



Western Game Conference Held at Santa Fe

The 27th annual conference of the Western Association of State Game and Fish Commissioners held in Santa Fe, New Mexico, on June 4, 5 and 6 was well attended by representatives from all of the eleven member states as well as guests from the game departments of Oklahoma, Texas, South Dakota, and Missouri. Various federal agencies also were represented.

The comprehensive program included talks on all phases of wildlife management, the meeting being divided into general and technical sessions. One of the outstanding talks given was that by I. T. Bode, president of the International Association of Game Fish and Conservation Commissioners and director of the Missouri Department of Conservation. His subject was "The Function of the International Association in Wildlife Programs" and stressed the necessity of the states working together, exchanging ideas and experiences not only as to their success but also failures in management of wildlife problems. The International Association should, among other things, Mr. Bode stated, promote higher qualifications and standards for both commissions and personnel in state departments; unify thinking and policy in regard to wildlife procedure; and function and battle to keep wildlife before the public.

Talks by Oregon delegates included "Report on Interstate Deer Herd Studies" by John McKean and "Oregon's Method of Estimating Big Game Kill" by P. W. Schneider. A. S. Einarsen, director of the Oregon Cooperative Wildlife Research Unit gave a talk on "The Interstate Aspect of Prong Horn Census Work."

Officers elected for the coming year were as follows: President, Ross Leonard, Utah; Vice President, Emil J. N. Ott, Jr., California; Secre-

Control of Disease In Oregon Hatcheries

By H. S. DAVIS, Technical Consultant

There is a widespread belief that the average fish hatchery is a hot bed of disease where ailing fish are the rule rather than the exception. Some biologists have even gone so far as to maintain that hatcheries are a constant menace to the health and well-being of the native fish population. There is no denying the fact that the crowded and unnatural conditions at trout and salmon hatcheries provide an excellent opportunity for the spread of infectious diseases which, once started, may quickly become epidemic. Furthermore, hatchery fish are under constant observation and any serious outbreak of disease can hardly escape discovery. It naturally follows that most disease studies have been made on hatchery fish, and there is the added incentive that control of diseases is essential for the successful operation of our hatcheries.

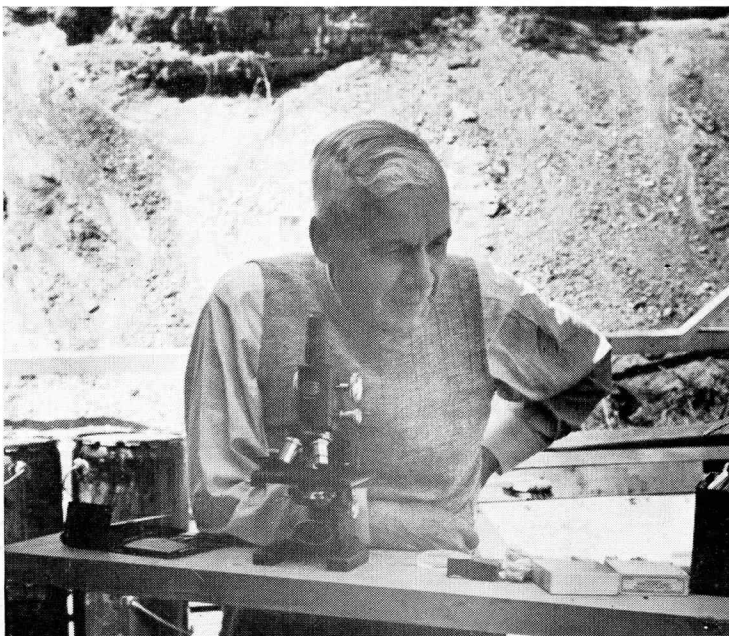
It is scarcely necessary to point out, however, that none of the diseases that bedevil our fish-culturists originated at

tary, Ben Glading of California. Next year's convention will be held at Salt Lake City, Utah.

hatcheries. All were introduced, usually on wild fish, and it is fortunate indeed that only a small percentage of the parasites occurring on wild fishes have become established at our hatcheries.

