

# **FOLLOW THE TUNA**

*Liquid Urbanism under Global Extraction*

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## Tuna: From the Sea to the Table

Tuna, serving as apex predators in the marine food chain, predominantly reside in temperate waters. These species are notable for their ability to maintain a body temperature higher than their aquatic surroundings, conferring upon them exceptional endurance and speed. The distinctive red hue and low-fat quality of tuna flesh, a consequence of their ceaseless swimming through oceans, are attributed to the elevated myoglobin content in their muscles. Unlike salmon, which are well-suited for aquaculture due to their high-fat content, the optimal method of procuring tuna is through oceanic hunting [01].

The developmental journey of a bluefin tuna, from a 1 mm egg to a 2-3 meter adult, spans 4 to 6 years, with the largest species living over 35 years. However, their high economic value has led to overfishing, pushing them towards the brink of extinction.

As a significant resource in the Pacific Ocean, in 2022, one single bluefin tuna was auctioned for approximately \$60,000 in Taiwan [02]. The commercialization process of tuna reveals intricate international networks behind the products. The extensive tuna industry chain precipitates not only an ecological catastrophe but also unveils labor, socio-economic, and political issues across nations.

Inspired by Henri Lefebvre, this research looks at the urbanization of marine as a multi-dimensional planetary extraction process, including ecology, supply chain, regulations, and labor. [03]

01 Cooking Sections, "When [Salmon Salmon [Salmon]]", Oct, 12, 2021



02 Bluefin Tuna Auction in Taiwan. Source: China Times, April, 06, 2022

03 Neil Brenner and Christian Schmid, "Planetary Urbanization," in *Urban Constellations*, ed. Matthew Gandy, 2011

## History of Distant-Water Fishing

Since ancient times, indigenous peoples of Pacific islands have depended on fishing for subsistence, developing various fishing techniques and management methods. However, it was not until the 19th and 20th centuries, with the advancement of fishing technology and industrialization, that fishing activities expanded significantly, including distant-water fishing.

Initially, fishing vessels were primarily wind-powered wooden sailboats. These vessels were generally small, operating within coastal waters, and highly sensitive to weather and marine conditions [04]. The industrialization era, from the late 19th to the early 20th century, drastically expanded the dimensions of nautical technology. With the advent of steam power, the introduction of engines allowed fishing vessels to operate beyond the constraints of wind direction for the first time, venturing further into the open sea. Additionally, the steam era facilitated the use of steel hulls, rendering vessels more robust and durable, capable of carrying larger catches and supplies, thereby broadening the scope of fishing operations [05].

In the early 20th century, internal combustion engines, such as diesel engines, began to replace steam engines, significantly enhancing fishing vessels' efficiency and navigational capabilities. These vessels could now operate for extended periods at sea, boasting higher speeds and better maneuverability. Beginning in the mid-20th century, fishermen incorporated more modern equipment, such as sonar navigation systems, further augmenting nautical technology and significantly increasing catch volumes.

However, it was the invention of refrigeration technology that truly revolutionized distant-water fishing. This innovation was crucial in preserving the freshness of catches and extending the operational range of the fishing industry. Before refrigeration, fishing vessels primarily relied on ice to maintain the freshness of their catches, necessitating substantial ice storage space and offering only a

limited preservation duration [06].

The evolution of fishing vessel refrigeration equipment reflects a mastery over 'time'. With the advent of refrigeration technology in the early 20th century, vessels began to be equipped with mechanical refrigeration systems, marking the inception of true at-sea preservation techniques [07]. Improvements in compressor technology enhanced refrigeration equipment, facilitating longer and more distant fishing operations. The introduction of rapid freezing techniques in the latter half of the 20th century, such as liquid nitrogen freezing or blast freezing systems, allowed for the immediate freezing of catches, significantly improving preservation quality.

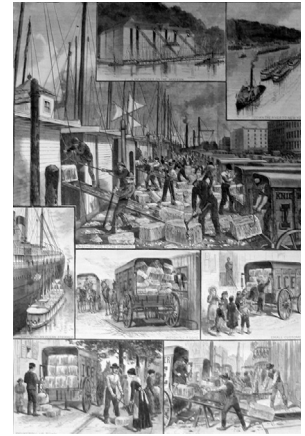
## Vessel as Marine Infrastructure

With technological advancements, the marine infrastructure of the International fishing grounds has evolved into a more complex system. Apart from fishing vessels, it encompasses various types of vessels and a range of support facilities and technologies, all of which collectively sustain the ongoing operation of distant-water fisheries.

Cargo ships play a pivotal role in transporting catches and supplies in fisheries. Typically laden with fish products and other necessities, these ships transfer catches from fishing vessels and transport them to global markets for auction.

Fuel ships provide essential fuel supplies to vessels, enabling them to operate at sea for extended periods without the frequent need to return to port, thus crucial for continuous maritime operations. These vessels often import fuel from industrial ports and spend extended periods in international waters, supplying various types of ships.

Moreover, the marine infrastructure of distant-water communication and navigation equipment is needed to monitor and manage fishing activities.



06 The ice trade around New York City. Source: F. Ray, Harper's Weekly, August, 30, 1884

07 S.G. Wang, R.Z. Wang "Recent Developments of Refrigeration Technology in Fishing Vessels," March, 2003

04 Yara Simón, "The Origins of the Steamship," Jul 18, 2023

05 New Mind, "The Story Of Large Vessel Engines." Jan, 03, 2020

## Pacific Ocean as Public Fishing Ground

Territorialization of the ocean can be seen as the result of several forces: superficial (on the surface) legal boundaries, networks of human interests, communities of marine life occupying different zones at different times, and natural oceanographic events[08].

The Pacific Ocean, possessing the largest expanse of oceanic territory in the world, boasts a rich diversity of marine life. Its unique marine ecosystems, such as coral reefs and deep-sea trenches, offer ideal fishing resources.

The historical evolution of international regulations governing distant-water fisheries in the Pacific reflects the global community's growing attention toward marine resource conservation and fishery management. Over the past decades, various incidents and reports have continuously driven the development of these norms.

Beginning in the latter half of the 20th century, the rapid expansion of global fisheries and the increase in catch volumes led to international concerns about overfishing, unsustainable fishing practices, and the negative impacts on marine ecosystems. Additionally, in recent years, foreign fishermen's exploitation and unfair treatment in distant-water fisheries have emerged as significant issues. For instance, reports by Greenpeace revealing forced labor and human rights issues in Taiwan's distant-water fisheries have garnered widespread attention from the international community [09].

According to the United Nations Convention on the Law of the Sea (UNCLOS), The high seas commence beyond a 12-nautical-mile distance from the country's border lines (usually the low-water line) of coastal states, while the Coastal states may also establish an Exclusive Economic Zone (EEZ) extending up to 200 nautical miles beyond their territorial sea, where they have rights to explore and manage marine resources [10].

