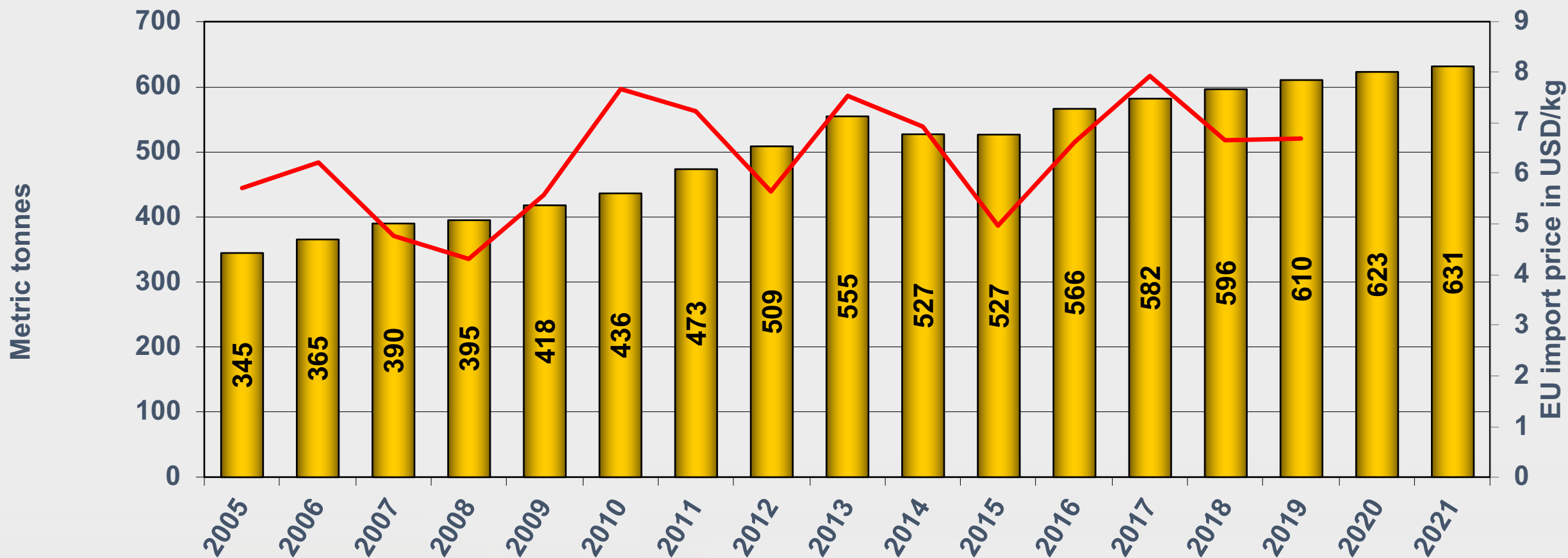
Total Marine Production, real US fresh import price (blue) and real EU fresh import price USD/kg (red)



Sources: FAO, Kontali and miscellaneous, NSC. Note: Prices until 2018 are annual averages. Price in 2019 is January-July average.

Small Rainbow Trout

Global Production and EU27 real import price



Sources: Kontali and miscellaneous. Prices: NSC and Eurostat.

Asian Seabass, Barramundi



Scandasia.com

Cairnspost.com.au



MainStream

<https://www.facebook.com/Mainstream-Aquaculture-343274141855766/> - <http://www.mainstreamaquaculture.com>

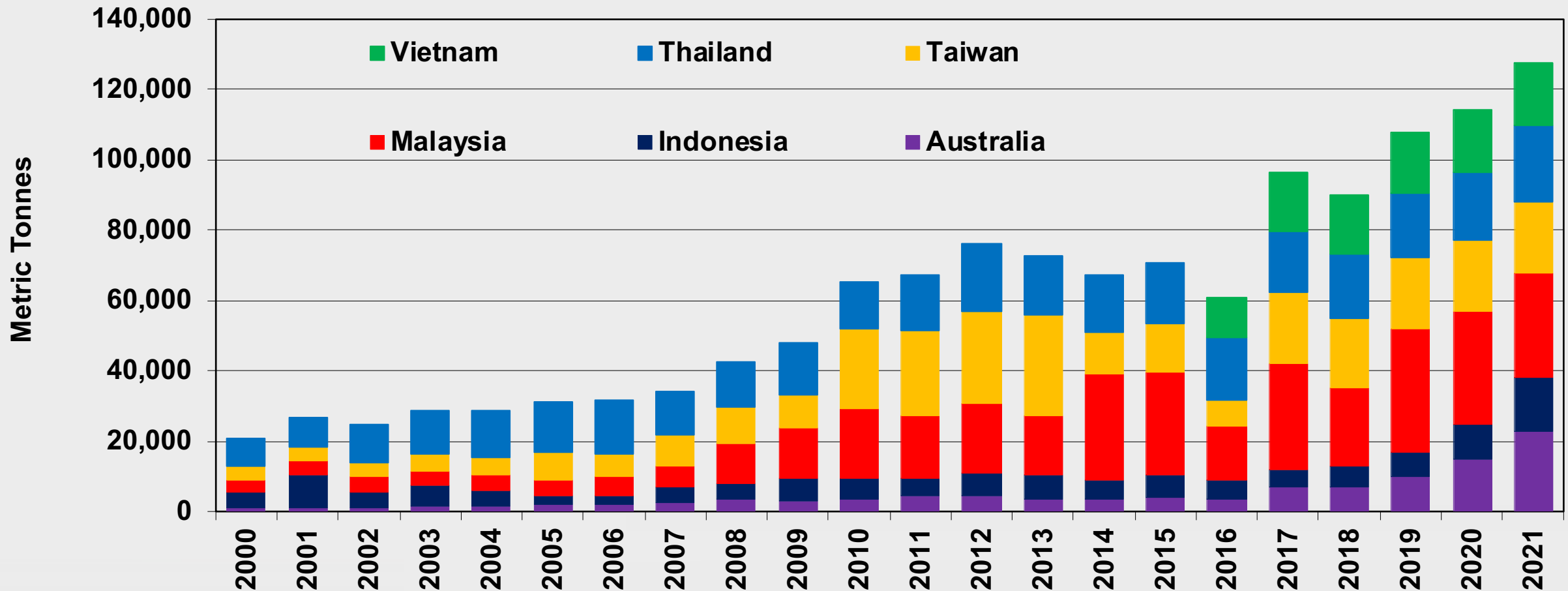


Thebetterfish.com



Barramundi

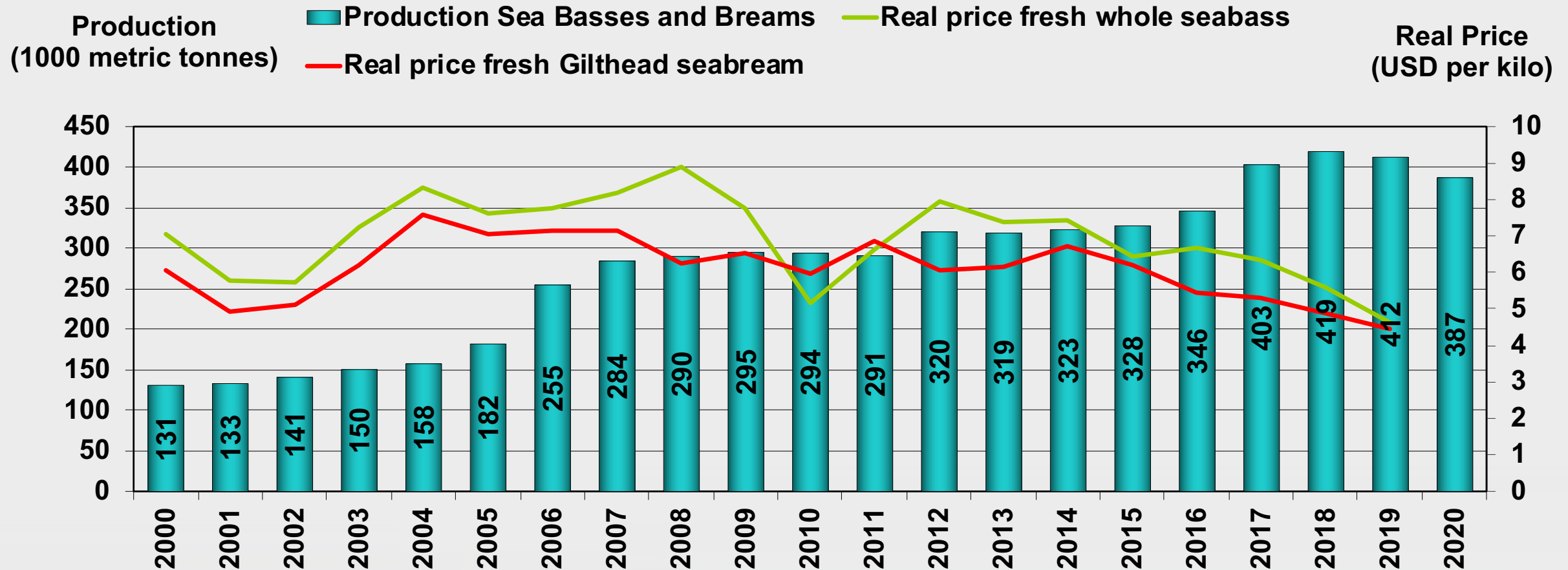
Total production by major producing countries



Source: FAO 2000-2016, Miscellaneous 2017-2021.

Seabass & Seabream

Mediterranean Production & Real Italian Import Price



Sources: Kontali and miscellaneous.