The common impression that wild fishes are rarely afflicted with disease is easily understood. They are difficult to observe and, unless there is a heavy mortality at one time, there is little chance that the presence of diseased fish will be discovered. Weakened fish are quickly destroyed by predators and even if they are not they usually sink to the bottom after death where they easily escape detection. Even when there is such a heavy mortality as to attract public notice, it is rarely brought to a biologist's attention until too late to determine the cause of the trouble, which is usually attributed to pollution or lack of oxygen. No doubt this is frequently the cause of fish mortalities but it is equally certain that many mortalities are primarily due to disease.

Moreover, we should not
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Trout being examined for parasites by Dr. Davis.

The Supervisor's Column

The game departments in the west have not always seen eye to eye with the federal departments administering the federal lands in our states. We are speaking now of the public domain under the Taylor Grazing Act and the lands comprising the national forests under the Forest Service. We have criticized them from time to time but most of these differences have been ironed out and we feel that at the present time these agencies are trying to recognize the rights of both the stockmen and of the wildlife.

One big feature in favor of the public domain and national forest lands is that they are accessible to the hunter and fisherman. Here in Oregon there are hundreds of lakes and streams as well as thousands of acres of game habitat entirely within the national forests and lands where a citizen may hunt and fish without being considered a trespasser. Roads and camping grounds are maintained and cooperation extended to the state in stocking programs.

Now comes the American National Livestock Association, whose committee on public lands is asking that these lands be sold to the private stockmen. This action was taken at their 50th annual convention held in Phoenix, Arizona, January 8-10, 1947. They hope to accomplish their objective by a special act of Congress or by amendment to the Taylor Grazing Act. They want the exclusive purchasing rights on lands adjoining their own holdings or lands on which they now hold permits and propose to pay 10 per cent down and the balance over a period of 30 years with interest at 1½ per cent. We cannot believe they are sincere in wanting to buy all the lands, but they, of course, would buy the key tracts that had water and the best grazing. This would make the balance of the areas unusable for other stockmen.

A comprehensive discussion on this matter was held at the recent conference of the Western Association of State Game and Fish Commissioners in Santa Fe, New Mexico. Mr. Dan Hughes argued for the stock interests, being the chairman of the joint livestock committee on public lands. The opposition was ably led by C. N. Feast, director of the Colorado Fish and Game Commission, and Don Clarke, director of the Washington Game Commission.

Now we have in Oregon a bunch of stockmen that are level-headed and recognize the value of all interests, and the sportsmen should take off their hats to them in view of the action taken at the recent annual meeting of the Oregon Cattle and Horse Raisers' Association. At that time there was adopted the following resolution, which speaks for itself:

"Be It Resolved that the Oregon Cattle and Horse Raisers Association in session assembled go on record as being opposed to the sale of the public domain,

either to private interests or to the state.

"It is further resolved that we urge Congress to appropriate a sufficient sum of money to operate the Taylor Grazing Administration in an economic manner, and we urge further that the present field office be maintained under the provision of the Nicholson plan as presented to the National Advisory Board Council and the joint land committee."

Game Field Agents Hold Staff Conference

The second annual staff conference of the game field agents of the Commission was held at the Portland office on June 26, 27 and 28 for the purpose of discussing mutual problems as well as future work programs. The schedule of talks and discussions was as follows:

June 26

Introductory Message — F. B. Wire, State Game Supervisor. Departmental Organization — C. A. Lockwood, Ass't. Supervisor. Budgetary, Civil Service and Purchasing procedure — F. C. Baker, Controller. Fisheries Program — Dr. P. R. Needham, Director of Fisheries.

Big Game Section — John McKean, Chairman: Introduction, John McKean; Interstate Deer Herd Study, W. C. Lightfoot, District Agent; Discussion; Pellet Group Method of Big Game Census, Glenn Mitchell, U. S. Forest Service; Aerial Census of Deer, Clifton Lemons, District Agent; Range Research and Application, Joseph F. Pechanec, U. S. Forest Service; Evaluation of Big Game Refuges, Frank Stanton, District Agent; Effects of Logging and Burning in Western Oregon on Game Species, Wesley Batterson, District Agent; Special Seasons as a Control of Big Game Damage, Nils Nilsson, District Agent; Round Table Discussion of Techniques.

June 27

Furbearer and Beaver Management Section — C. E. Kebbe, Chairman: Beaver Management, C. E. Kebbe; District Beaver Records and Map, W. C. Lightfoot, District Agent; Furbearer Management, C. E. Kebbe; Furbearer Census Experiments, L. C. Zumwalt, District Agent.