08 Nancy Couling and Carola Hein, "THE URBANISATION OF THE SEA: FROM CONCEPTS AND ANALYSIS TO DESIGN", 2020

09 Green Peace, "Greenpeace Briefing on Taiwan for the US Department of Labor 2020 List of Goods Produced by Child Labor or Forced Labor," (2020)

Also see: Allan Sekula, "Fish Story," 2013

10 United Nations Convention on the Law of the Sea, December 10, 1982

## Longline Fishing Methods

In distant-water fisheries primarily targeting large species such as tuna, longline fishing is a widely adopted method. This technique commences with deploying a lengthy mainline in the sea, extending horizontally for several kilometers, akin to an invisible wall. Baited hooks are then affixed along this mainline, connected via shorter lines known as branch lines. To ensure the mainline remains at specific horizontal or vertical depths, buoys and weights are utilized for stabilization. Fishing vessels traverse predetermined routes, laying out and subsequently retrieving the mainline equipped with hooks [11].

However, this extensive and non-selective fishing approach inflicts considerable ecological impacts. In addition to frequently leading to the overfishing of tuna, longline fishing is highly likely to ensnare non-target species, including endangered fish and other marine organisms such as turtles, seabirds, and sharks. The likelihood of a higher bycatch rate often results in the issue of discards. Furthermore, the integration of sonar technology with longline fishing has amplified its detrimental effects on marine ecosystems, especially impacting species such as whales and dolphins[12].

## Everything Happens on the High Seas

On the high seas, no state can exercise sovereignty. This means that the high seas are free and open to all nations, allowing activities such as navigation, overflight, and fishing by vessels of any country. In other words, the lack of national territorial sovereignty over these areas presents unique challenges in terms of governance and surveillance.

One of the most prevalent issues on the high seas is IUU fishing [13]. Due to the absence of effective regulation, some fishing vessels engage in activities such as exceeding fishing quotas, employing prohibited fishing methods,

11 Overseas Fisheries Development Council of the Republic of China, "Taiwan Tuna Association, Pacific albacore longline fishery improvement plan," (2021)



12 Transshipment Monitoring- Source: Global Fishing Watch, January, 18, 2022.

13 Illegal, Unreported and Unregulated (IUU) fishing



or capturing protected species. On certain distant-water fishing vessels, particularly those with unclear registration or concealed identities, issues of forced labor and human trafficking may arise as well.

### Tracing the Vessel

To enhance the understanding of the dynamic relationships within the marine domain, this study employs real-time data mapping to track the trajectories of vessels. It focuses on comprehending the relationship between the navigational paths of fishing vessels in the Pacific fishing grounds over several years, their economic and geographical distribution, the allocation of marine resources, and interactions with other vessels[14].

The operation involved tracking a Taiwanese fishing vessel using Global Fishing Watch for its voyages from 2020 to 2023. During the navigation, the duration of stay in each region was organized, and the vessel's movements were monitored to determine whether it was engaged in fishing activities or stationary. Identifying encounters with other vessels also provided significant insights into maritime operations[15].

The scope of fishing operations reflects international political relations. By overlaying Exclusive Economic Zones (EEZ) on the map, we observed that the majority of this vessel's intensive fishing efforts were concentrated in international waters due to their unregulated nature. The abundant fishing activities near the Solomon Islands were attributed to a special treaty signed between the governments of Taiwan and the Solomon Islands, allowing legally registered Taiwanese fishing vessels to operate within the EEZ of the latter[16].

Additionally, during a continuous fishing operation lasting over 200 days from Aug 2021 to April 2022, the target fishing vessel was observed to have numerous prolonged sea encounters with shipping vessels in international waters. These lengthy encounters, spanning

several hours, involved small fishing vessels transferring their full catches to a larger cargo ship without docking, allowing the latter to transport the catch to ports for auction. In contrast to the fishing vessels' extended fishing duration at sea, the trajectory of the cargo ship shows it engaging with as many small and medium-sized fishing vessels as possible during each voyage, swiftly transferring catches from international waters to international ports.

### Foreign Labor and Globalization

The utilization of foreign labor in distant water fisheries reflects the interplay of global economic, social factors, and political forces.

Initially, after the advancement of sailing techniques, distant-water fisheries predominantly relied on local labor. As the industry expanded and industrialized, there was a growing demand for additional workforce. With deepening globalization, especially the economic growth in Asia and other developing regions, distant-water fisheries began seeking cheaper labor to reduce costs, leading to cargo ship the recruitment of foreign workers [17].

In some developed countries, especially major fishing nations, a local labor shortage has occurred due to a lack of interest in strenuous fishing jobs or higher wage demands. In most cases, foreign workers may face lower labor protection standards and poor working conditions, reflecting global labor market inequalities.

### Human Agency

*“It's said that one can earn more money on the sea, so for the sake of my family and the future of my kids, I decided to give it a try. “*

*(reported by Green Peace, 2020)*

In fact, many fishing villages on Southeast Asian islands host international human agencies. These

14 Global Fishing Watch, Fishing Activity,\* <https://globalfishingwatch.org/>, Access in 2023

15 Green Peace, "Fake My Catch, The Unreliable Traceability in our Tuna Cans," 2022

16 Nauru Agreement Concerning Cooperation In The Management Of Fisheries Of Common Interest, 1983.



17 Photo of Human Resource Agency in Indonesia, Source: PT. DUTA SAMUDERA BAHARI

agencies promote a quick and easy employment model that is very attractive to the local fishermen. However, many uneducated fishermen sign unfair contracts without fully understanding the terms and rights. Many workers even have their passports taken away as a means of control.

As foreign nationals, they frequently lack labor law protection, working irregular hours and receiving wages much lower than local fishermen. After leaving their own countries, the workers embarked on years of work at sea. They work over 18 hours a day in a row, often unable to rest properly to meet their performance goals.

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### Reports from the Fisherman

*“ We only got to sleep for five hours if and when we caught some fish. If we didn’t catch anything, we’d just have to keep working, even for 34 hours straight. If it were possible, I’d like to change how much time we have to work and rest, to meet the needs of human bodies. There’s got to be a way to make it more balanced, just like how people who work on land do it.”*

*(reported by Green Peace, 2020)*

From a series of reports by Green Peace, it’s observed that on some ships, even if workers get injured, captains do not provide any medical assistance, let alone docking for treatment [19].

The sanitary conditions on the ships are often extremely poor, with many crew members unable to get proper food or clean water resources despite the lack of rest. Yet, to support their families back in their countries, foreign workers usually endure and keep working.

18 Green Peace, “Choppy Waters, Forced Labour and Illegal Fishing in Taiwan’s Distant Water Fisheries,” 2020



19 A crew's hand was stabbed by fishhook (up) Room of Foreign Workers(dn), Source: Green Peace, 2020

## Vessel as House

In Taiwan, the influx of foreign fishery workers has precipitated a distinct urban phenomenon along the coastal regions. A case in point is Keelung Port, where a systematic mapping of fishing ports, varying in grades and functionalities, has been conducted. The modernization of port infrastructure along Keelung’s coast, primarily executed during the Japanese colonial era, has given rise to a diversity of port types and functionalities[20].