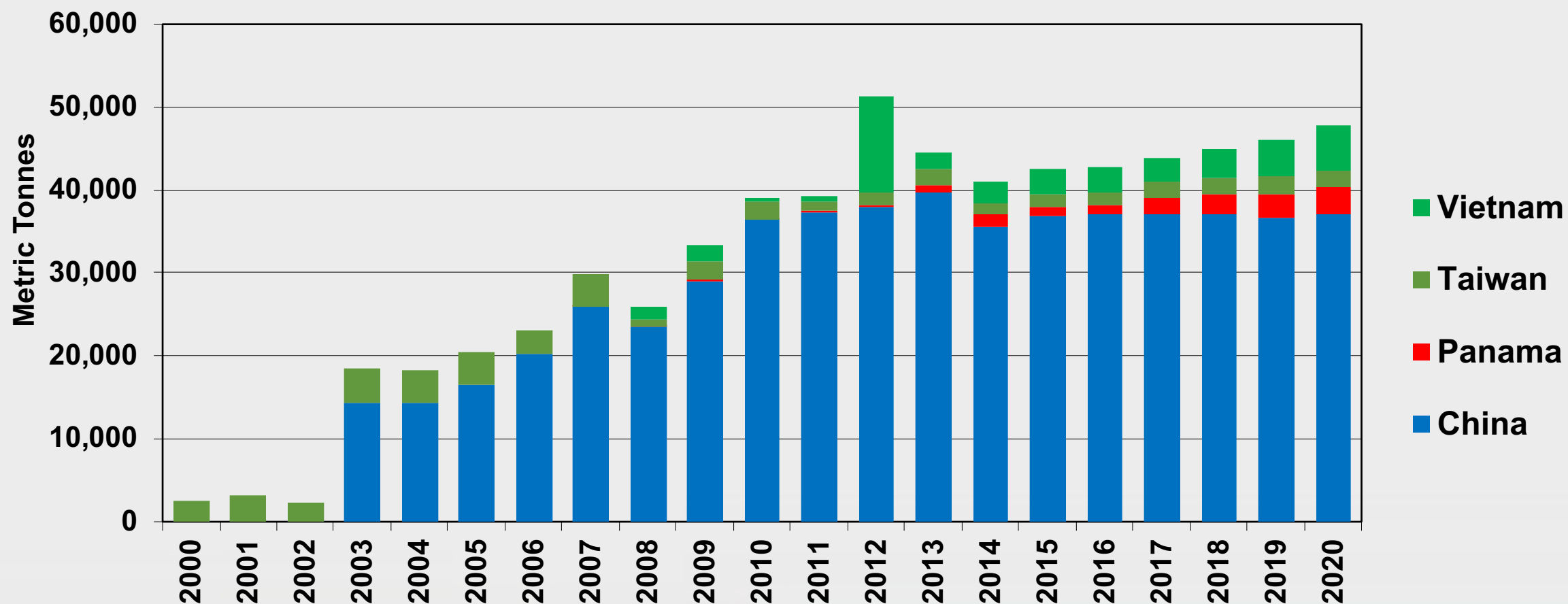
COBIA



SNAPPERFARMS

Cobia

Estimates for China, Taiwan, Panama and Vietnam

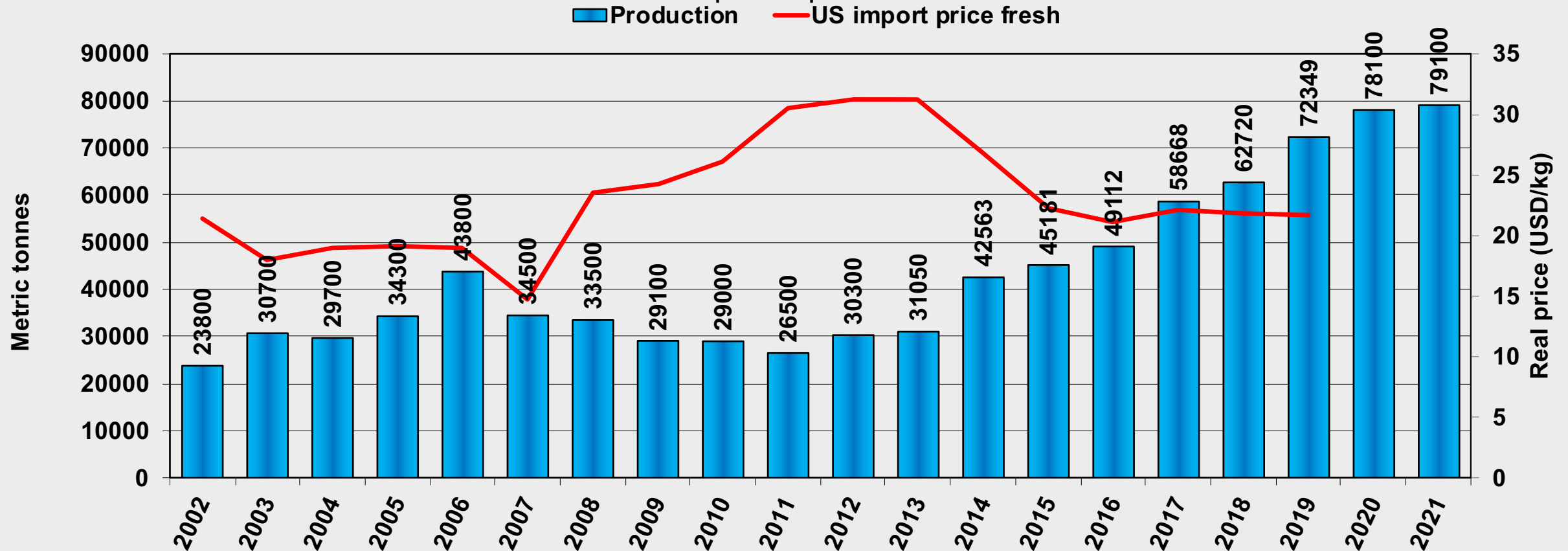


Source: CAPPMA and miscellaneous.



Bluefin Tuna

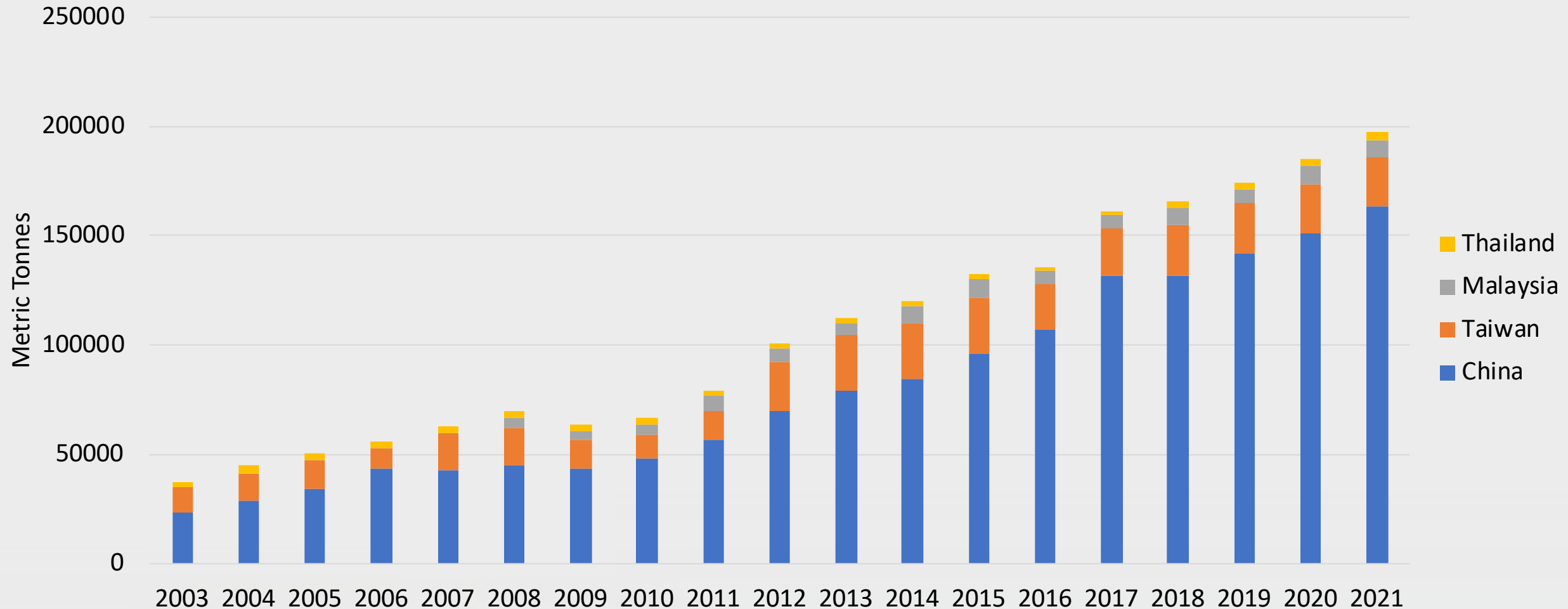
Total Production and US real import price fresh



Source: Production – Anonymous; Prices - NMFS.

Groupers

Estimates for selected countries

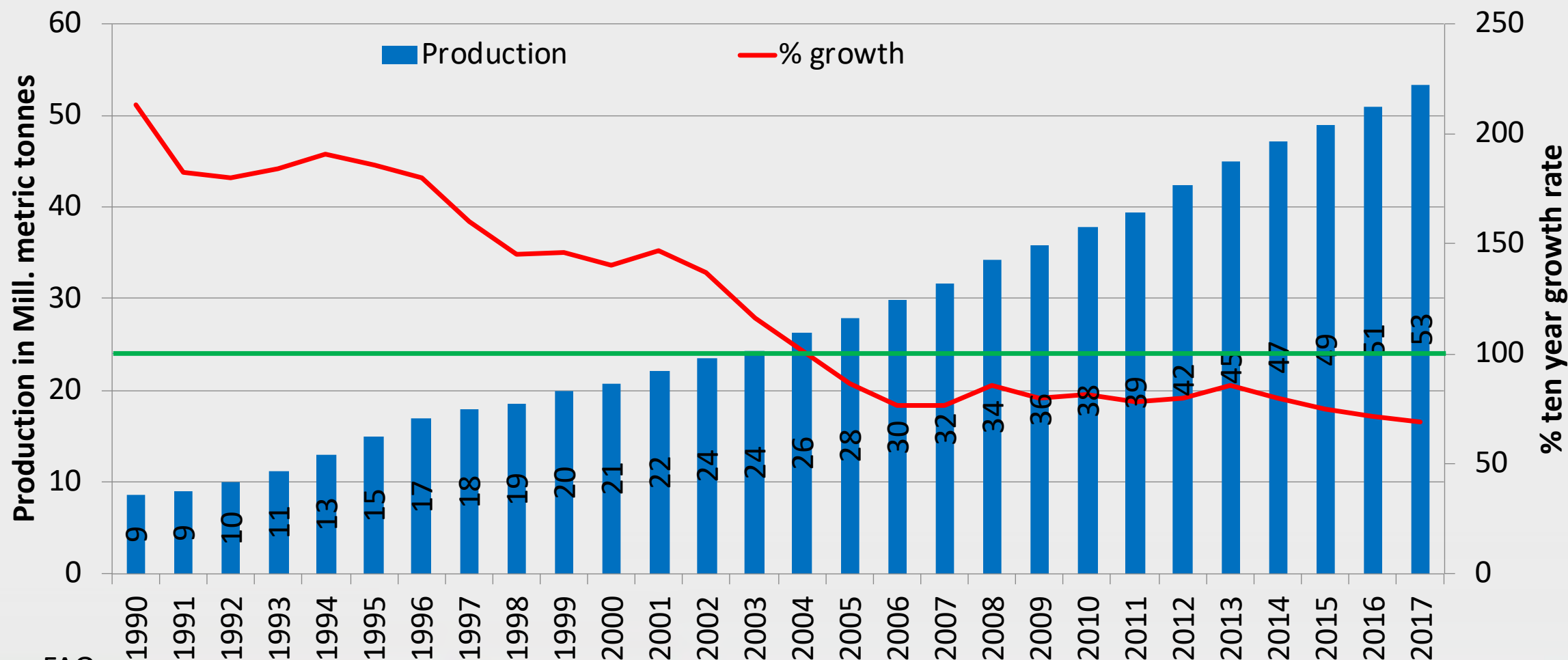


Source: Miscellaneous.

