



# European eel

What should we know?

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**Species tool**

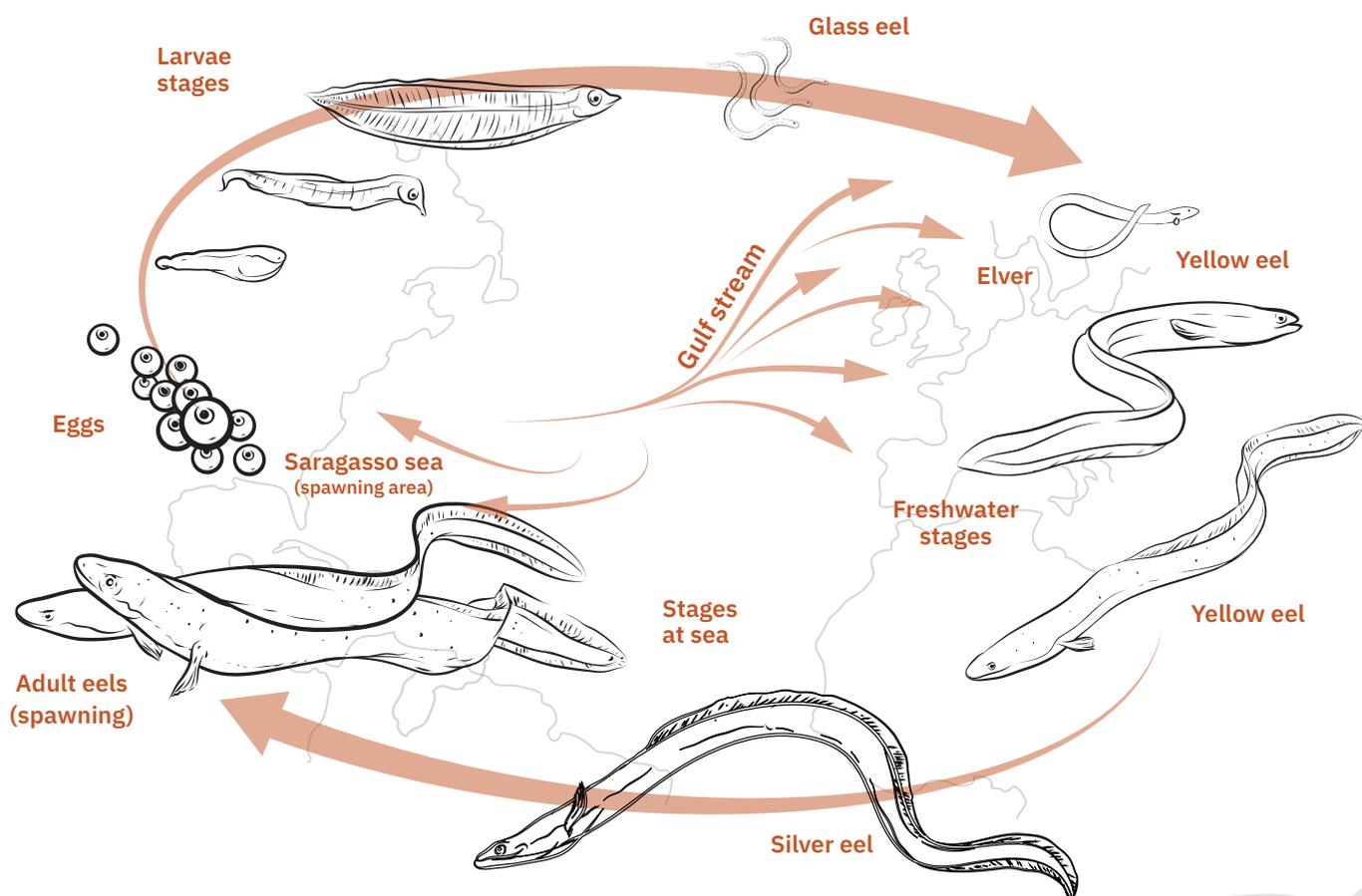
# European eel:

## What should we know?

Eels are characterised by their round, elongated, slender bodies. The European eel (*Anguilla anguilla*) is a unique fish with a freshwater and a seawater stage, called a catadromic lifestyle. It is a mysterious creature with a complex life cycle. The European eel spawns in the Sargasso Sea, about 6,000 km from the European continent. The larvae are called leptocephalus and drift with the current toward land for almost one year. Before reaching the European coast, the larvae develop into glass eels that enter the freshwater rivers of Europe and also northern Africa. They live there for several years until they reach adulthood and return to their spawning ground to reproduce.