Currently, the largest international fishing ports in Taiwan are predominantly engaged in handling business cargo and facilitating international tourism, surrounded by relatively comprehensive urban development. Most of these fishing ports, situated along the coastline, cater to diverse fishing operations, each defined by its hinterland, available resources, and facilities. Notably, these peripheral port facilities often transform into living spaces for foreign workers[21].

First, the employment of foreign labor in Taiwan is characterized by highly flexible independent contracts. Given the offshore nature of fishing activities, the majority of migrant workers experience transient and purposeful stays in Taiwan’s ports, with no immediate need for local settlement since their families often reside in their home countries.

Second, The issue of foreign workers in Taiwan has only recently captured public attention, resulting in a lack of government planning regarding their spatial requirements.

Third, fishermen usually return to their vessels for rest instead of renting accommodations at the ports. This has led to the emergence of temporary, non-localized, and marginalized communities around these fishing ports. The extent of their “settlement” is often limited to a handful of shops or open spaces on the fishing ports’ periphery, highlighting these groups’ fragmented and fragile nature.

20 Hsien-Ming Chen, “Taiwan Tuna Fishery: Linkage with PAFCO Cannery in Fiji,” *Journal of Geographical Research* No.67, 2017

See Jason Nguyen, *Encountering the shoreline: ecology and infrastructure on the early modern Newfoundland coast, Studies in the History of Gardens & Designed Landscapes*, 2022



21 Yu-Wen Wang, “Territorialization in Expediency: Indonesian Fishers’ Spatial Practice and Identity Negotiation in Taiwan,” 2020

These observations underscore the complexities and challenges faced by foreign fishery workers in Taiwan, particularly in terms of urban settlement and social integration. The study sheds light on the need for more comprehensive and inclusive urban planning strategies that address the unique needs and circumstances of these transient labor populations.

### **Living by the Water**

Based on an interview with some foreign fishermen about their coastal life, the mappings of space and the narratives from the perspective of the foreign workers, illustrate their everyday life by the port:

*As dawn breaks, they step out from their boats, busily fixing their nets under the protective roofs of the port. Their skilled hands work tirelessly, preparing the tools of their ocean trade.*

*When the sun reaches its peak, they gather by the roadside in their makeshift spot. Under the shade of their nets, they share stories and laughter, bonding over their shared life at sea.*

*Come afternoon, they're by the road, trading the day's catch. Each gleaming fish, caught by their efforts, is sold for a bit of money.*

*As evening arrives, the bright lights of the claw machine stores call to them, offering a fun break by the sea. In this place, language doesn't matter; it's all about the joy of the game, a welcome pause from their hard work.*

*And as night falls, they return to their boats, their home on the water. Under the stars, rocked by the gentle waves, they sleep, surrounded by the vast ocean that is both their livelihood and home.*

### **Conclusion: Liquid Urbanism**

The ocean, conceptualized as a fluid urbanized space, operates independently of the conventional locational context associated with established urban nodes and elements. As a region optimized for maximal extraction of benefits, its primary importance lies in the manipulation of fluid resources and the boundaries of rights.

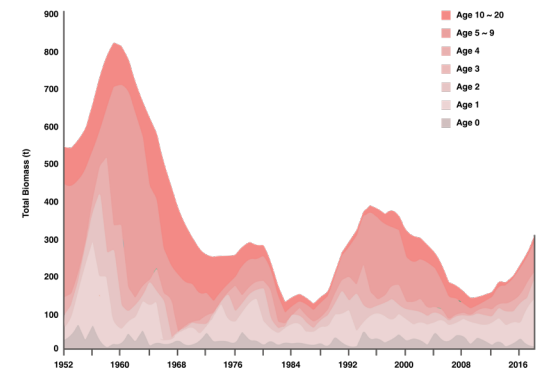
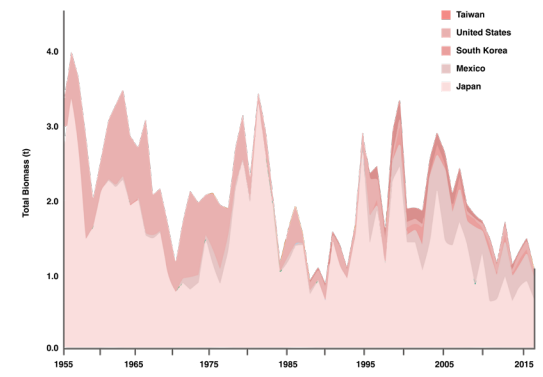
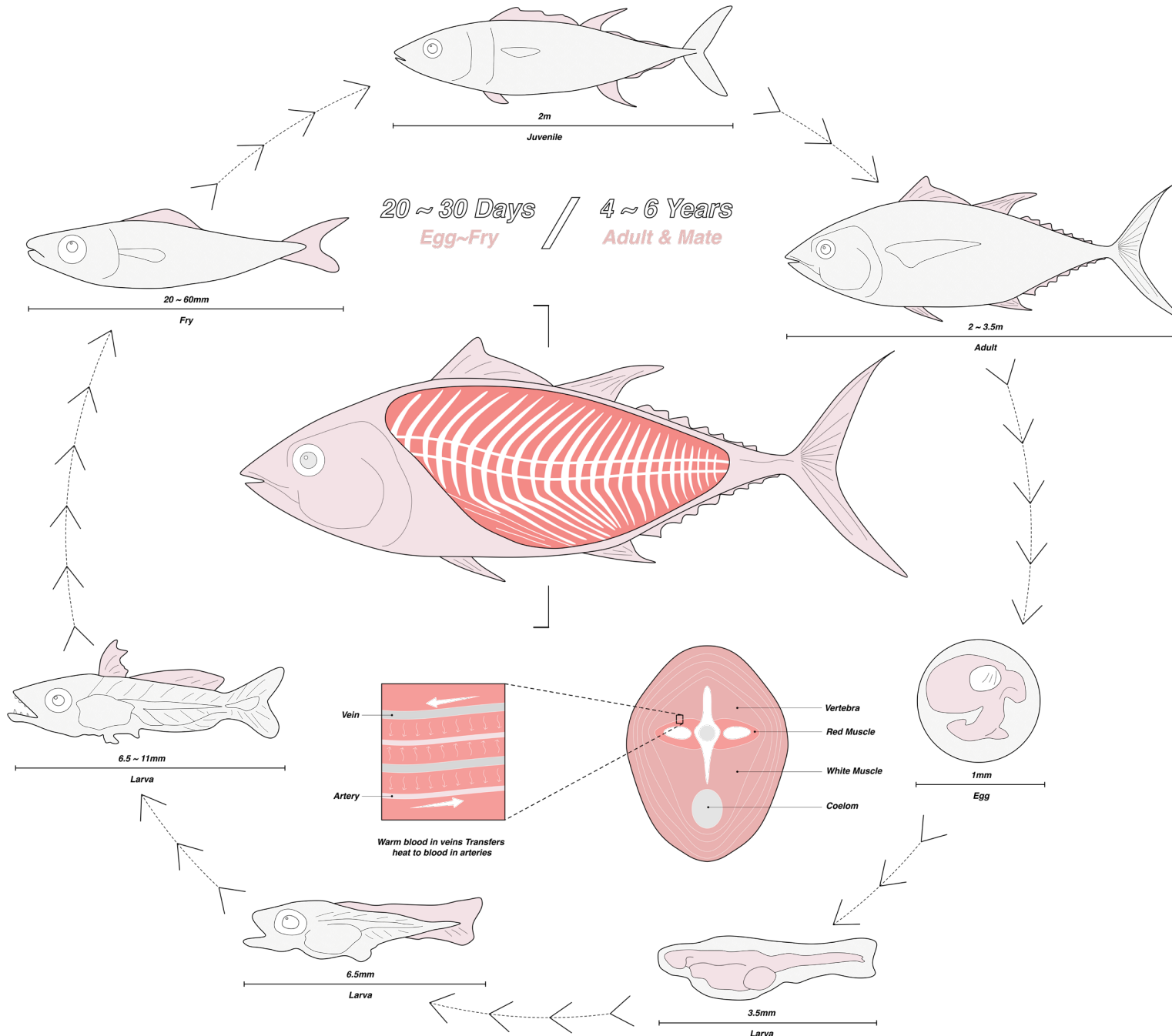
Tuna, one of the fastest fish species in the ocean, necessitates a contemporary industrial synergy that forms a collective planetary urbanism transcending space, nations, and languages, particularly in the vast Pacific fishing grounds to maximize its economic extraction.