Federal Aid Section — A. V. Meyers, Chairman: Federal Aid Program, A. V. Meyers; Report on Game Damage Control Project, Austin Hamer; An Appraisal of Federal Aid Projects in Region 1, Robert P. Boone.

Waterfowl and Game Management Areas Section — A. V. Meyers, Chairman: Waterfowl Management, W. B. Morse, Waterfowl Biologist; Public Shooting Ground Management, A. V. Meyers; Report on Summer Lake, Hugo Leyva, Summer Lake Manager; Game Research, A. S. Einarsen, Leader Oregon Research Unit; Law Enforcement Program in Relation to District Management, P. W. Schneider, Director of Game; An Appraisal of Current Game Law Enforcement Problems of the Oregon State Police, Lt. Bert Walker.

Pheasant Demonstrational Project Started

Motivated by the Oregon State Game Commission, a project to demonstrate better methods of utilizing game farm reared pheasants has been started on Eliza Island in Puget Sound by the Oregon cooperative Wildlife Research Unit under the supervision of Arthur S. Einarsen, Unit Leader. The Washington game department is also extending its cooperation in the project.

While the study is being started on 160-acre Eliza Island, it will be extended later to other islands in the San Juan chain, which are miles from the mainland and therefore suitable for the purpose.

Pheasants have been released on the island from Oregon game farms and will be under close observation by technicians to determine the age class survival and stocking value of game farm chicks, the survival of field-reared versus pen-reared pheasants, hen-hatched versus incubator-hatched chicks, and also the best periods for liberations.

Later hunters will be invited to take part in the demonstration, so that the effect of the different methods of harvest now being used can be determined. For instance, the crippling loss based upon shooting ranges, size of shot and load will be measured, after which a search will be made for the most thrifty method of game bird conservation harvest.

Other game species will be studied and breeding stock developed. The mountain quail will be maintained in such abundance that test planting on available range will be made to learn their usefulness and show the capacity of this bird for management in the Pacific Northwest.

June 28

Upland Game Section — John McKean, Chairman: Introduction, John McKean; Factors Affecting the "Quadrat Census" in Malheur County, Wayne Young, District Agent; Acquisition of Contract Refuges, Francis Schneider, District Agent; Summer Lake Pheasant Study, Boyd Claggett, Senior Biologist, Summer Lake; Soil Conservation Program and its Relationship with Upland Game, R. M. Bond, U. S. Soil Conservation Service; Recent Trends in Upland Game Work, Jay B. Long, Oregon State College.

Predator Control Section — A. V. Meyers, Chairman: Predator Control Program of the U. S. Fish and Wildlife Service, G. H. Hansen, U. S. Fish and Wildlife Service; Predator Control Program of the Game Division, A. V. Meyers; Game Division Program and Objectives, P. W. Schneider; Publicity and Information, Miriam Kauttu; Message from the Commission, Dr. George Cathey, Member Oregon State Game Commission.

East Lake Produces Rainbow Eggs

Over 2½ million rainbow trout eggs were secured in East Lake this spring by spawning crews operating out of the Fall River Hatchery. The fish were seined on the beaches and the first net haul made in late May produced over 185 ripe females. The eggs were of large size running approximately 245 per ounce. The fish that produced them were beautiful, deep-bodied rainbow running in weight from 2 to 6 pounds on the average, while 1 female of 12 pounds was obtained. Field Agent John B. Dimick noticed the fish working the beaches when he went up to East Lake to put out buoy lines marking closed areas. The spawning crew from Fall River Hatchery was immediately sent over to do the work. This take of spring rainbow eggs was the first ever collected out of East Lake. In past years the emphasis has always been on taking of eastern brook eggs.

All fish spawned, both males and females, were marked by cutting off the adipose of "flesh" fin with a pair of scissors. This fin is the small one found on top of the fish between the dorsal and tail fins. This was done to save rehandling of the fish in later seinings so the spawners would recognize marked fish quickly and toss them out of the net and not attempt to re-spawn them. The fish thus marked will also permit a calculation of the rate of "kill" by anglers from the creel census work as they are checked in catches this season. From the proportion of marked to unmarked taken, it will also be possible to estimate fairly accurately the total spawning rainbow population in East Lake.



