



(Photos by U. S. Coast Guard)

During the fish-planting work on alpine lakes of Olympic National Park, a small clearing at Lake Crescent served as a base of operations for the helicopter made available by the U. S. Coast Guard.



THE HELICOPTER IN FISH-PLANTING OPERATIONS IN OLYMPIC NATIONAL PARK

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IN OLYMPIC National Park there are numerous small lakes at elevations ranging from 4,000 to 5,000 feet above sea level. These lakes are subjected to moderate to heavy fishing pressure, which, coupled with poor spawning conditions, makes fish planting necessary to provide satisfactory fishing and maintain a suitable stock of fish in the lakes. For many years rangers, employees of the State game department, and sportsmen have carried fish to these lakes by means of horse and mule pack strings and back packs. Because of the rugged terrain, poor trails, and the widely separated locations of the lakes, these methods are inefficient and costly.

As many conservation agencies in the West have developed the use of aircraft for planting high mountain lakes, it seemed advisable to utilize this method to plant fish in the alpine lakes of Olympic National Park. The U. S. Coast Guard Air Station at Port Angeles, Washington, is just north of Olympic National Park. Coast Guard officials offered the use of aircraft and base facilities for this operation, and the U. S. Fish and Wildlife Service, in cooperation with authorities of the National Park Service, planned and supervised the planting of 12 lakes in the Park.

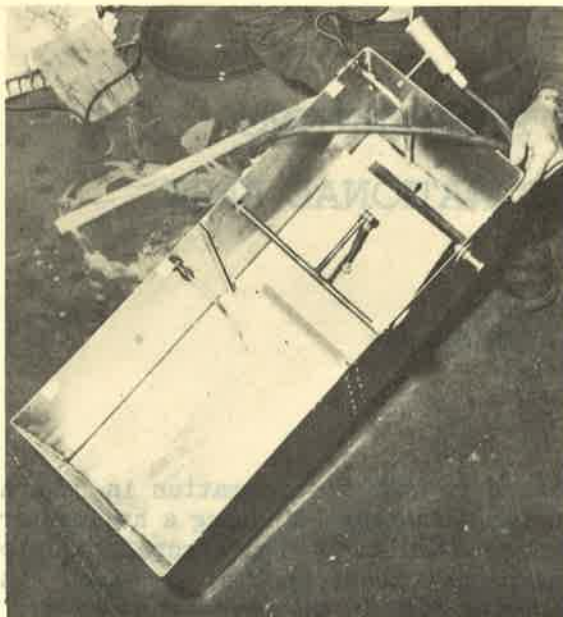
A Sikorsky helicopter and fixed-wing aircraft having flight characteristics suitable for fish-planting work were available. The small size of the lakes (5 to 20 surface acres) and the presence of high cliffs adjacent to these lakes made the use of the helicopter advisable. Another factor in this decision was the

desire to obtain information in regard to the advantages of using a helicopter rather than fixed-wing aircraft and to learn more about special problems in carrying fish in this type of aircraft.

Coast Guard personnel at the base constructed a tank for carrying the fish in the aircraft. This tank is patterned after one used by the Washington (State) Department of Game in its fish planting from the air. The tank is designed for use in either a helicopter or a fixed-wing aircraft. Constructed of welded sheet aluminum, the tank is 12 inches wide, 14 inches deep, and 30 inches long. A cover held in place by wing nuts is provided.

A partition which can be removed in flight divides the tank into two compartments of equal size, making it possible to plant two lakes during one flight. In the bottom at one end of the tank there is a port for the release of the fish. The release-port cover, controlled by a lever mounted on the side of the tank, swings up into the tank. Proper adjustment of the lever system, the presence of a rubber gasket around the port, and the pressure of the weight of water in the tank provide a watertight seal. No difficulty was experienced in releasing the fish with the port opening inward.

It was planned that aeration would be effected by an air funnel mounted on the side of the tank with tubing leading into each compartment. Rubber tubing from the funnel to the tank has an inside diameter of 3/8 inch, and the metal tubing inside the tank is 5/16 inch. It was



Fish-carrying tank: air funnel and tubes of aerating system on left-hand side; release port, opened by the lever on right-hand side; slot for insertion of partition, middle of tank.

found, however, that this system did not function on the helicopter. At operating air speeds from 40 to 80 knots, the weight of water in the tank prevented the air from entering the water except when the inside end of the tube was within 1-1/2 inches of the water surface. Varying the size of the funnel and directing the funnel at various angles so as to take advantage of the thrust from the rotating blades as well as the forward motion of the aircraft, made no noticeable change. It was found, however, that up to 5 pounds of trout fry could be carried without aeration during the one-half hour required for the Olympic National Park plants. The vibration of the aircraft set up considerable surface agitation, which undoubtedly provided some aeration. A small oxygen tank would provide adequate aeration when the fish tank is used in a helicopter and would eliminate the necessity of an air funnel should the tank be used in a fixed-wing aircraft.