This liquid urbanism looks at the dynamic urban movement entirely predicated upon political and economic interests OR EXTRACTION, often overlooking fundamental contexts such as culture, history, geography, ecology, and humanity. Illustrated by various scales and steps in transnational extraction operations, each action represents a different scale of interest transformation.

In every process of interest extraction and conversion, there are sacrifices, sometimes nature, sometimes humans. Liquid urbanism endeavors to visualize those parts unseen in traditional maps and architectural drawings, connecting crucial narratives to reveal the underlying social and ecological impacts of these issues.

# Lifecycle of Pacific Bluefin Tuna

Tuna, a species at the top of the marine food chain.

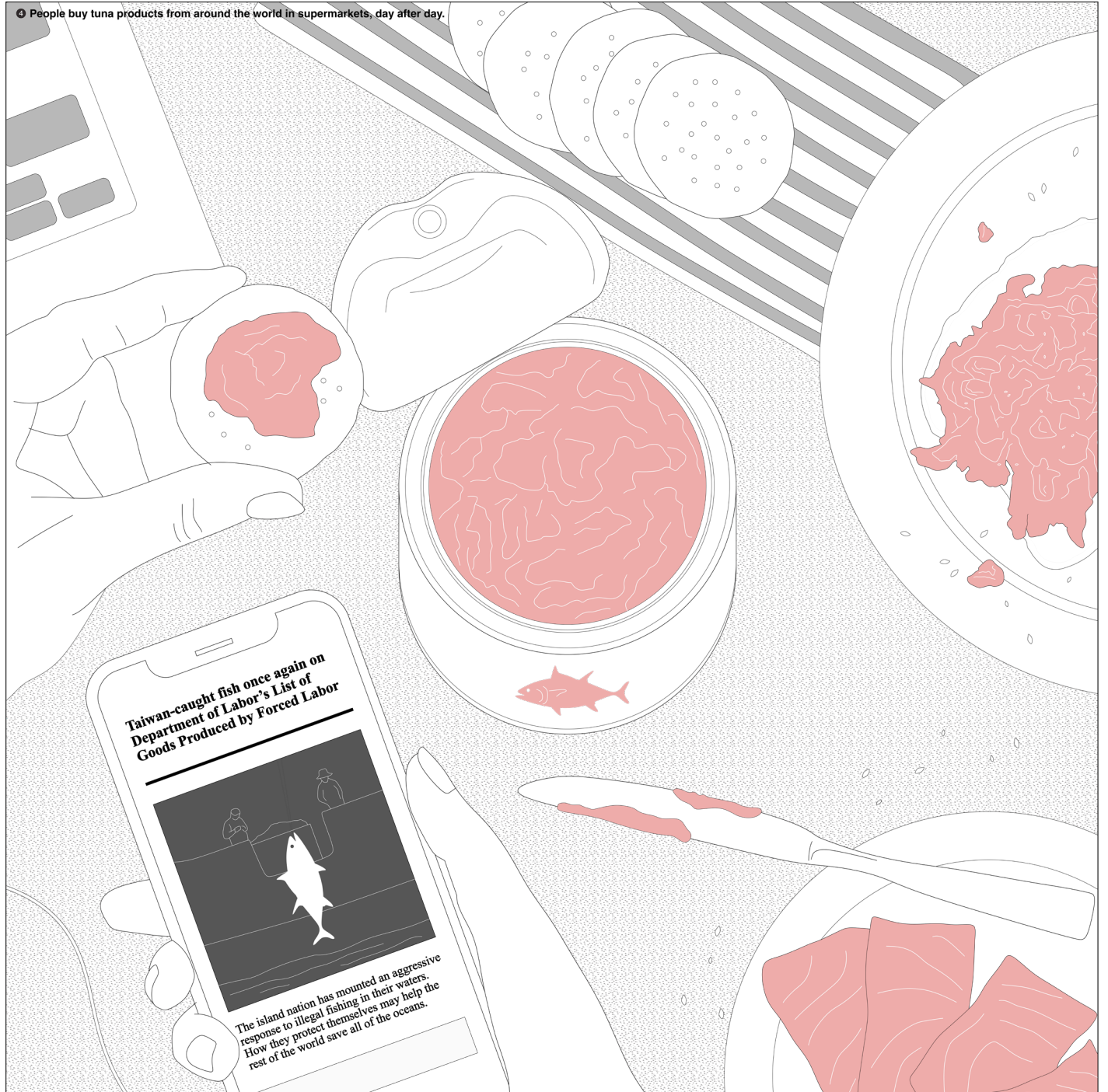
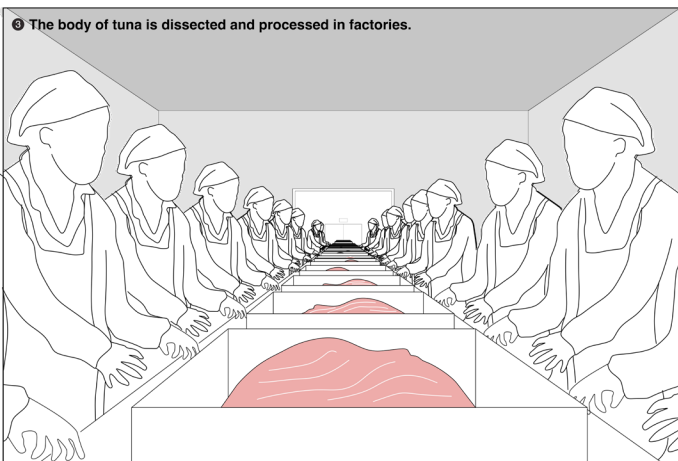
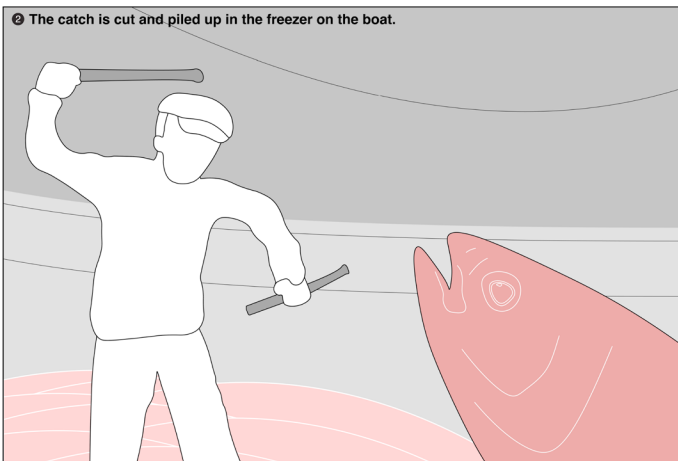
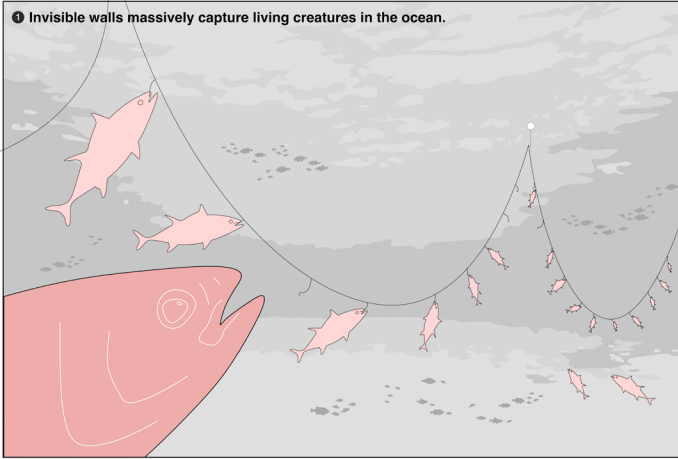


