

Aral Sea

In 1970-1980s the Aral Sea fishery yields were reported to reach 40,000 MT/year. All fisheries have collapsed as water diversions have removed the major river sources of water and the lake dried. The Aral Sea today has broken into sections - Northern (Kazakhstan) and Southern (Uzbekistan), and it has been reported that the southern sector split again, with one section completely drying up in 2014, exposing the *Aralkum*, the "white desert", a vast, salt-covered land. Large windstorms have swept the area which have affected the health of residents and the quality of drinking waters.



Image from <https://www.youtube.com/watch?v=RhxS1sF8hBk> with a summary available at <https://www.youtube.com/watch?v=tkMJfoeF518>

In 2024 Kazakhstan became leader of the International Fund for Saving the Aral Sea, and ~1.3 billion m³ of water was directed into the Aral Sea from October 2023 to April 2024. As a result, the water volume in the Northern Aral Sea has been reported to increase to ~22 billion m³ (<https://www.waterdiplomat.org/story/2024/07/waters-rising-northern-aral-sea> and https://en.tengrinews.kz/kazakhstan_news/efforts-to-increase-aral-sea-water-volume-have-been-revealed-265316/).

In the 1990s, the introduction of flounder (*Platichthys flesus*) from the Sea of Azov temporarily revived fishing. However, by the end of that decade, rising salinity levels rendered the South Aral Sea uninhabitable, leading to another collapse in fisheries. Water salinities have reached 60 ppt and above (the average ocean salinity is 34-36 ppt). As with other drying salt lakes at such high salinities where fisheries have collapsed (such as the Salton Sea, California, USA), the regional ecosystem is now a habitat for insects (brine flies and water boatmen), and the only remaining aquatic resource is brine shrimp (*Artemia spp.*).

Brine shrimp (*Artemia*) are being harvested, and are the subject of pond aquaculture developments, see <https://www.youtube.com/watch?v=tkMJfoeF518>). *Artemia* are a valuable resource globally for marine shrimp aquaculture hatcheries. However, questions have been raised about the lack of regulations and governance of this valuable fishery. The largest *Artemia* fishery in the world is conducted on the Great Salt Lake in Utah, USA.

Great Salt Lake Brine Shrimp (*Artemia*) Fishery, USA

Companies must purchase a Certificate of Registration (COR) annually. Seventy-nine Certificates of Registration are available to purchase each year. The U.S. state of Utah Division of Wildlife Resources regulates ([harvesting regulations](#)) the harvest and ensures a viable shrimp population by allowing enough cysts to repopulate the lake each spring. The estimated minimum cyst number is currently 21 cysts/L at the end of each harvest season.

Winds and wave actions pile brine shrimp cysts on beaches. The original harvest method was to rake, shovel, bag and then transport cyst piles to trucks or boats. This method still accounts for a large proportion of the total product taken from the Great Salt Lake. Another harvest method is to use large floating mats to accumulate cysts in the water. These mats are referred to as "streaks" or "slicks," and some are large enough to be seen from space. To find a suitable area to harvest, a spotter airplane will fly over the lake, identifying the streaks that are full of cysts and recording their coordinates. The pilot will then radio the coordinates to the harvester boats, which will quickly move to the streaks and then display bright orange-lettered or numbered buoys to claim an area. Harvesters will then encircle the streak by deploying a floating containment device very similar to an oil containment boom. The cysts within the streak are then condensed into very small hoops, and vacuum pumps pump the cysts into 900 kg (~2000 lb.) capacity mesh bags that rest on the deck of the harvester boat. The contents of these bags are called "raw product," and they must be washed in order to remove any broken shells, feathers or other debris. Additional processing of cysts prior to selling them on the marketplace involves a period of cold storage, washing them with freshwater to remove salt and other debris, drying them and vacuum sealing them in various containers. Once they are fully processed, they are graded based on their hatch rates and sold at different prices based on their grade quality. As the brine shrimp industry has expanded, technology has as well. Advances in communication, Global Positioning Systems, night vision and spotter airplanes, as well as 20 hour or longer harvest days, have increased the efficiency of the harvest by at least four times. In other words, companies today can collect four times the weight of cysts compared to when they started in 1950. Harvest seasons usually begin in October and end in January, as mandated by an administrative rule. An agency conducts regular sampling runs in the Great Salt Lake during each harvest season to monitor the brine shrimp population, and compiles reports of the commercial harvest totals.