Rainbow trout taken in seine at East Lake.



Spawning crew seining rainbow trout at East Lake.

Angling at East and Paulina Lakes

Robert Borovicka, field agent stationed at East and Paulina Lakes, reports that during the opening weekend of fishing, a record number of anglers came in to fish these two lakes. There were approximately 200 boats each day on East Lake during the opening weekend; probably around 600 anglers Saturday and 700 Sunday. Many parties made limit catches and most anglers caught some fish. Eastern brook provided most of the fishing, but many large rainbows and brown trout were also taken. The recent poor weather discouraged many so that the opening angling pressure fell off rapidly.

Paulina Lake provided good fishing for fly fishermen and experienced anglers. The opening weekend, approximately 80 boats were on the lake each day. Eastern brook trout from 8 to 12 inches long comprised the bulk of the catch, but many browns and some rainbow were caught.

Opening Day Results at Eel and Ten Mile Lakes

On the opening day of the trout season, April 26, a portion of the anglers at Eel and Ten Mile Lakes were checked by a Game Commission field agent. At the former lake 20 anglers whose catch totaled 40 fish by noon averaged 0.70 fish per hour of angling effort. Three limits of 5 fish each were recorded in this group, and one 15-inch cutthroat trout was measured.

A comparison of the creel census made the opening weekend of the 1946 trout season at Eel Lake with the present year's check shows a close comparison in the

lengths of the trout landed. As listed in the table below, 32.1% of the 1946 fish and 34.5% of 1947 fish were in the 8 to 10-inch size group, and 52.8% in 1946 and 57.5% in 1947 made the 10 to 12-inch group. Last year, 11.8% of the fish measured over one foot in length, but this year only 8% reached that size. However, the largest fish caught in 1946 stretched to 13¾ inches, somewhat shorter than the 15-inch trout brought in the opening day of the 1947 season.

At Ten Mile Lake, 47 anglers, many of whom had finished their day's angling, caught 119 trout, ranging much smaller in size than those fish taken at Eel Lake. The Ten Mile Lake anglers expended a total of 278 hours of effort to catch trout at an average of 0.43 fish per hour. Over 300 perch were landed by these same anglers in this period. Included within the 8 to 10-inch size group at Ten Mile Lake were 6 silver salmon (6% of catch) while only one silver (2.5% of catch) of this size was landed at Eel Lake.

The table below lists the percentages of fish in various size groups taken by anglers at Eel Lake in 1946 and 1947, and at Ten Mile Lake in 1947.

Size Group	Eel Lake		Ten Mile Lake
	1946	1947	1947
	522 Fish	40 Fish	119 Fish
6"- 8".....	3.3%	...*	...*
8"-10".....	32.1	34.5%	71.5%
10"-12".....	52.8	57.5	26.0
12"-14".....	11.8	5.5	1.7
Over 14"...	None	2.5†	0.8‡

*Minimum size limit—8 inches.

†One fish—15 inches.

‡One fish—16 inches.

Control of Disease in Oregon Hatcheries

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overlook the fact that conditions frequently arise in nature which are very favorable for the spread of infections. As streams become low or dry in summer the receding waters may leave pools overcrowded with fish and with relatively high temperatures which provide ideal nurseries for the multiplication and spread of parasitic organisms, often rivaling hatcheries in this respect.

Most of the more serious diseases of fishes are caused by bacteria and protozoa, which are invisible to the naked eye. Infections with fungi may also result in heavy losses and virus diseases are not uncommon. The larger animal parasites such as copepods and worms while common on wild fishes are not, ordinarily, a serious problem at hatcheries. There are, however, some notable exceptions.