During its life in freshwater, the now yellow eel builds a great deal of fat in its tissue, which serves as fuel for its long and exhausting journey to the Sargasso Sea, the final destination for reproduction. By the time it reaches adulthood, it can have a fat percentage of 30%. When it stops eating, its digestive tract becomes inactive and it gains a silvery sheen, becoming a silver eel. This serves as camouflage, which is necessary for life in the sea.

In total, there are more than 800 species of eel worldwide, ranging from 5–400 cm in length.



Eels have poor eyesight, and they rely on their acute sense of smell to locate food.

Nostril

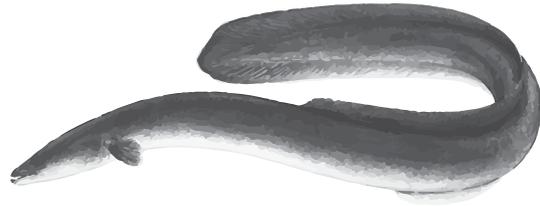
Pectoral fin

# Other well-known eel species are:



**Australian Longfin eel**

*Anguilla reinhardtii*



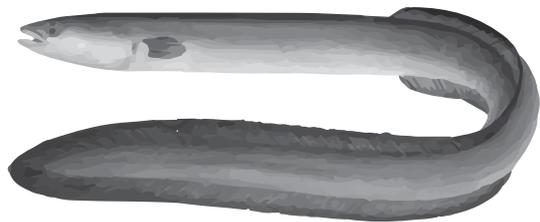
**American eel**

*Anguilla rostrata*



**Japanese eel**

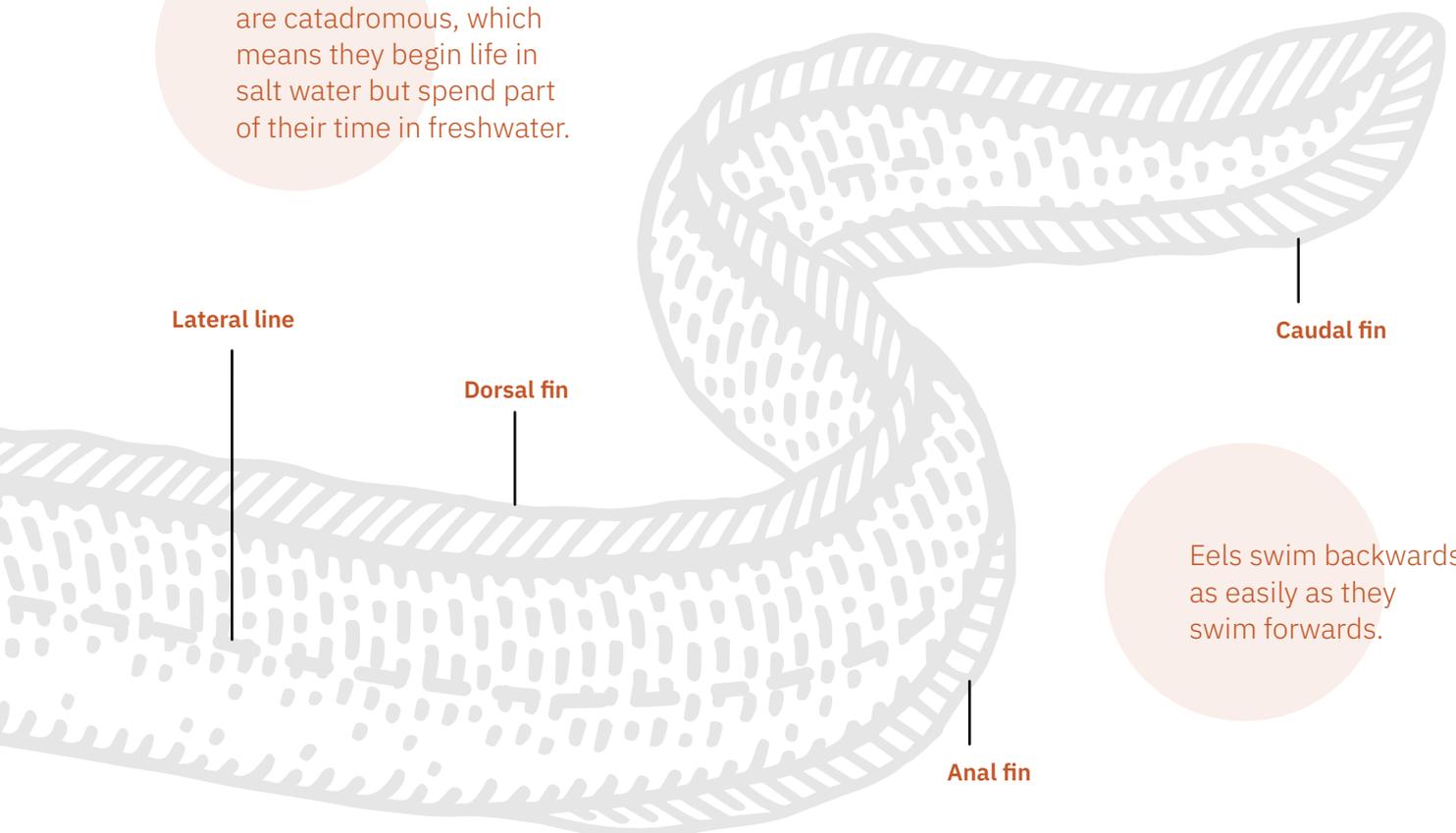
*Anguilla japonica*



**African Longfin eel**

*Anguilla mossambica*

Eels of the family *Anguillidae* are catadromous, which means they begin life in salt water but spend part of their time in freshwater.

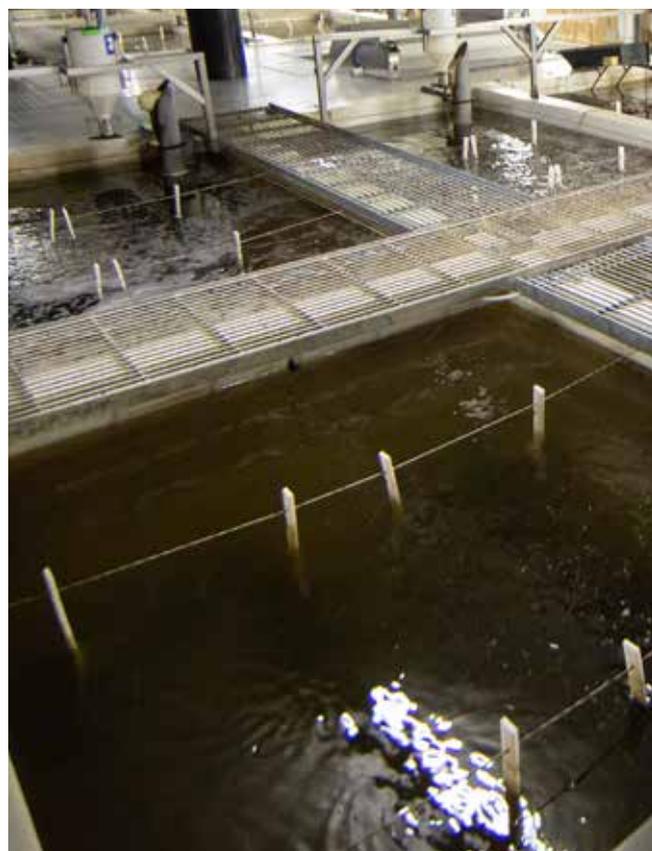


Eels swim backwards as easily as they swim forwards.