Government	Fishing effort (thousands of hours)	Fishing effort (millions of kWh)	Number of vessels
China	962	579	4,615
EU	581	529	964
Japan	207	173	221
South Korea	135	157	333
Taiwan	655	590	634
<b>Total</b>	<b>2,550</b>	<b>2,030</b>	<b>6,767</b>

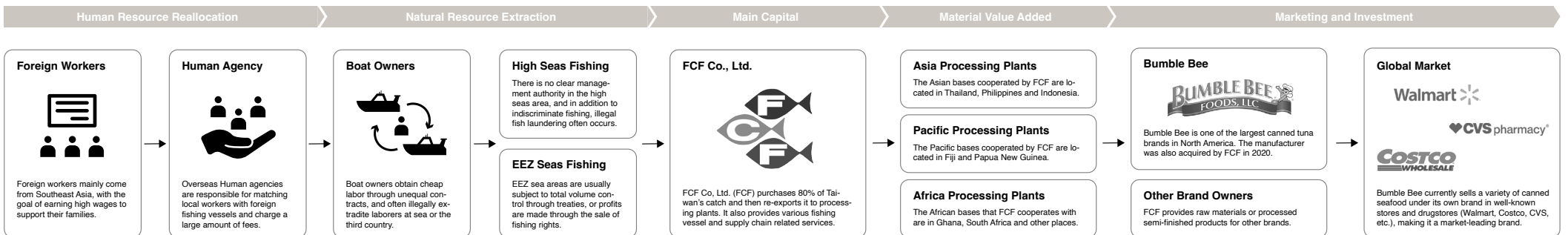
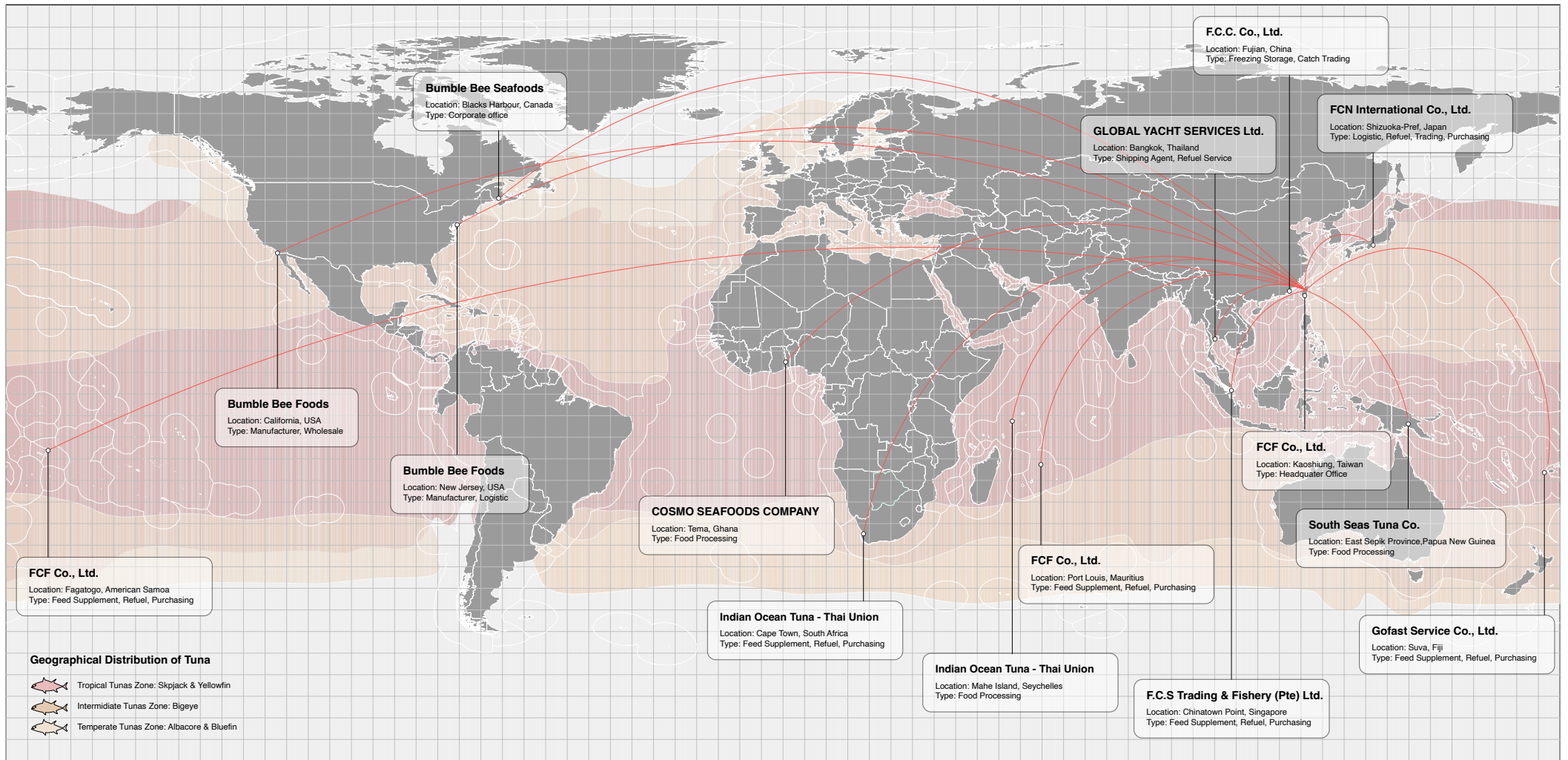
**Comparison of Distant-Water Fishing Effort and Number of Vessels**  
Source: K.D. Millage et al., "Distant-Water Fishing Subsidy Atlas."