Global Summary Finfish

Aquaculture Production of Fish Species and 10-year growth rate

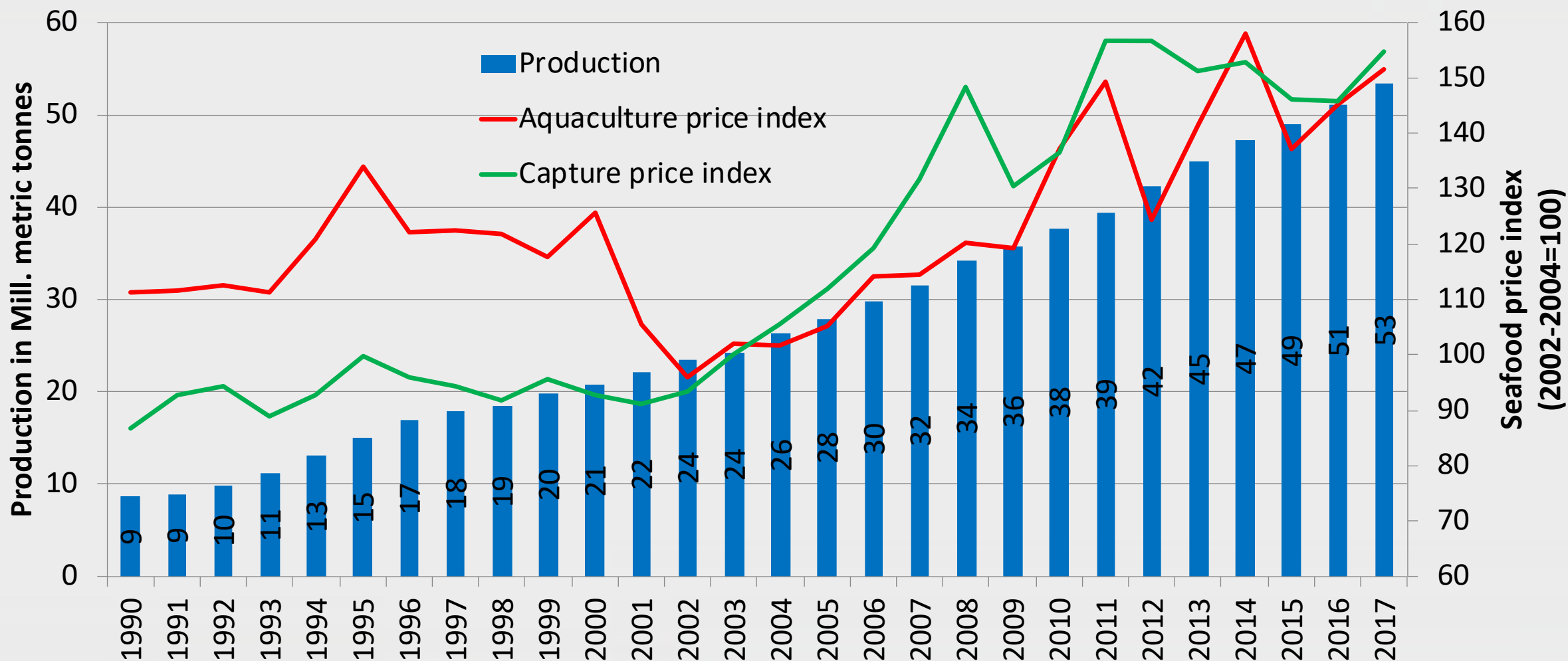
FAO data 1990-2017



Source: FAO

Aquaculture Production of Fish Species and Seafood Price Indices

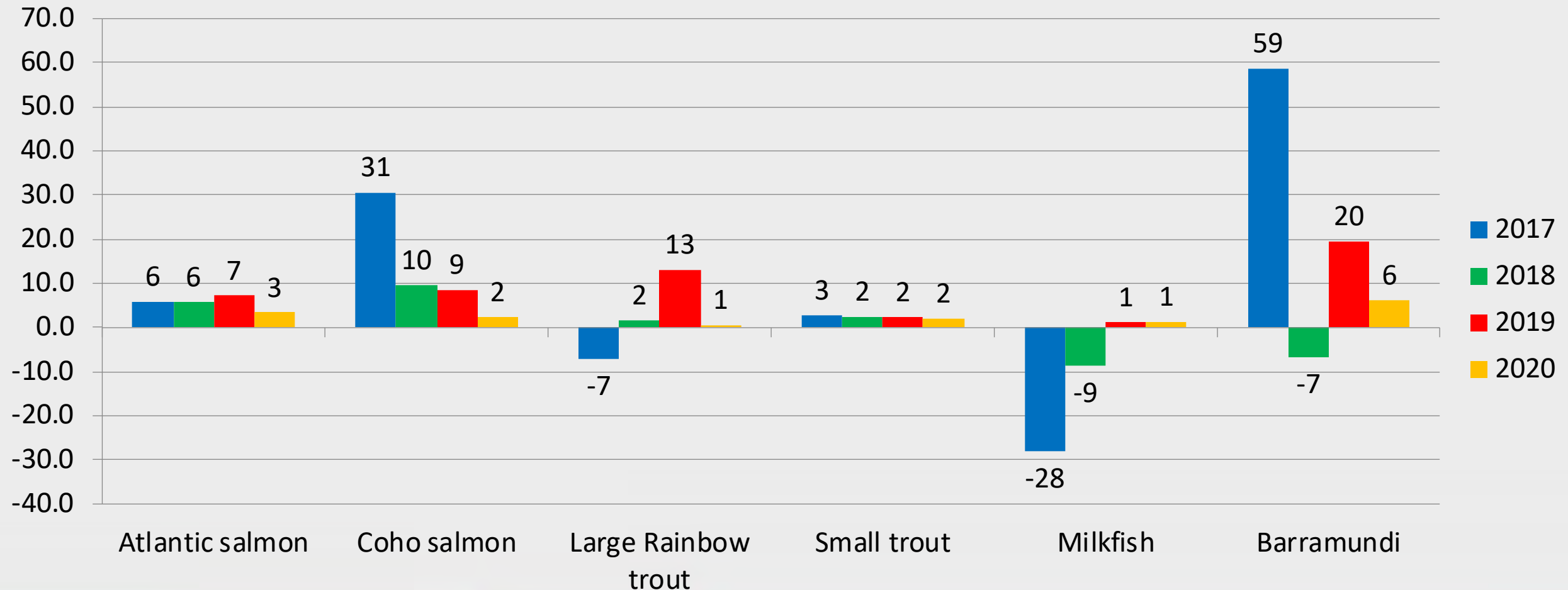
FAO data 1990-2016



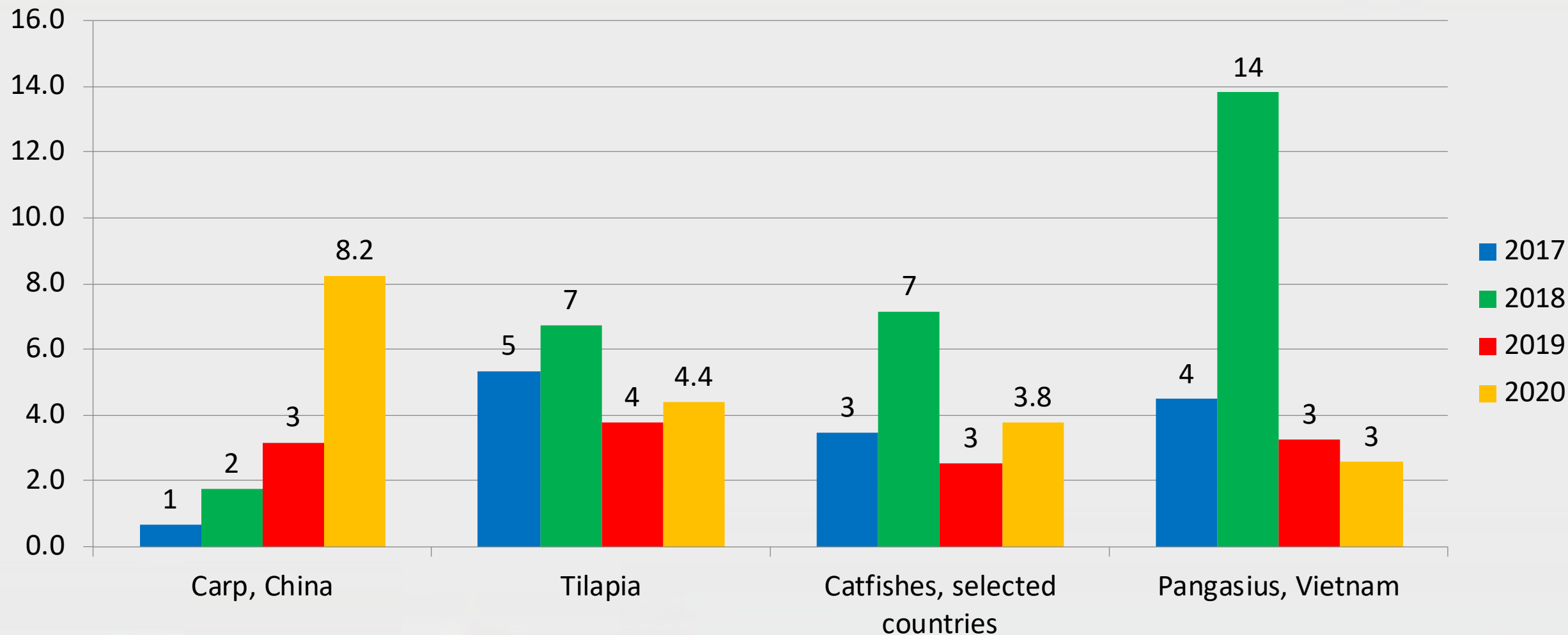
Source: Production – FAO; Price index - FAO, Univ. of Stavanger, Norwegian Seafood Council