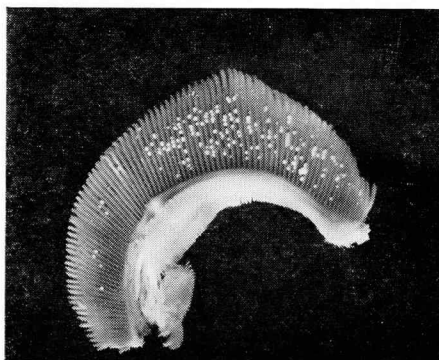
Bacterial Diseases

As a rule, bacterial diseases are more lethal for fish than other types of infections but our knowledge of these diseases is quite limited. A number are known to produce serious epidemics among European fishes and there is reason to believe that similar infections are prevalent in this country. Only recently a disease which is often very destructive to fishes in the Mississippi Valley has been found in salmon in the Columbia and Sacramento rivers and is now known to occur in all parts of the United States. Fortunately the causative bacteria flourish only at comparatively high temperatures and for that reason are less injurious to salmon and trout than to warm water fishes. The bacteria, however, are of special interest since they belong to a peculiar group of organisms known as Myxobacteria which are common in soil and water but are usually not parasitic. Other Myxobacteria infect the gills and it is probable that these organisms are responsible for many fish diseases, but this can only be determined by future studies.

The best known and most feared bacterial disease of fishes is furunculosis. Although usually considered a hatchery disease, furunculosis is quite common among salmon and trout in many western streams. In fact there is much evidence that this disease is indigenous among salmonids in this region and was carried on trout or salmon eggs to eastern hatcheries where it caused heavy mortalities, especially among eastern brook trout. A little later it made its appearance in European hatcheries, the native brown trout being very susceptible. Unlike the Myxobacteria which grow mostly on the surface of the body and gills, the furunculosis bacteria occur in large numbers in the circulating blood which accounts for the rapid development of the disease.

Protozoan Diseases

Protozoans are probably the most com-



Myxosporidian cysts on trout gill. This is a protozoan parasite that often heavily infest trout.

mon parasites of fishes. They occur in all parts of the body where the great majority, unless very abundant, lead harmless lives with little injury to the long-suffering host. One entire group, the Myxosporidia, comprising hundreds of species, are nearly all fish parasites. With one striking exception, the known forms are internal parasites and may be found in every organ of the body, although each species has its individual preference. Ordinarily, myxosporidians cause little injury to hatchery fish and consequently present no serious problem to the fish-culturist. Other internal protozoan parasites are the intestinal flagellates (*Octomitus*), the blood flagellates (*Trypanoplasma*), and various species of Coccidia. *Octomitus* is the only one known to occur in hatchery fish but there is a possibility that some coccidian might find a congenial environment in our hatcheries and prove as destructive as their cousins are to poultry and other birds.

Some of the best known and most serious diseases are caused by protozoans which live on the surface of the body, fins, and gills. They are second only to bacteria in their injurious effects on both hatchery and wild fishes. Such parasites as *Ichthyophthirius*, *Chilodon*, *Trichodina*, and *Costia* are well known to fish-culturists but they are common also on wild fishes along with many other species unknown, as yet, at hatcheries.

Fungus Diseases

Among the parasitic fungi the fish molds are the most common and best known. Since fungused fish are so conspicuous, the disease is probably better known to the average person than any other fish disease. Spawning salmon are usually so covered with patches of fungus that one wonders how they can survive as long as they do.

Parasitic Worms

Parasitic worms, both external and internal, are common on wild fishes but in most cases appear to cause little injury unless present in large numbers. External flukes (*Gyrodactylus*) are serious hatchery pests but, fortunately, are easily controlled. Largely due to their complicated life history, few internal worm parasites infect hatchery fish but larval flukes may

invade the eyes causing "popeye" or blindness, while a larval blood fluke may be so abundant in the gills as to kill the host.

Control Measures

With such a variety of fish parasites differing widely in habits and living requirements, it is no wonder that the trout culturist must wage a continuous fight to keep his charges free from disease. In this battle he may employ both prophylactic and therapeutic measures, which while basically distinct may not always be clearly defined in practice.

The object of prophylaxis is to prevent the parasite from becoming established either within or upon the fish. But if, in spite of our best efforts, the fish do become infected we must resort to therapeutic measures, or the use of chemicals and drugs, to destroy the parasites before they can destroy the host.