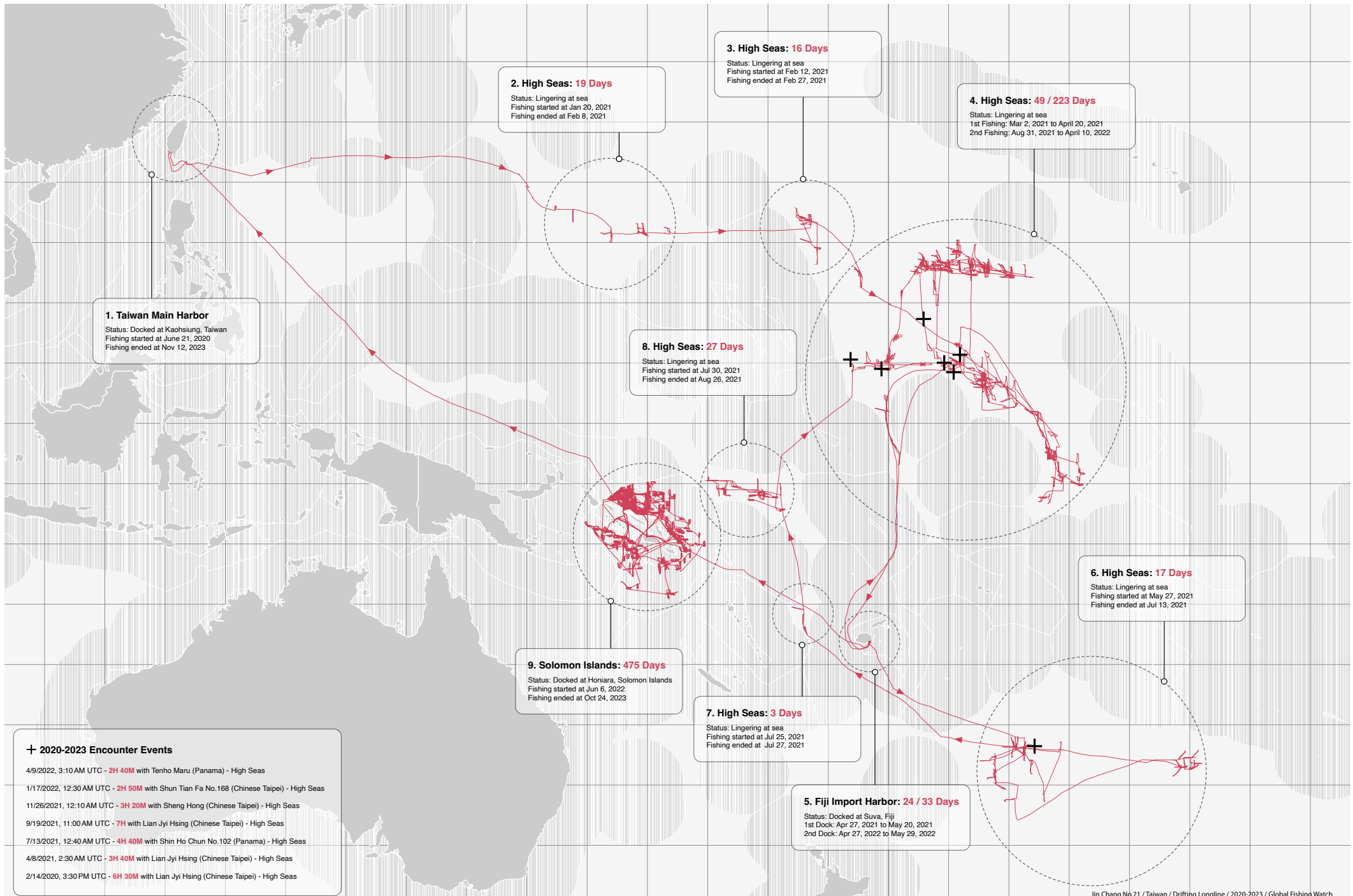
**From the Ocean to the Table** From tuna's perspective, recording the process from longline fishing, freezing, processing, to canning and wholeselling.



**Tracing the Global Network** Case study of global capital FCF, without owning fishing boats, purchases tuna globally and manages distribution, processing, and transportation.



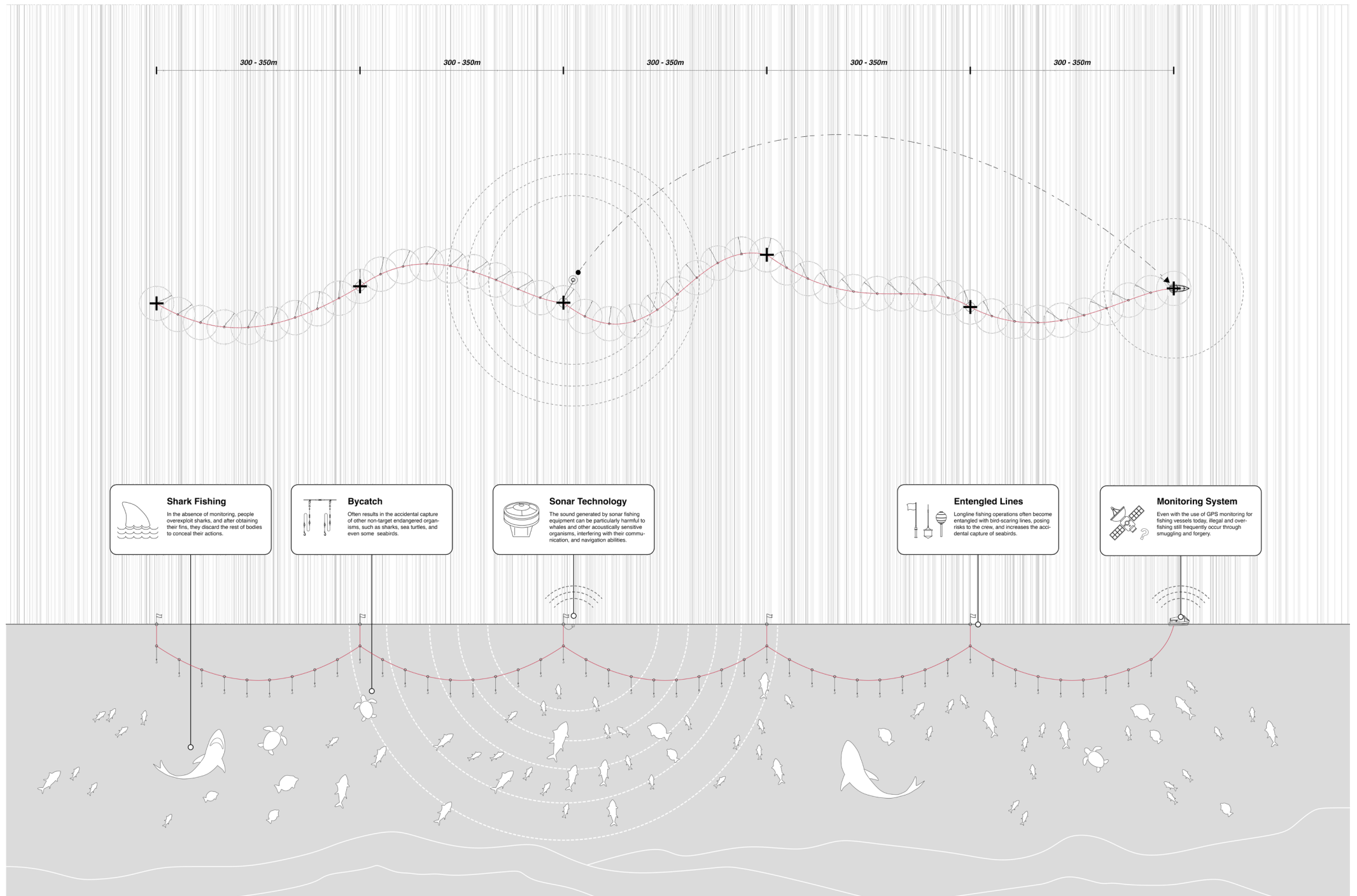
**Pacific Ocean Fishing Routes** Using Global Fishing Watch's real-time map to extract and study the footprint of a Taiwan-registered fishing vessel for the last three years.