Diadromous Species

Annual Percent Growth Rates

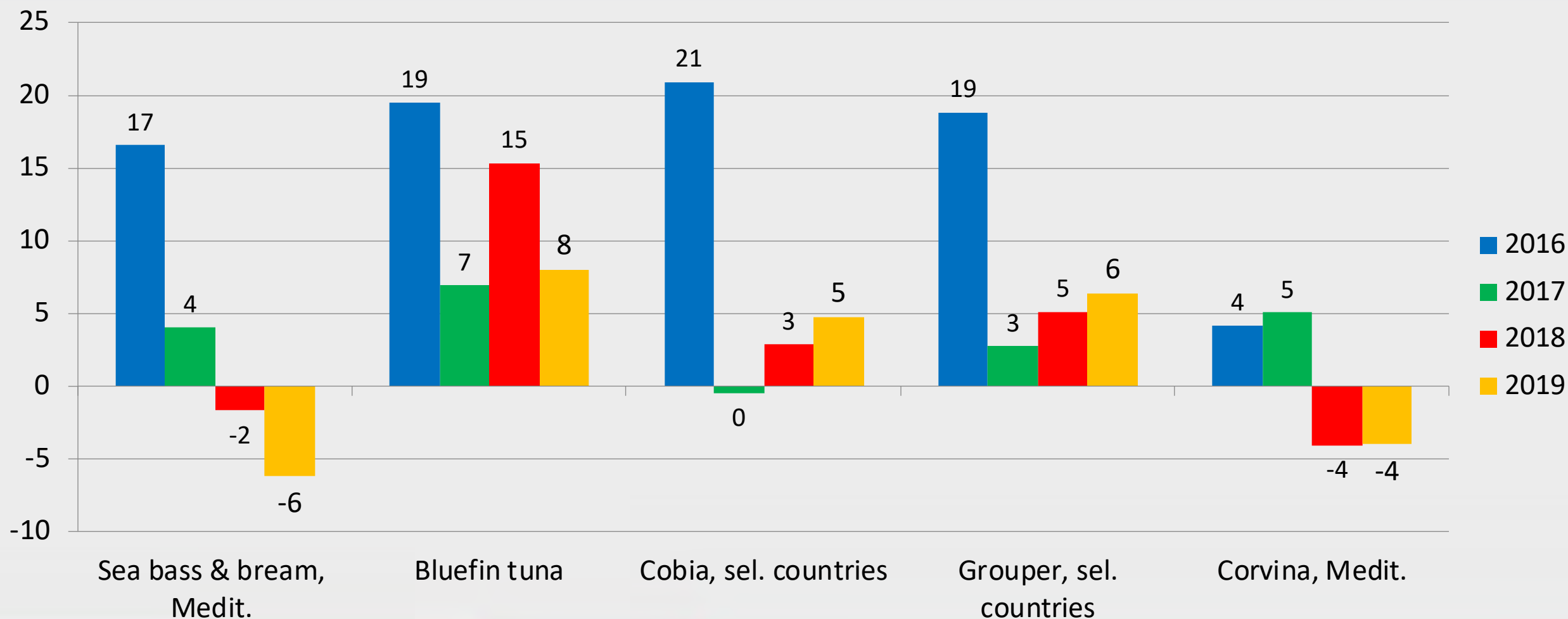


Freshwater Species Annual Percent Growth Rates



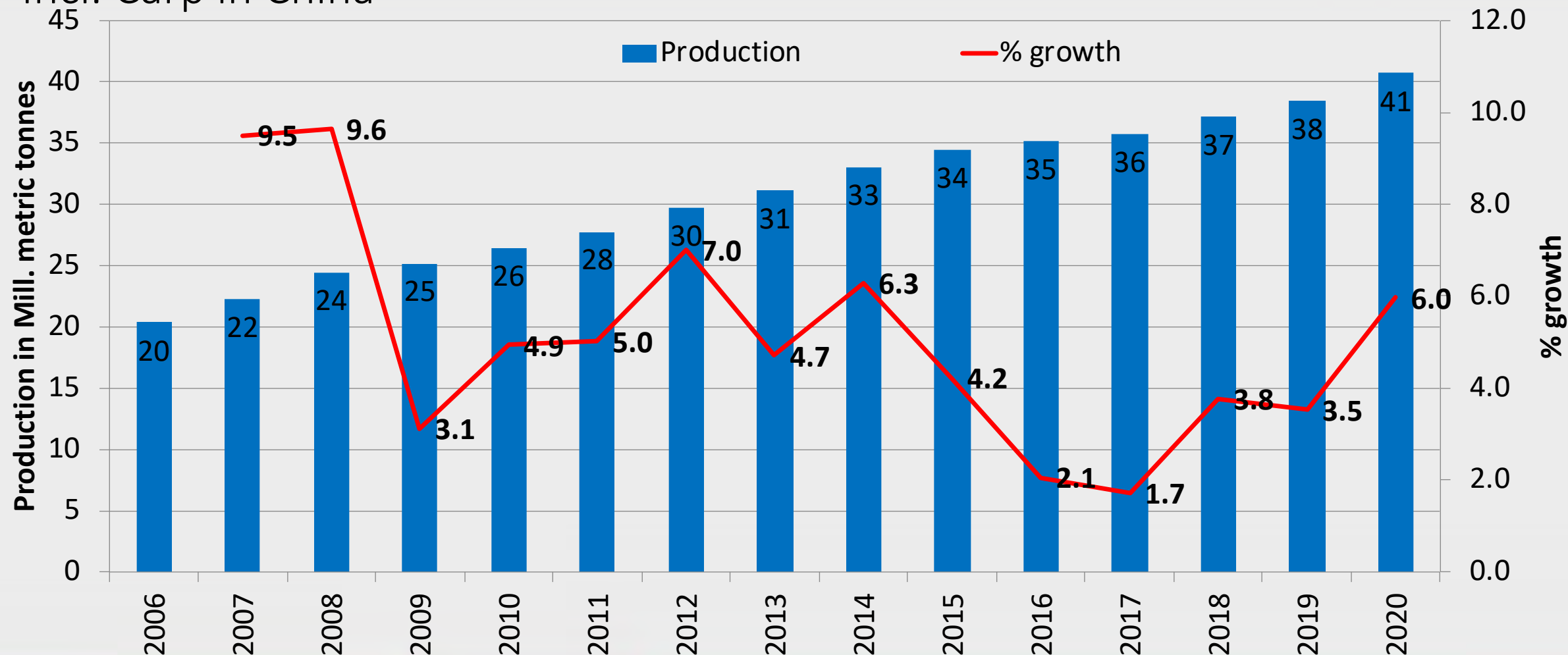
Marine Species

Annual Percent Growth Rates



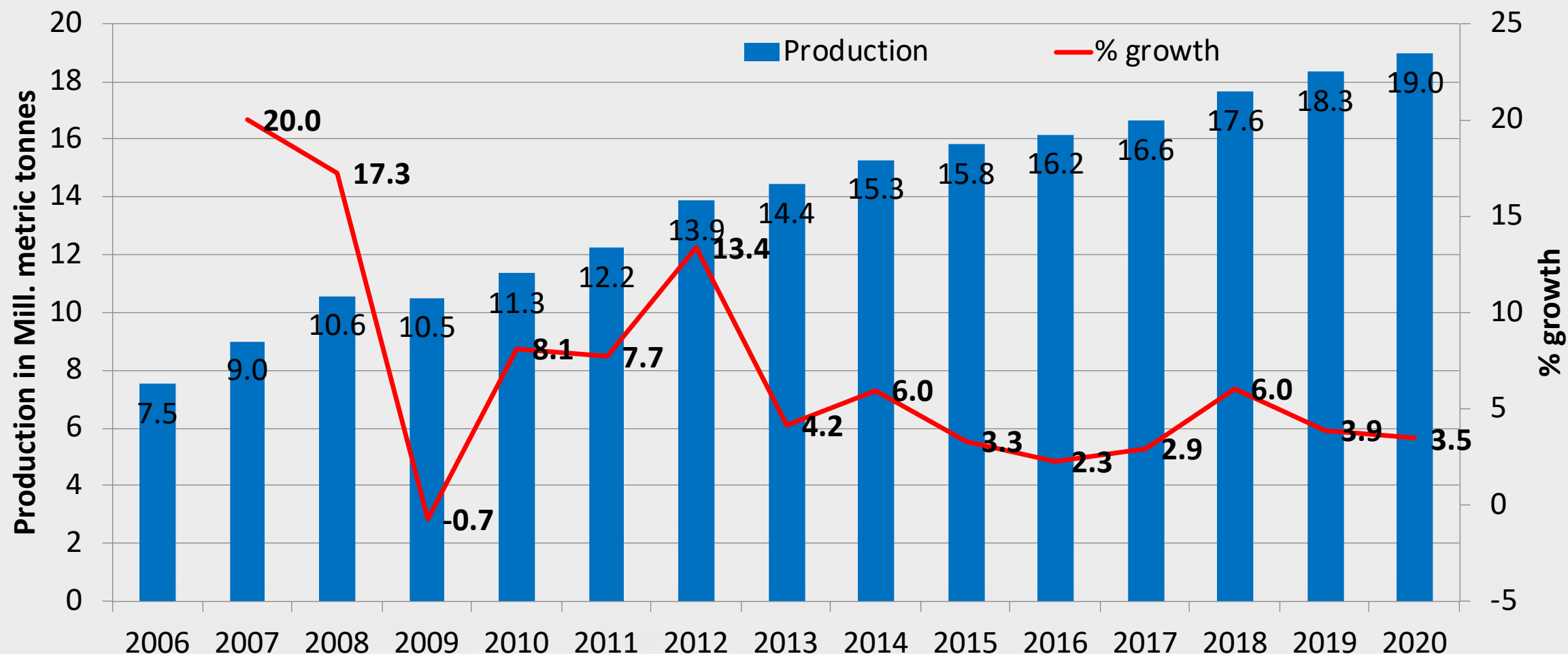
Production of Surveyed Species

Incl. Carp in China