# European eel farming

## Recirculating Aquaculture Systems

Farmed eels are primarily farmed in Recirculating Aquaculture Systems (RAS). This allows for farming in optimal conditions, even in colder climates. These systems consist of tanks, an oxygenation device and a filter system. The filter system consists of mechanical filters and biological filters. The mechanical filters remove the organic matter from faeces and uneaten feed, while the biological filters remove the ammonium excreted by the fish from the water. The degasser removes the CO<sub>2</sub> from the water. Finally, the water is oxygenated. The water is constantly filtered and reconditioned. Due to a consistent water flow, the eels have excellent water quality with the right amount of oxygen, water temperature and low amounts of CO<sub>2</sub>. The fish are in a constant perfect environment. The below table shows the optimal water parameters for eel farming in RAS.



### Recommended water quality parameters:

Dissolved oxygen	Min. 90%
Water temperature	24-25 °C
pH	5.0-6.0
Ammonia (NH <sub>3</sub> )	Max. 0.0125 mg/L
Nitrite (NO <sub>2</sub> )	Max. 1 mg/L
Nitrite (NO <sub>3</sub> )	Max. 400 mg/L
Carbon dioxide (CO <sub>2</sub> )	Max. 15 mg/L
Nitrogen (N <sub>2</sub> )	Max. 100%



Eels grow at different growth rates. This is why regular grading of the eels is essential. Eel grading should be done every six weeks in the beginning and later every two months. Grading is done via an eel grader that determines the thickness of the eels and makes different weight classes — the better the grading, the better the performance of the fish. The first growing eels are ready for harvest after 10 months, but slower growers might take more than two years. A farmer must have enough tanks so fish can be in the right size group, which will enable the best performance.

In an eel farm (like in all farms), a high level of biosecurity is essential. In RAS farms, this is easily achieved as it is a secure building and the fish are farmed in a closed system, so diseases and parasites coming into the farm are limited. New glass eels and visitors can bring disease or parasites. It is important to detect diseases or parasites early on. Frequent microscopical tests can ensure the farmer stays on top of this issue.

For eels, three known viruses that can have a significant impact on the farm: **HVA** (*Herpesvirus anguillae*), **EVE** (*Eel Virus European*) and **EVEX** (*Eel Virus European X*).

When the virus is on the farm, it is vital to prevent new fish from being infected in the first weeks. Only after the first grading and when they are parasite-free can fish develop immunity against disease.

Survival rate  
in the farms is  
**>95%.**

This is excellent and linked to the farmer's skills and the design, control and management of the farm. Farming eels is an intensive job and demands constant alertness.