Jin Chang No.21 / Taiwan / Drifting Longline / 2020-2023 / Global Fishing Watch



**Longline Fishing Method** This method, setting lines at fixed intervals, creates miles-long 'walls' in the ocean, indiscriminately capturing marine life and often resulting in bycatch like sharks and seabirds.



**Shark Fishing**  
 In the absence of monitoring, people overexploit sharks, and after obtaining their fins, they discard the rest of bodies to conceal their actions.

**Bycatch**  
 Often results in the accidental capture of other non-target endangered organisms, such as sharks, sea turtles, and even some seabirds.

**Sonar Technology**  
 The sound generated by sonar fishing equipment can be particularly harmful to whales and other acoustically sensitive organisms, interfering with their communication, and navigation abilities.

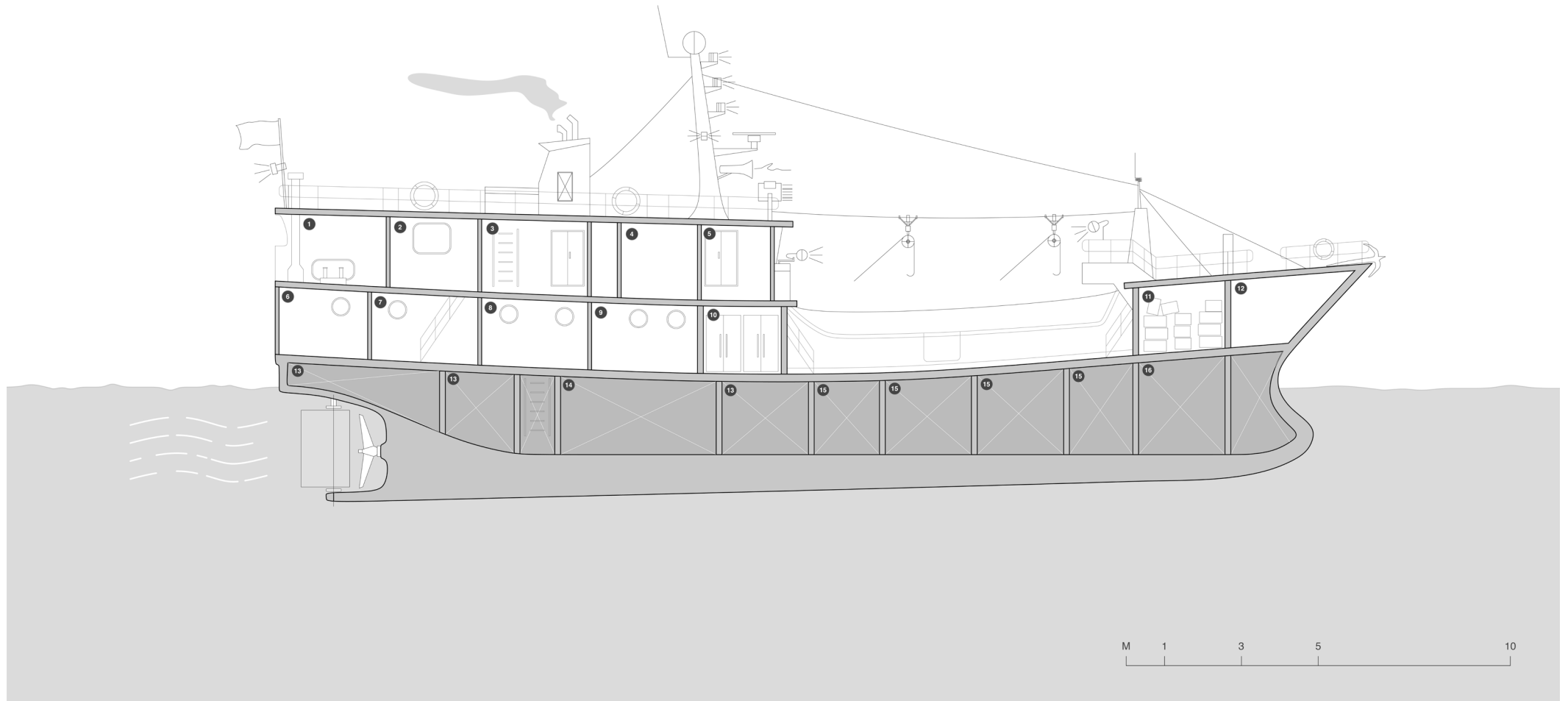
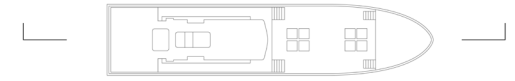
**Entangled Lines**  
 Longline fishing operations often become entangled with bird-scaring lines, posing risks to the crew, and increases the accidental capture of seabirds.

**Monitoring System**  
 Even with the use of GPS monitoring for fishing vessels today, illegal and over-fishing still frequently occur through smuggling and forgery.



**Section of Fishing Vessel** For distant-water fishing, the vessel is both a workplace and a living space. These independent boats, in the vast ocean, operate continuously, extracting valuable tuna.

- 1 poop deck
- 2 fishing machine room
- 3 upper public area
- 4 captain room
- 5 wheelhouse
  
- 6 public kitchen
- 7 lower public area
- 8 crew room
- 9 mechanical room
- 10 refrigerating hold
- 11 freeze cabin
- 12 rigging cabin
  
- 13 oil tank
- 14 engine room
- 15 water fish hold
- 16 fresh water tank



**From Distant Island to Distant Water** A typical fishing story from the perspective of a foreign worker on the distant-water fishing vessel.