As air currents are unpredictable and uncertain in the rugged country in which the lakes are located, and as most lakes



When tank is loaded, the cover will be secured by wing nuts.

lie in pockets with cliffs nearby, the helicopter pilot, Lt. (j.g.) S. H. Raumer, preferred to drop the fish at an altitude of about 100 feet above the lakes and at an air speed of 40 knots. Several practice drops (in which the tank held only water) were made on a target on the runway of the Coast Guard base. Unexpected accuracy was achieved. It was found that fish could be dropped consistently into an area of less than 1 acre when wind velocities were not great. On August 6 one lake scheduled to be planted was still ice-covered except for a fraction of an acre of open water. The fish dropped as a test landed directly in the center of the open water. In every operation the lakes were successfully hit.

The obstacle hardest to overcome was the weather. The Olympic Mountain area is noted for its heavy rainfall. Over much of the year this area is a flyer's nightmare, and it was just that when the preparations for the planting from the air were completed. A heavy cloud cover at 4,000 to 6,000 feet (the altitude of the lakes) kept operations at a standstill for 3 days. After this period of waiting



Fish being transferred directly from fish-distribution truck to the aircraft.

there was a break in the clouds over some of the lakes and the route to them. The fish were quickly loaded and a take-off was made. It was found that in the area of the lakes shifting cloud masses were closing in and then moving away from the lakes in unpredictable fashion. It was therefore impossible to know, when the plane was loaded with fish for the take-off, which lake would be open enough for planting. Planting allotments for the various lakes had been made up on the basis of lake size, food present, spawning success, and fishing pressure. These allotments ranged from 2,000 to 16,000 feeding rainbow trout fry, but most of the allotments, fortunately, were grouped around 5,000 and 10,000 fish per lake. The tank was therefore loaded with 10,000 fish divided equally in the two compartments and trips were made to the lake areas, where the fish were planted in whichever lakes scheduled for planting were free of clouds.

Upon reaching the lake to be planted, the pilot would circle several times to determine the direction of the wind (often impossible to determine) and the locations



When fish are released during flight above the lake, the thrust of the rotor blades forces fish and water almost straight down--but only for a few feet below the helicopter.

of cliffs and trees. Most of the lakes in the Olympic Mountains are in glacial cirques that have precipitous sides. Sometimes it was necessary to approach the lake from the open end of the cirque, make a tight turn at the upper end of the lake, drop low and decrease air speed for the fish drop, and then leave the lake through the open end of the cirque. Where there were no cliffs at the upper ends of the lakes, it was possible to make an approach low over the mountain meadows often present in such areas, drop the fish, and depart over the lower ends of the lakes, which, except for trees, are always open. After the release of the fish, a quick turn would be made to permit observation of the fish and water striking the lake surface. From the air, this looks much like a small rain squall on the smooth water surface.

One important advantage of the use of a helicopter is the flexibility of the operation by reason of the fact that only small clearings are required for landings and take-offs. Several of the lakes planted were in the northwest corner

of the Park. From a small flat clearing at a resort on Lake Crescent, a round-trip flight of only 36 miles was required to plant the lakes. The rainbow trout were hauled by truck from the U. S. Fish-Cultural Station at Quilcene, Washington, to Lake Crescent, where they were held in live boxes in the lake until loaded in the aircraft. A schoolyard at Quilcene was used as a base of operations for planting lakes on the west side of the Park. The schoolyard was only 2 miles from the Quilcene fish hatchery--which facilitated the handling and loading of the trout. Telephone lines bordered two sides of the schoolyard (less than a block square), and school buildings were on the third side. In landing, the helicopter would approach from the open side, hover over the yard, turn around on its axis, and settle down facing the open side of the yard--ready for take-off. The combination of fish and helicopter in the schoolyard created such excitement that the town of Quilcene practically suspended business whenever fish were being loaded and the aircraft was arriving and departing. Fish for the planting

of a lake on the north side of the Park were hauled by truck to the Coast Guard base at Port Angeles and there put on the helicopter.

Use of a helicopter in fish-planting work in rugged mountain country is regarded as highly successful. The advantages of the helicopter over fixed-wing aircraft in fish planting in mountainous country may be summarized as follows:

1. Greater maneuverability in difficult flying conditions among cliffs and trees.

2. Slower speeds and lower altitudes over lakes as the fish are dropped, making it possible to assure that the fish are planted in the water and not over surrounding terrain, and making it possible to plant smaller lakes successfully.

3. Landing-space requirements which permit utilization of small clearings close to the lakes to be planted, thus cutting down the flying time required and enabling the establishment of a base of operations where water is available for the holding of fish in live boxes until loaded for flight.