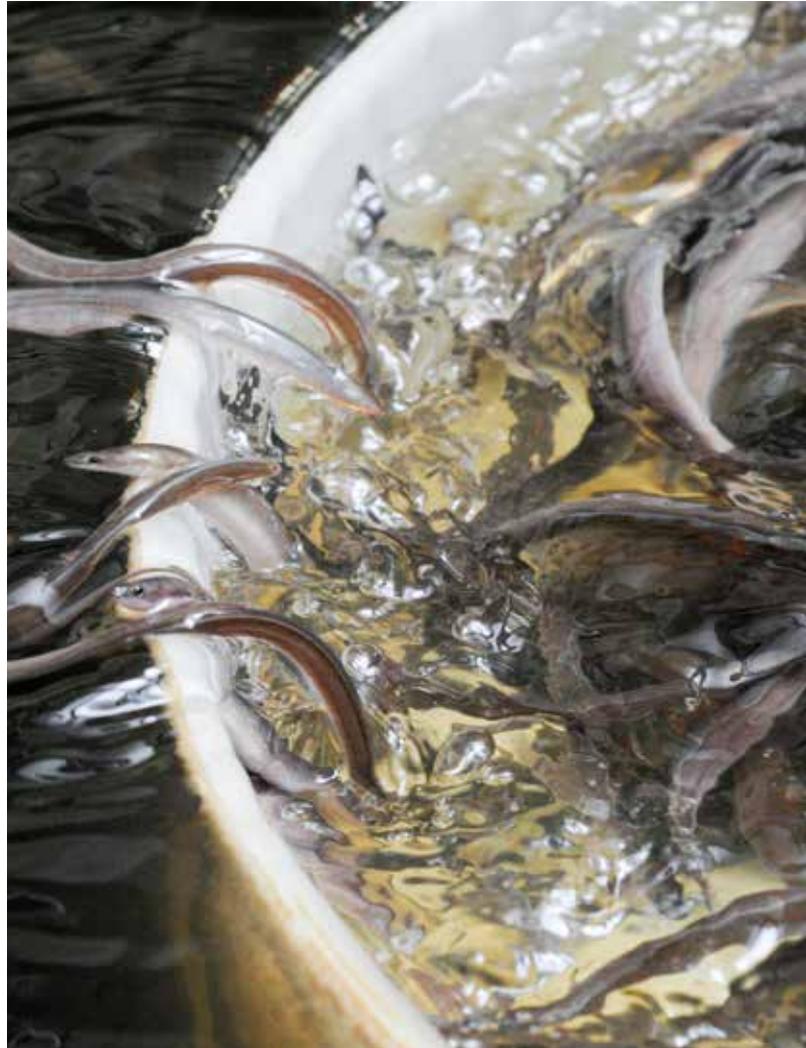
## Eel farming in ponds & tanks

In Italy, some farms use a traditional pond system. The water comes from a warm/hot water spring and is mixed with colder water to reach the right temperature. Farms in Asia also use this method. They farm eels in flow-through systems, where the fish live in tanks, and the pre-heated water flows through the tanks. The water is aerated or oxygenated to have the right oxygen concentration.

## Reproduction

Complete breeding of eel from egg to adult fish is not yet possible. Eggs and larvae have been produced in reproduction trials, but the next step has been **unsuccessful** so far. Different projects in Europe are working on eel reproduction and are coming closer to unravelling the mystery. Eel farms receive their glass eels from strictly controlled and certified fisheries in France and Spain. Eel farming relies on the juvenile glass eels that migrate to Europe. Glass eels arrive at the French and Spanish coastlines, where they are collected. This is where farms begin sourcing stock. It is important to quarantine glass eels for several weeks and carefully inspect them for any signs of freshwater pathogens.

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## Harvest

Before harvest, the eels will be size graded and purged to remove any traces of off flavour. This means they will be kept in clean spring or ground water for 3–4 days to perfect the taste. The weight eels are harvested at depends on the market preference. The harvest weight can vary from 150–1,000 g. After purging, the eels are ready for processing.



# Commercial products

Depending on the country and region, eels are prepared in different ways. Eels are renowned for their delicious taste and are high in essential omega-3 fatty acids.

- Smoked eel is very popular throughout Europe, either eaten from the bone, in a bun or on toasted bread.
- Pan-fried or stewed in white wine is another Dutch favourite.
- In Belgium, eels are eaten in a green sauce with herbs.
- Smoked eels with scrambled eggs on Smorrebrod (an open sandwich) is a favourite in Denmark.
- Barbecued or grilled eels are popular in Italy.
- In Spain, eel is served in red wine sauce.
- Popular in Asia, and now also in Western countries, is Unagi kabayaki, a traditional eel recipe from Japan. The eel is marinated in soya sauce, grilled and served with rice as a sushi dish.
- Eels can be bought in restaurants, smokeries, fishmongers and specialist fish shops. Also, some eel farmers have an outlet, small shop or restaurant.





# Challenges in eel production



## Consistency in water quality & feed

Eel raised at the eel farm is sensitive and responds immediately to changes in water quality or the smell or taste of feed. This is why optimal farm management is key to giving the best results. Constant control of feed uptake and eating behaviour is very important. The eels should be fed the right amount, so there is no feed spillage and to maintain growth and water quality. The same applies to the feed. Every change in smell or taste gives rise to reduced nutritional absorption for days or even weeks. This naturally limits the productivity of an eel farm.

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## Sustainability

The wild population of European eels has plummeted in recent decades due to barriers like dams, hydropower plants and water pumping stations that block the migration route. Pollution and habitat loss due to industrialization or land recovered from inland water areas have also had a big impact on the eel population.



# Solutions:

## Restocking

In 2007, countries in the EU started implementing eel recovery plans for wild stocks. This was to ensure eels would be saved for the future. The eel faced many problems like disappearing habitats, barriers to migration, polluted water, over-fishing, etc. This is why the industry, researchers and environmental groups have joined forces in Europe under the name **Sustainable Eel Group** (SEG).