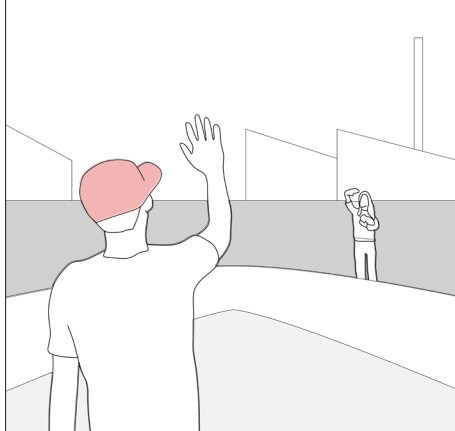
❶ Fisherman on an island in Southeast Asia saw a recruitment ad and decided to go abroad to earn money for his family.



❷ He signed the contract without fully understanding the terms and surrendered his passport to the agency.



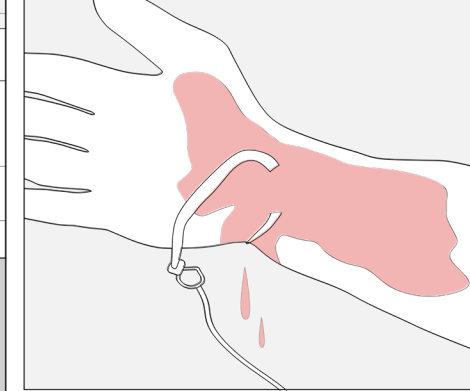
❸ On the day of departure, saying goodbye to his family.



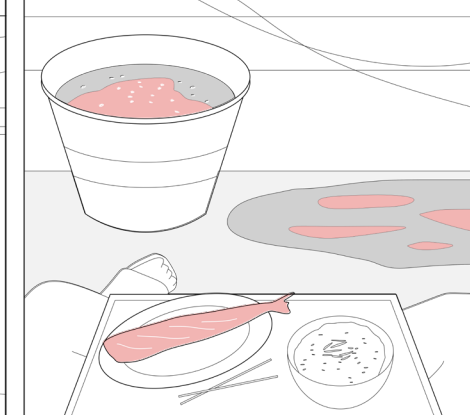
❹ Working on the ship for over 18 hours a day, they often cannot rest properly in order to meet performance targets. They only receive a monthly salary of \$350 to \$450, from which a large handling fee is often deducted by recruiting agency.



❺ Even when hands were cut, the captain did not provide any medical assistance.



❻ It is very difficult for foreign workers to obtain clean water resources and food on the ship.

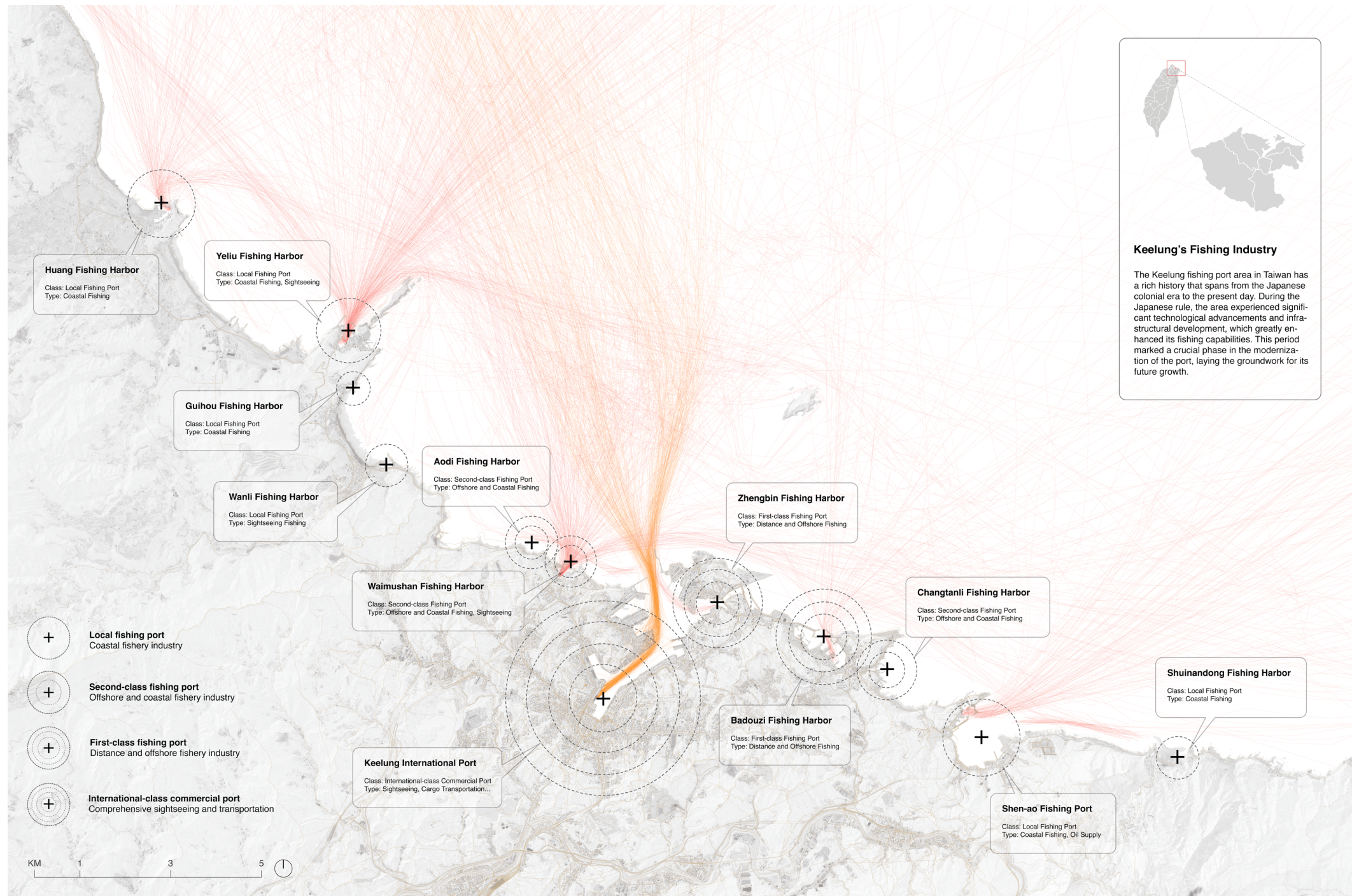


❼ Although they are unable to connect to the internet, for the sake of their families, they still have to work hard tomorrow.





**Marginalized Fishing Ports and Settlements** Most fishing ports are located along the coast-line, serving different fishing operations based on their hinterland, resources, and facilities. These marginalized port facilities often become the living spaces for foreign workers.





**Liquid Urbanism** In the absence of private housing, foreign workers often resort to using the vessel itself as their primary living space, leading to the formation of unique informal settlements along the peripheries of ports.