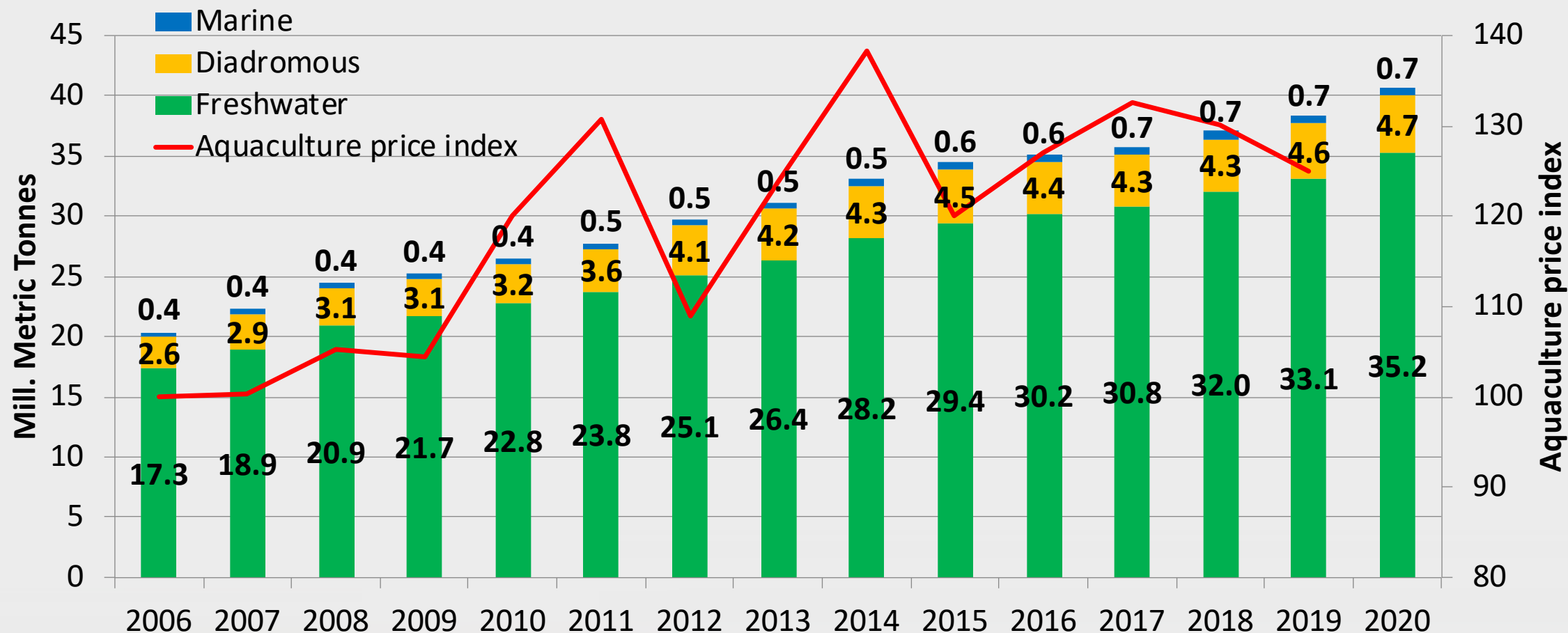
Production of Surveyed Species

Excl. Carp



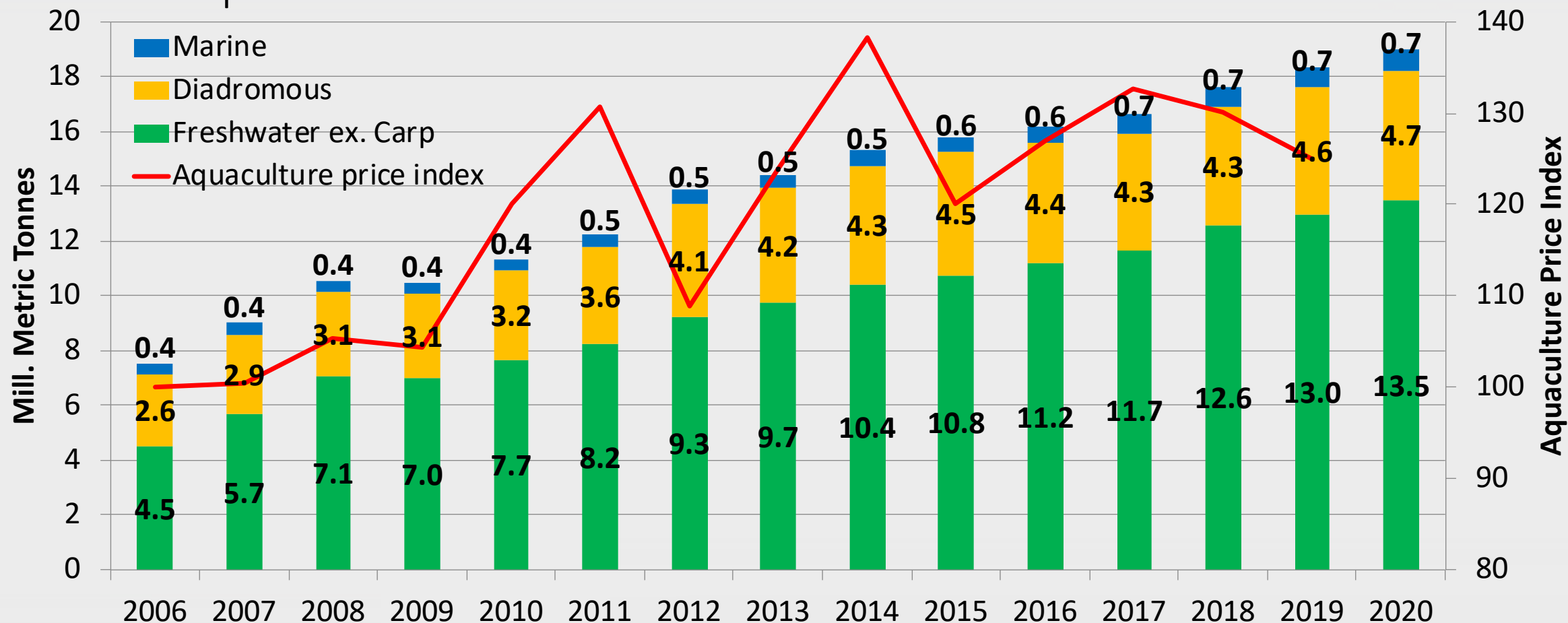
Production of Surveyed Species

By species group



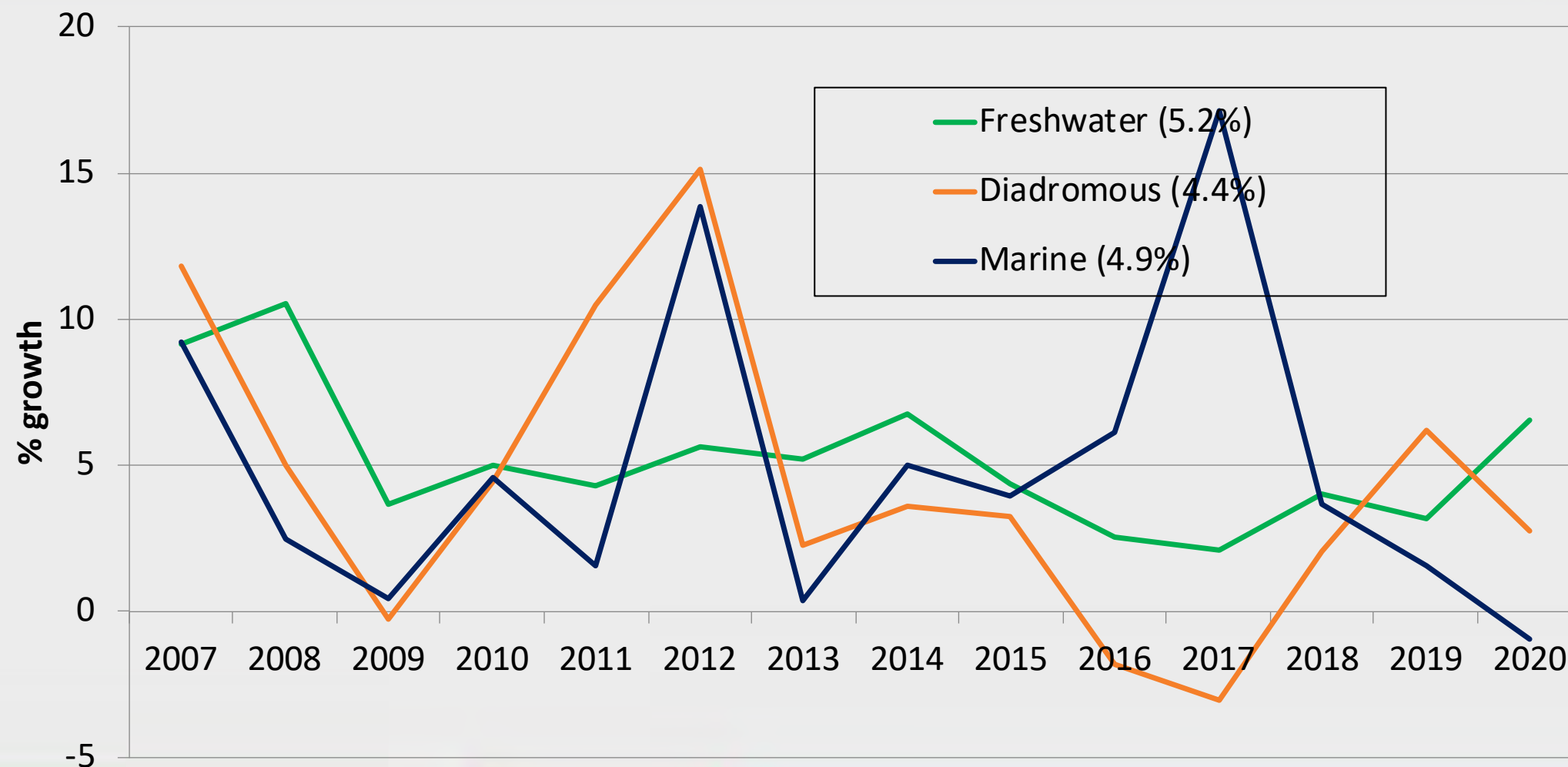
Production of Surveyed Species

Excl. Carp



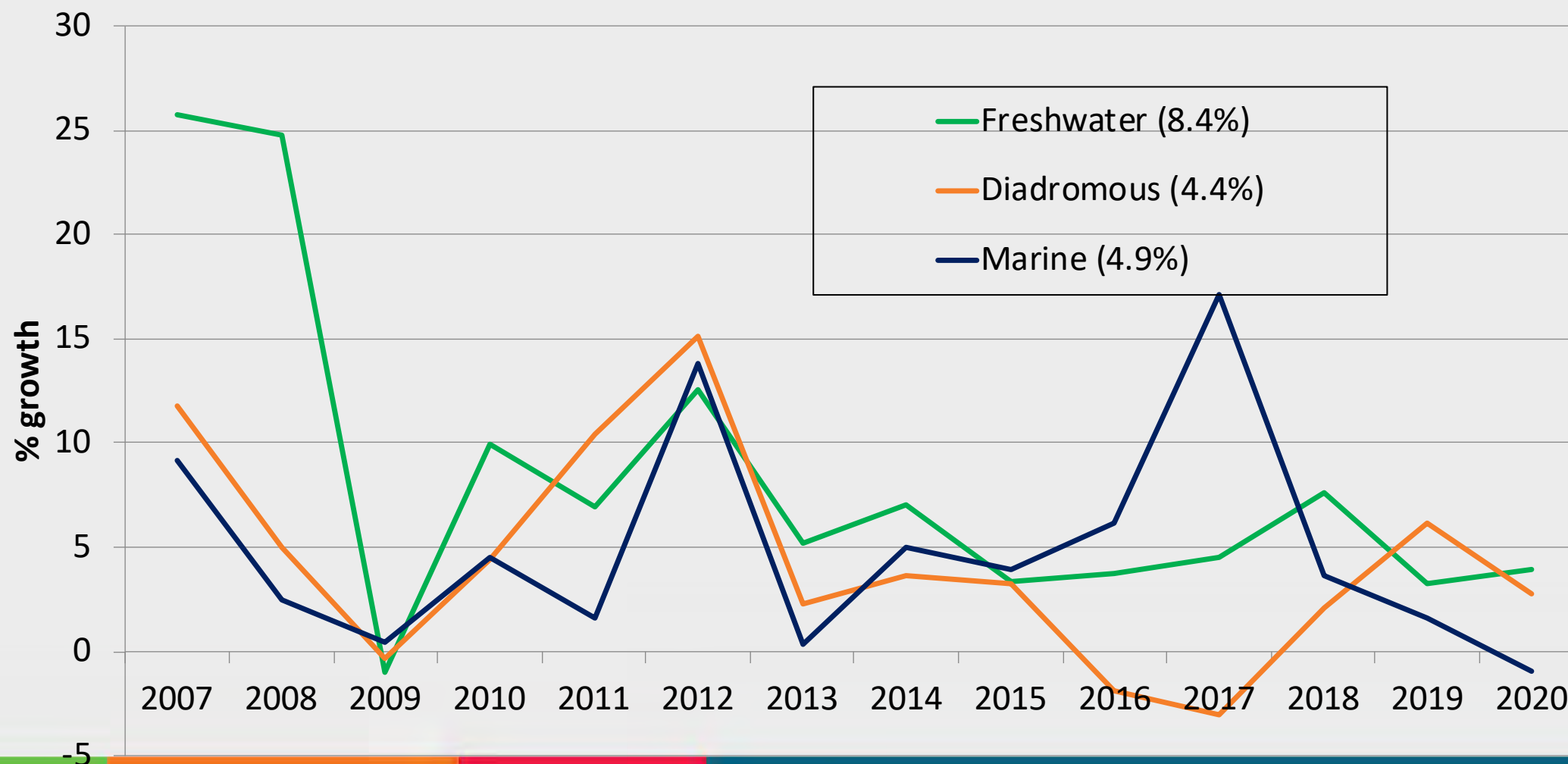
Growth Rates by Species Groups - Incl. Carps