Within the group, farmers aid eel survival by supporting restocking programmes and research. All eel farmers are committed to the **Sustainable Eel Standard**, details of which can be found at this link ([www.sustainableeelgroup.org](http://www.sustainableeelgroup.org)). It is vital that the whole chain, from glass eel fishing to glass eel trading and transport companies, farms and processors, is committed to the cause. The standard's parameters, such as survival, feed conversion and restocking, are scored, and the whole chain of custody is regularly checked to make sure all partners are following the standard and working toward a sustainable future for the industry.

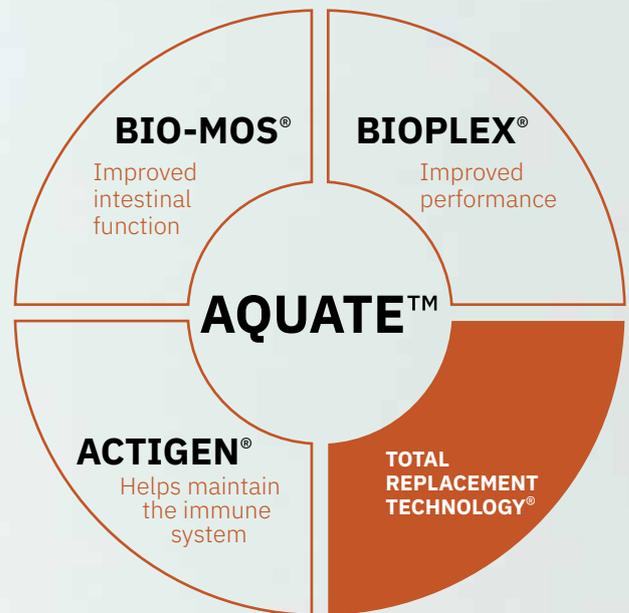
The industry also helps eel in nature. The Dutch organisation of eel farmers, eel fishermen and processors called **Dupan** ([www.dupan.nl](http://www.dupan.nl)) and the **European Stewardship Fund** ([www.esf.international](http://www.esf.international)), which is sponsored by the whole European eel industry, helps the eel in many different ways. With restocking projects in many European countries, eel stocks are increasing. The restocking is done with glass eels and fingerlings. Also, projects like **Eel Over The Dyke** help the eel return to the reproduction grounds in the ocean.

It is very important to support ESF and SEG in their attempts to restore the wild European eel population to a self-supporting and sustainable level.



## Eel feeds

Alltech Coppens eel feed is made with highly palatable ingredients. Getting the smell and taste of the feed right is crucial to getting all the eels in a tank to eat well and reach a high feed intake. Another important point is to minimise variations in smell and taste. A **constant feed** that is highly attractive provides a **constant high feed intake**. This also sends a constant load of excrement to the filters, which is instrumental in maintaining a high water quality in which the eels feel well. Next to that, the Alltech Coppens eel feed is highly digestible, minimising the amount of faeces produced per kg of feed. The compositions of these feeds are in line with the increasing requirement for dietary fat as the eels grow.



### Aquate™

The **AQUATE™ premix** that Alltech Coppens uses in all its feeds is also beneficial for the health and robustness of eels in any type of farming. AQUATE™ optimises digestion and provides a strong mucus barrier defence against pathogens.

At the Alltech Coppens Aqua Centre, eel feed research is carried out to allow us to make the best eel feed now and in the future.



## Research & development

With 30 years of experience researching, developing and producing high-quality eel feeds, Alltech Coppens offers on-farm assistance through our dedicated sales team and technical support team, ensuring optimal farm performance.

Alltech Coppens formulates feed on the 4 Pillars of Fish Nutrition: **Palatability, Performance, Pollution Control** and **Planet**. All four pillars are important and taken into the balance of sourcing new/alternative raw materials:



### Palatability

To ensure the best growth and performance of fish, optimal feed intake is vital. Fish must be attracted to the smell and taste of the feed.

### Performance

Our feeds must perform well. This means that they must generate healthy growth and ensure efficient feed utilisation. This is a decisive factor in the profits of fish farmers.

### Pollution Control

To maintain water quality and secure optimal fish health and performance, it is crucial that all our feeds are highly digestible, thereby decreasing the risk of pollution.

### Planet

The environmental sustainability of the feed.



For more information, please contact us:  
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