2007-2020 average growth rate in parenthesis

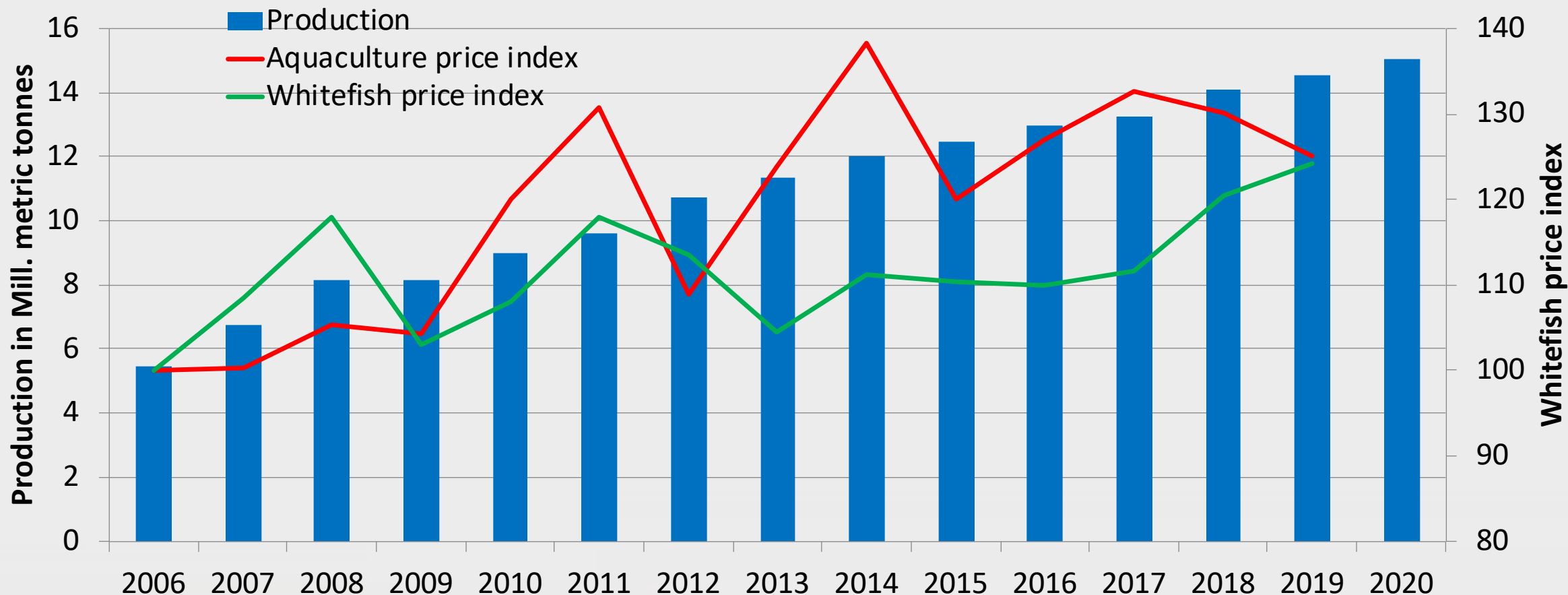


Growth Rates by Species Groups - Excl. Carp

2007-2020 average growth rate in parenthesis

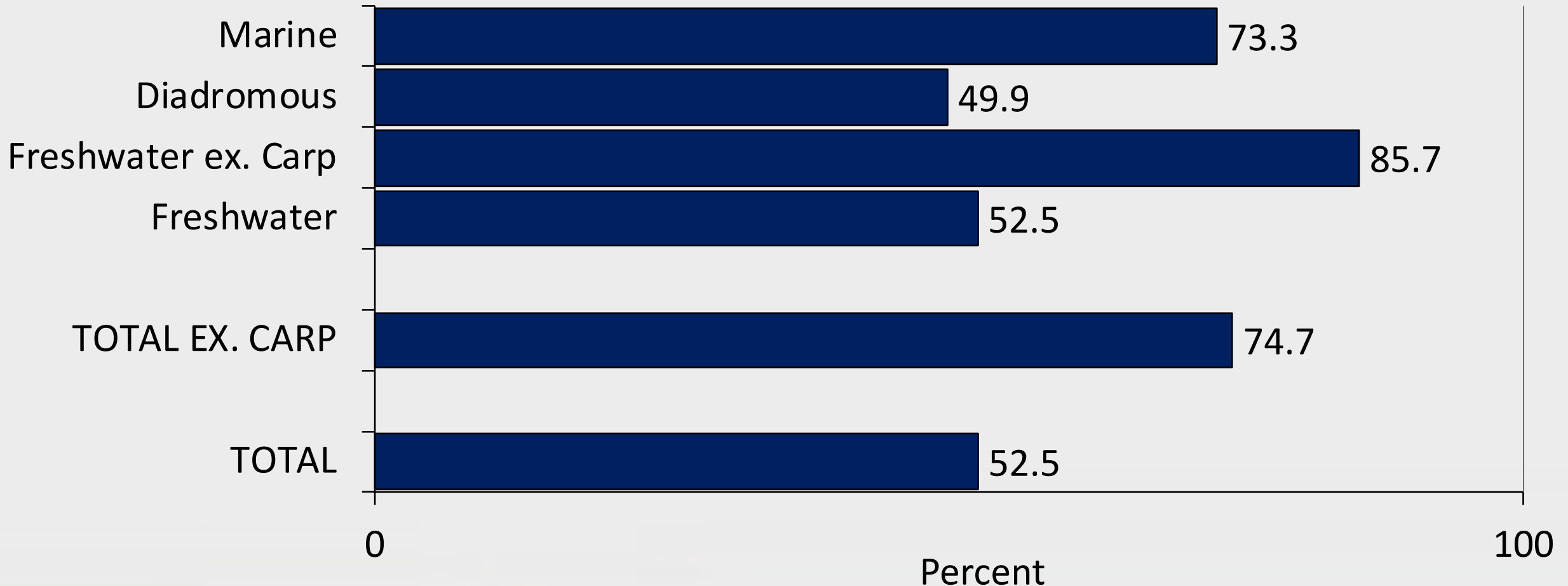


Production of Surveyed Whitefish Species and Price Index Aquaculture & Whitefish Excluding Carp



Did they double in a decade?

Percentage growth, 2009-2019



Trends and issues:
Sustainable growth
– technological or
institutional
innovations?



- Technological leaps?
 - Land based, closed production systems
 - Exposed / offshore production systems
 - Increasing capital requirements
 - Scaling up
 - Increasing financial risks?
- Institutional innovations?
 - Problem: External biological/environmental effects
 - A new generation of regional collaboration models?
 - Certification schemes for regional collaboration?

Investors could spark big growth in France land-based fish farming sector

Investors in France are being encouraged to put their money into **land-based** aquaculture projects planned for the suburbs of the country's big cities. Prospective **land-based** projects using recirculating aquaculture systems (RAS) powered by recycled energy from industrial plants in the suburbs of Paris...systems in conjunction with trade body FranceAgrimer. France has currently around 10 commercial **land-based** recirculating aquaculture projects, mainly in

AQUACULTURE

08 Jul 04:35 GMT

Pure Salmon building Africa's first land-based salmon farm

Land-based **salmon** farming company **Pure Salmon** said Tuesday it is building a new 20,000-metric-ton recirculating aquaculture system (RAS) **salmon** farm...the **Pure Salmon** pledge to deliver sustainable Atlantic **Salmon**, free of microplastics, antibiotics, pesticides and other contaminants," said Stephane Farouze, director of the board at **Pure Salmon** and chairman of private equity parent 8F Asset Management. Embed: Lesotho, Africa

AQUACULTURE

18 Jul 11:29 GMT

Investors sinking \$50 million into Chile land-based salmon venture

\$50 million (€44.5 million) **land-based** salmon farming project in Chile, El Mercurio reports. The so-called "Bordemar" project will be cited in the...to raise \$150 million (€133 million) through institutional investors in the capital markets for expansion. -- OUT NOW! Industry Report: The **land-based** salmon farming revolution --

AQUACULTURE

30 Apr 17:41 GMT

Chinese land-based salmon farm hits financial roadblock

Nordic Aqua Partners' plans to construct a **land-based** fish farm in Ningbo on China's wealthy east coast, have been delayed by a lack of funding. The company had previously announced a planned construction date of early 2018, but this was revised to mid-2019. However, an email last week to IntraFish from owners Johannes Neteland and Ove Nodland said that they are "still working to get the funding in place" and that construction may start at the beginning of

AQUACULTURE

04 Jul 07:48 GMT

UK firm opens country's first land-based shrimp farm

Aquaculture startup Great British Prawns is launching a **land-based** shrimp farm in Scotland, the company said. The company employs recirculation aquaculture systems (RAS) to produce warmwater white shrimp in the 1,500-square-meter farm in Balforn, Scotland. Great British Prawns' sustainable farm could hold up to a million fresh shrimp growing to an average size of 25 grams each, the company said. The **land-based** farm processes shrimp within 24 hours

AQUACULTURE

07 Jun 00:00 GMT

Inside Barramundi Asia's ambitious plan to create 'salmon of the tropics'

, allowing the first round of on-growing in Brunei, while **land-based** facilities are still being built. Why Brunei? Brunei is not an immediately obvious....5/\$7.3 million-€13.0/\$14.6 million), is still in the early stages, with reconnaissance just beginning on sea and **land** sites for hatchery, nursery and on...capacity cages in the initial stages. Larger fish will initially be put into the water, with extended growing time on **land**, to around 500 to 800 grams

AQUACULTURE

22 May 02:47 GMT

Icelandic land-based charr farmer reveals ambitious expansion plans

Land-based Arctic charr producer Matorka is aiming to raise production at its Icelandic site to 6,000 metric tons of Aquaculture Stewardship Council (ASC) certified products by 2022 at the earliest. This comes after the company completed an expansion to 3,000 metric tons with the help of \$8 million (€7.1 million) in equity funding last year. The Kopavogur-**based** company has been ramping up production over the past two years from 200 metric tons in

AQUACULTURE

22 May 02:44 GMT

US land-based shrimp firm hits another road block

US **land-based** shrimp company reports construction of its first facility, says Argus Leader. The delay at the company faces after having to change its first option – to the \$6.5 million (€5.7 million) in economic

AQUACULTURE

25 Jun 16:01 GMT

New US land-based to deliver its first

Finger Lakes Fish Inc., a new **land-based** aquaculture facility in Auburn, New York, expects to deliver its first mid...capacity to produce 500 metric tons of seabass. Is aquaculture bubble burst? Finger Lakes is...at the white tablecloth foodservice. The **land-based** salmon operation

AQUACULTURE

25 Jun 05:12 GMT

Kingfish Zeeland with Maine RAS

Dutch **land-based** aquaculture company Kingfish Zeeland has completed an "exhaustive study" along the coast of Maine. Its...between seafood entrepreneurs. For example, Nordic Aquafarm's market has been met...requires," he said of the company's plan to locate in Maine. "These are complex projects that require at least some

AQUACULTURE

08 Jul 04:38 GMT

US land-based Ma acquisition deal

Prospective **land-based** salmon producer purchase and sale agreement with the former Verso paper mill in Bucksport. The culmination of many months of planning by American Iron and Metal (AIM), the company said Tuesday in Bucksport

NEWS

21 May 21:10 GMT



US land-based seabass producer nabs 'significant' investment

Deal will give supplier a stronger balance sheet and fund growth.

by IntraFish Media

May 31st, 2019 14:10 GMT Updated May 31st, 2019 18:25 GMT

US land-based seabass producer Ideal Fish on Friday announced it closed a "significant" equity investment from a consortium of US and international investors.

The funds will be used for growth capital, and strengthen the company's balance sheet.

Ideal Fish is on track to produce 175 metric tons of European seabass in recirculating aquaculture system (RAS) farm in Waterbury, Connecticut.

Atlantic Sapphire doubles land on farm

Atlantic Sapphire entered into a \$5 million (€4.4 million) deal to double the size of **land** it owns at its US operations. The project has 40% of the company produce 220,000 metric tons of salmon. Integration opportunities, the company reported upping its expected

Maine land-based legal hurdle

Atlantic Sapphire faced a new legal hurdle in its bid to build a new land-based facility in the rural Maine city of Belfast. A ruling by the city of Belfast decision in favor of the city's neighbor in 2018. The court found that the decision could possibly serve to justify reversal of the decision to

US land-based plans

Atlantic Sapphire announced plans to build a **land-based** facility in Maine by a year. Will the **land-based** facility be in the works of building a new facility with the capacity to produce 220,000 metric tons of salmon. Atlantic Sapphire Management & Holding Co.

producer nabs

Ideal Fish on Friday announced it closed a "significant" equity investment from a consortium of US and international investors. The funds will be used for growth capital, and strengthen the company's balance sheet. Ideal Fish is on track to produce 175 metric tons of European seabass in recirculating aquaculture system (RAS) farm in

31 May 14:10 GMT

PE fund envisions global network of land-based salmon farms

Group has ambitious goal to reach a production target of 260,000 metric tons per year across a global network of facilities.

by Dominio Welling
November 8th, 2018 12:08 GMT Updated November 8th, 2018 13:24 GMT

Now is the ideal time for investing in land-based salmon farming, and 8F Asset Management -- headquartered and regulated in Singapore with group offices in London, New York and Tokyo -- is putting its money where its mouth is.

The company manages a private equity fund that invests solely in vertically integrated salmon production and processing facilities, using land-based sustainable recirculating aquaculture system (RAS) technology.

The operating company and brand is known as Pure Salmon.

"It is not a traditional PE fund in the sense of investing in other companies, but instead we invest in our own facilities, which we build ourselves," Martin Fothergill, co-founder and partner at 8F Asset Management, told **IntraFish**.

Most recently the company announced a \$162 million (€141.9 million) investment to create "Soul of Japan," a 10,000-metric ton land-based Atlantic salmon farm in Japan's Mie prefecture.



The project is fully integrated with a hatchery, grow-out systems, and processing facilities. It will be located in Tsu city on a site of approximately 137,000 square meters and will employ 130 staff, Fothergill said.

Construction will begin in 2019 and the facility will become operational in 2021, with the first products being available from 2022.

Soul of Japan will be majority owned by 8F's private equity fund and use proprietary technology from Israeli firm AquaMaof Aquaculture Technologies -- which is the preferred and exclusive technology partner to 8F's projects.

Norway could produce over 10% of its farmed salmon on land. Meet the companies who could make that happen

If all of Norway's ambitious land-based salmon farming projects succeed -- and that's a big if -- the result could be a significant increase in production.

by Anders Furuset
November 2nd, 2018 12:12 GMT Updated January 11th, 2019 16:36 GMT

In 2015, Norwegian Fisheries Minister Elisabeth Aspaker's administration jump-started land-based salmon globally by offering investors a tantalizing prospect: production would not require standard salmon farming licenses.

Though permitting is still required, it's insignificant in cost when weighed against the demand for salmon and the current pricing climate. That said, skeptics abound about the future of the industry, and some projects have struggled to obtain financing, particularly when capital expenditures typically run in tens of millions of dollars.

So who's in the mix? **IntraFish** looks at a list of the largest and most realistic projects underway.

Up and down the country

Land-based salmon farming entrepreneurs have been at work in Norway for a long time. The first to begin making progress has been Fredrikstad Seafood, which will complete Phase 1 of its project soon with a capacity of 1,500 metric tons. Most others in the country are in a far earlier stage.

Outside Norway's borders there are several land-based salmon plants under construction or in planning. Another of the main arguments for the industry finally being competitive is that proximity to key markets will further reduce costs, and provide fresher product that can fetch a premium.



Nordic Aquafarms to start construction of US land-based salmon facility next summer

Company is working on permit applications to start constructing the giant site in Maine.

by Anders Furuset
December 3rd, 2018 12:10 GMT Updated December 3rd, 2018 13:54 GMT

NORDIC AQUAFARMS

The Norwegian group includes three subsidiaries:

Fredrikstad Seafood is Norway's first land-based fish processing plant for salmon. Phase 1 is set to be completed by the end of 2018, and will have a production capacity of 1,500 metric tons.

Denmark's Sashimi Royal (62.5-percent owned) produces the species Yellow Kingfish. It has a production capacity of 1,200 metric tons.

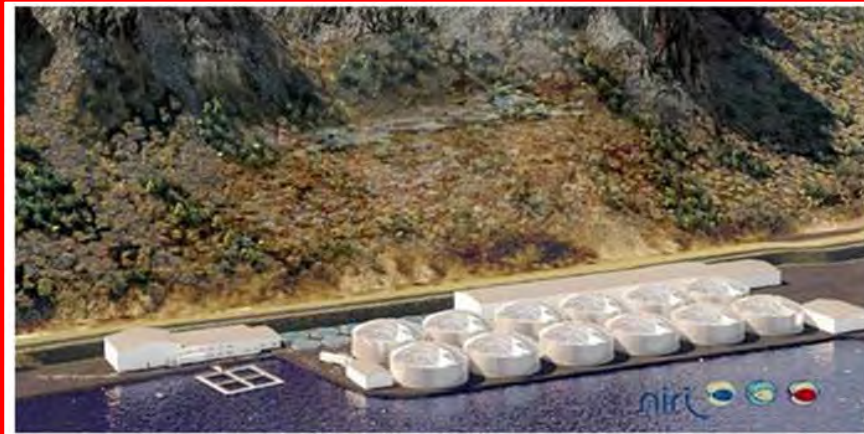
Nordic Aquafarms Inc. is the American company in charge of building the massive plant in Maine.

While Atlantic Sapphire is currently stocking its first eggs in its Florida facility, another Norwegian company is in full swing to realize its plans further north.

As **IntraFish** recently reported, the company's US CEO Erik Heim moved from Norway to Maine earlier this year to oversee the massive land-based project, and that project is now on track for a 2019 start date.

At the end of January, the news broke of plans by **Nordic Aquafarms** to build a land-based salmon production complex with production capacity of 33,000 metric tons at the US site, for an investment estimated between \$450 million-\$500 million (€395.8 million-€439.8 million).

The company's first phase is a \$150 million (€131.9 million) investment where Nordic Aquafarms expects to produce about 13,000 metric tons of salmon.



New land-based salmon farm given green light in western Norway

Ofs Måløy has been granted permission to establish land-based facilities.

by Vegard Solslettén
January 4th, 2019 12:10 GMT Updated January 4th, 2019 13:10 GMT

The Sogn and Fjordane County Council in western Norway has granted permission for Ofs Måløy to establish a new land-based farm producing 15,000 metric tons of salmon and trout annually.

The farm will be use a recirculating aquaculture system (RAS) from Niri and will cost "several hundred million [NOK]," according to Jon Ove Stokke, CEO of parent company Ofs Norway.

Fully developed, the facility will have a volume of 200,000 cubic meters, an area requirement of 37.9 cubic meters and will include and integrated processing plant.

The building will be built in several phases. The first will be an research and development phase to "fine-tune the technology," before Phase 2 builds production to approximately 7,500 metric tons. Phase 3 is designed to take the farm to producing 15,000 metric tons per year.

The plan is to buy smolt externally to begin with, but to gradually build its own hatchery.



Israel's AquaMaof building €25 million land-based salmon farm in Russia

The company will stock the first batches of eggs towards the fourth quarter of 2019.

by IntraFish Media
December 12th, 2018 12:13 GMT Updated December 12th, 2018 13:28 GMT

Israel's AquaMaof Aquaculture Technologies is building a €25 million (\$28.4 million) land-based Atlantic salmon farming project in Russia, the company said.

The facility is financed by local investors, and is expected to stock the first batch of eggs towards the fourth quarter of 2019.



PE fund envisions global network of land-based salmon farms

[Read more](#)

The recirculating aquaculture system (RAS) facility will have a capacity to produce 2,500 metric tons of Atlantic salmon a year.

The facility will include a hatchery, nursery, and full grow-out areas, as well as management and operational zones.

"We are extremely honored to be selected by a group of esteemed local investors, after a thorough evaluation process, that carefully assessed several available RAS technologies," said

David Hazut, CEO of AquaMaof.

The site will be equipped with AquaMaof minimal liquid discharge (MLD) technology using proprietary water recycling techniques.

The design will allow for minimal energy consumption and costs, and requires minimal maintenance, while enabling the reduction of the feed conversion ratio and operational costs, the company said.



South African land-based salmon farm in the works

If successful the farm would produce half of the salmon the country already imports.

by IntraFish Media
December 12th, 2018 12:08 GMT Updated December 12th, 2018 13:25 GMT

A newly formed company based in Cape Town, South Africa, plans to bring land-based salmon farming to the African continent.

Atlantis West Coast Salmon Project is a ZAR 766 million (€46.7 million/\$53.2 million) venture that claims it will be one of the largest full lifecycle salmon farms globally with annual production capacity of 3,400 metric tons of HOG fresh fish. "This is enough Atlantic Salmon fish to increase South Africa's consumption by 50 percent of current imports," says the company website.

The system is designed to be a zero-effluent discharge facility with its own oxygen, electricity generation, and waste management plants, with excess electricity generation to help local communities, says the company.

It is the brainchild of Dennis Rogers Karangwa, who's LinkedIn profile describes a long career in obstetrics and gynecology before launching West Coast Salmon in 2015.



Atlantic Sapphire tour December 2018. Photo: Lola Navarro / IntraFish

Atlantic Sapphire's land-based farm construction in full swing as 'biological clock' ticks

The company will stock the next batch of eggs in January.

by

Lola Navarro

December 18th, 2018 12:12 GMT Updated December 18th, 2018 13:31 GMT

After stocking the first 800,000 eggs at its Miami-based "Bluehouse," Oslo-listed, land-based salmon company Atlantic Sapphire plans to stock a new generation of eggs every seven weeks. By June, it expects to have five generations of salmon at different stages of the production cycle at the site currently under construction.



Photo gallery:
Atlantic Sapphire's
Miami land-based
salmon site

Read more



The massive project and ambitious timeline will require several different companies from different trades to work at full capacity over the coming weeks, as the live eggs' biological cycle marks the rhythm of the initial operation.

"In this project we're in the construction business, in the water infrastructure business and in the fish business," said Jose Prado, CFO of Atlantic Sapphire, during a tour through the site.

"The theme is coordination, communication and collaboration."

The first phase of the project – a 9,500 metric ton HOG land-based salmon farm expected to deliver steady harvests by 2020 – covers nine acres. The company is currently finalizing the construction of the fresh-water circuit, which will take the fish through the post-



New CEO of Maine land-based salmon farm bullish on the future

Company plans to produce 20,000 metric tons of salmon in the next 15 years.

by Rachel Sepin

November 23rd, 2018 13:09 GMT Updated November 23rd, 2018 13:40 GMT

US land-based salmon farmer Whole Oceans is still on track with its goal to capture 10 percent of the US salmon market over the next decade, according to its new CEO.

Jason Mitchell, [who was promoted to the role in October](#), told **IntraFish** he is helping the company meet aggressive growth goals so that it can ultimately produce 20,000 metric tons of salmon within the next 15 years.

"The company is transitioning from its development to execution phases," he said.

Whole Oceans has entered into an agreement with Cianbro Construction for pre-construction services to complement its partners CES, Pranger and Billund, he said. The partnership is helping Whole Oceans finalize design details for what could one day be the largest, most advanced land-based Atlantic salmon production facility in the world, he said.

Other aspects of the pre-construction phase include ensuring production personnel have input during the design and construction process, and developing bid packages for local contractors, he said.



"Whole Oceans has had, and will continue to have, aggressive plans to develop the business and accomplish its milestones," he said. "The start of construction is an important milestone."



US land-based sea bass farmer wins BAP certification

Development a timely year-end boost for land-based Great American Aquaculture.

by IntraFish Media
December 11th, 2018 12:08 GMT Updated December 11th, 2018 13:17 GMT

Ideal Fish, Great American Aquaculture's consumer-facing brand, has received notification of Best Aquaculture Practices (BAP) Certification for sea bass.

The BAP certification program is administered by the Global Aquaculture Alliance (GAA) and is compliant with the Global Food Safety Initiative (GFSI), Global Social Compliance Programme (GSCP) and Global Sustainable Seafood Initiative (GSSI).

It is the only certification to cover the entire aquaculture production chain, from hatcheries to farms to processing plants.

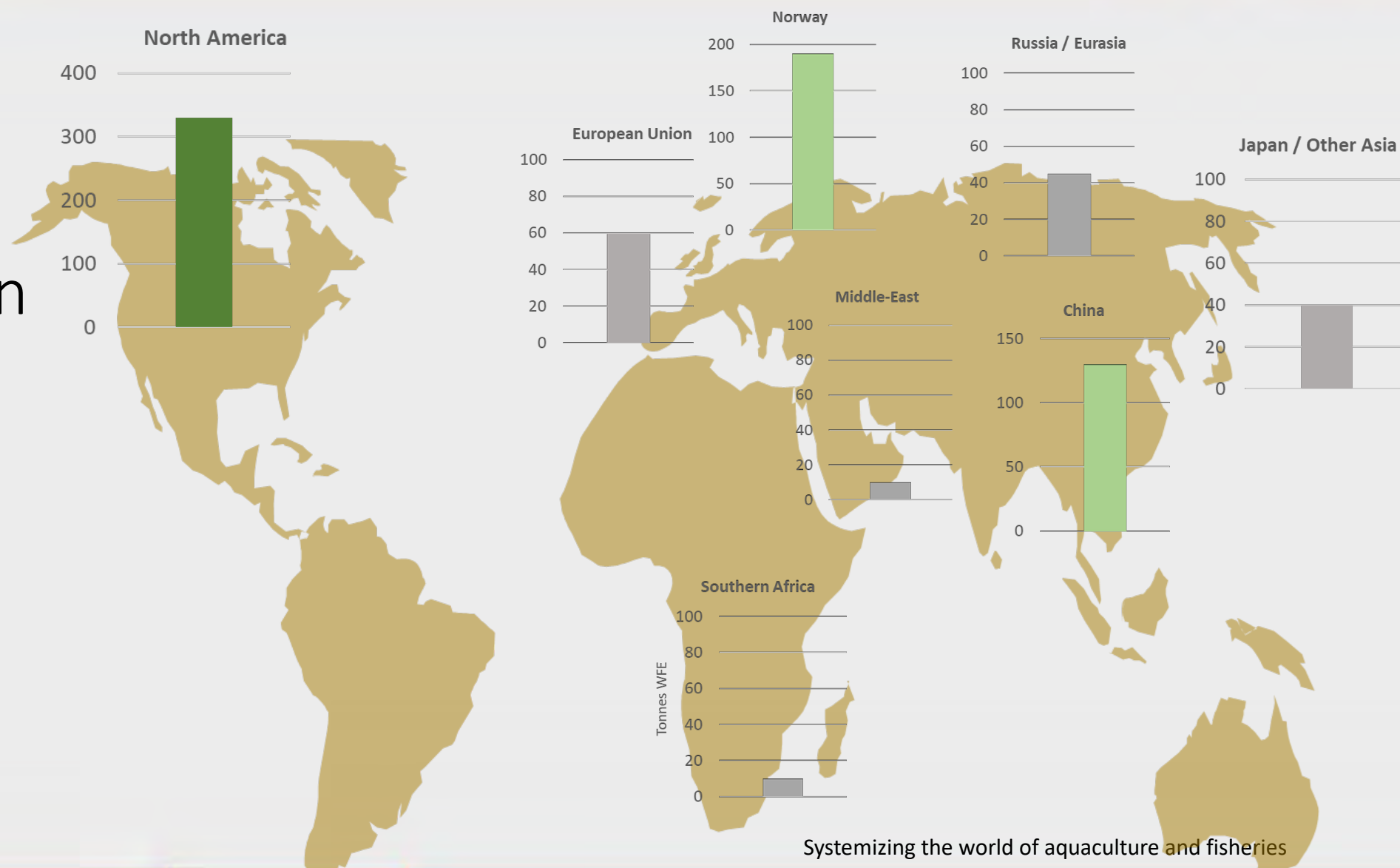
The Connecticut-based company uses a recirculating aquaculture system (RAS) to produce branzino, also known as Mediterranean sea bass.

The fish are being farmed in a 63,000 square-foot repurposed manufacturing site housing a 12-tank aquaculture system.

Ideal Fish imports its fingerlings from a hatchery in France but ultimately plans to be vertically integrated.

Land based Atlantic salmon plans/visions

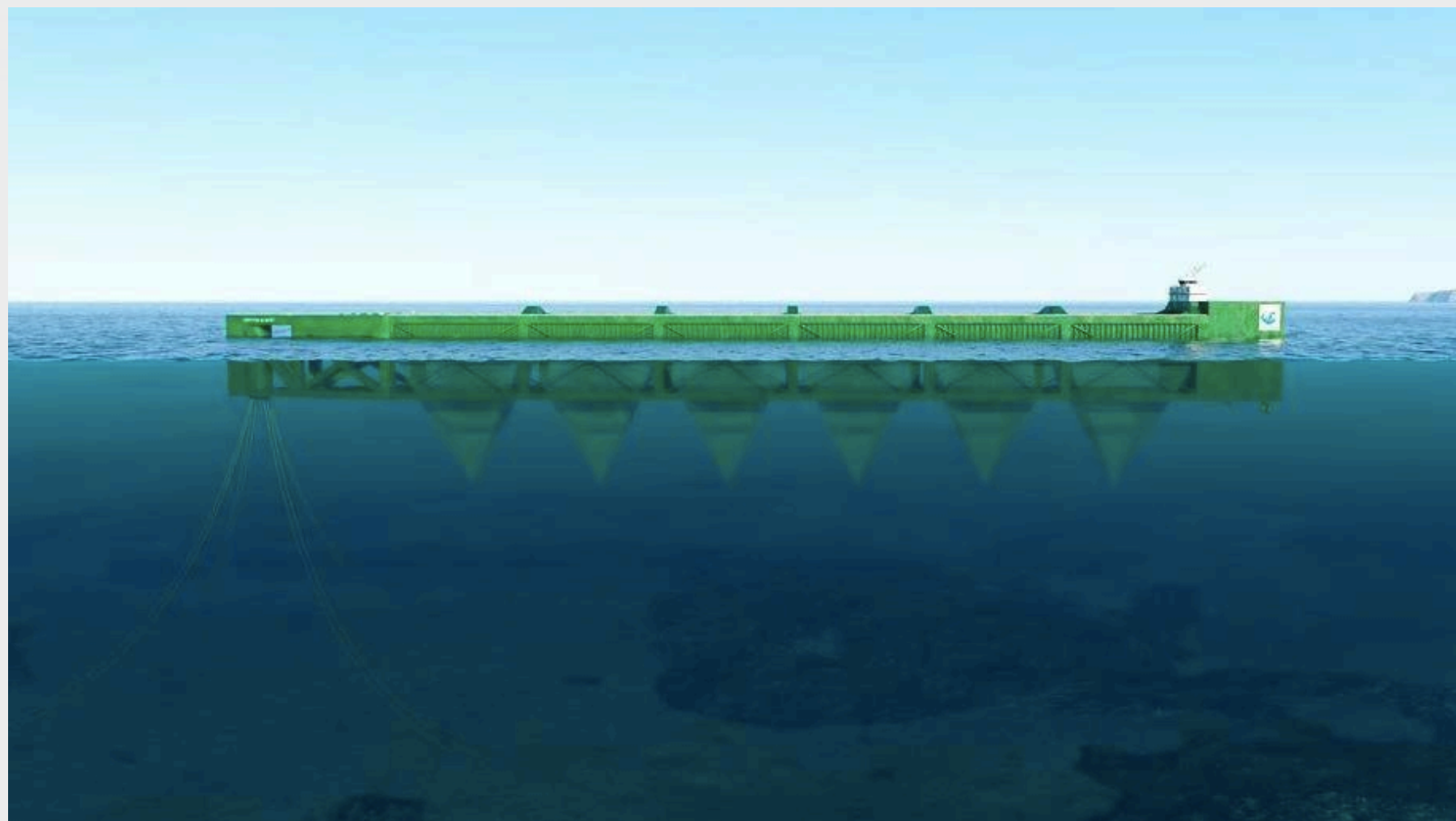
In 1000 tonnes



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