In combating fish diseases prophylactic measures are frequently the only ones available and in all cases they should be our first line of defense. The most fundamental requirement of any trout hatchery is an abundant supply of pure, cold water free from contamination. Without a suitable water supply, the battle against disease is lost before it is begun. From the disease standpoint, water taken directly from a spring has obvious advantages. Unless the spring contains fish there is no opportunity for parasites to be carried into the hatchery since no fish parasites, with the possible exception of some bacteria and fungi, can live long off the host. But, unfortunately, springs of sufficient volume and suitable temperature are limited in number and found only in certain favored regions. Owing to the amount of water required sterilization of a stream supply is impracticable and the trout culturist must make the best of a bad situation. This in many instances is not as difficult as might be supposed and there are numerous hatcheries supplied from streams in which the incidence of disease is little, if any, greater than at many spring-fed hatcheries. It is an unfortunate fact that sooner or later the more common bacterial and protozoan parasites may become established at a hatchery regardless of the water supply, and once established they are difficult to eradicate. No doubt the neighborly habit of transferring fish from one hatchery to another may be largely responsible.

But even though disease organisms may be present, all is by no means lost. Much can be done to prevent infection by keeping the fish in good physical condition. This means good care, good food, good sanitary conditions and sufficient room to prevent serious overcrowding. It is surprising what careful attention to these details will accomplish in keeping the fish healthy. A good maxim to follow is to keep the fish at all times under as nearly natural conditions as possible.

Nevertheless, despite all precautions, occasional outbreaks of disease are bound

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COMPARATIVE LICENSE SALES — 1945 - 1946

	1945	1946	Per Cent Increase
Resident Hunter	81,320	91,837	12.93%
Juvenile Hunter	4,629	4,623
Non-Resident Hunter	3,086	4,831	56.55
Combination Hunter and Angler	64,116	91,118	42.11
Special Combination	5,538	6,111	10.35
Special Hunters	501	500
TOTAL HUNTERS	159,190	199,020	25.02%
Resident Anglers	80,518	103,484	28.52%
Juvenile Anglers	13,515	14,494	7.24
Non-Resident Anglers	4,661	8,926	91.50
Vacation Anglers	6,361	17,464	174.55
Combination Hunters and Anglers	64,116	91,118	42.11
Special Combination	5,538	6,111	10.35
Special Anglers	841	838
TOTAL ANGLERS	175,550	242,435	38.10%
TOTAL LICENSE HOLDERS	265,086	344,226	29.85%

CONTROL OF DISEASE IN OREGON HATCHERIES

June Meeting of the Game Commission

The Oregon State Game Commission held its regular monthly meeting at Portland on Saturday, June 14, 1947.

A. S. Einarsen, leader of the Oregon Wildlife Research Unit, gave a brief progress report on the pheasant study project in the Willamette Valley and also on the inauguration of the pheasant project at Eliza Island.

Mr. Kenneth Gates presented resolutions adopted by the Oregon Wildlife Federation at its recent quarterly meeting and called particular attention to the one asking for a joint study of fish predators by the Fish and Game Commissions.

C. W. Scott, president of the Southwestern Oregon Sportsmen's Association, urged that further investigation and study be made of the Henderson Marsh area in Coos county from the standpoint of development of a possible waterfowl refuge and shooting ground under the provisions of the Federal Aid Act.

Consideration was given to resolutions passed by the Cattle and Horse Raisers Association of Oregon at their recent convention in Lakeview.

It was ordered that the Commission again appropriate the sum of \$450 for the purchase of salt for elk and deer ranges to be distributed by the Cattle and Horse Raisers Association.

A program for special work in predator control by the Commission for the balance of 1947 was submitted by the game division, involving aerial coyote hunting, aerial coyote poisoning and miscellaneous control methods. The program was approved and work authorized to the extent of \$4,000, amount now in the budget for predator control. An additional \$6,000 will be appropriated later in the year if funds are available.

It was ordered that Federal Aid projects 11-R and 12-R, in regard to game damage control methods and Summer Lake pheasant study be continued.

It was decided to submit a Federal Aid project for a survey of the entire state from the standpoint of possible land acquisitions for management of waterfowl and big game resources.

The department was authorized to purchase a scoomobile to be used by the fishways and screens and other divisions of the department.

The engineering department was instructed to submit final plans for development of the Diamond Lake hatchery to the Commission at the next meeting.

Timber Structures, Inc., Portland, was awarded the contract for the construction of 150 hatchery troughs.

The following applicants for membership in the game division of the State Police were added to the recommended list:

Allen Maleard Brooks, Milwaukie 2;
Marion H. Wayne, Ontario;
Melvin Edwar DeRock, Portland;
Carl William Berger, Corvallis;
Floyd D. Logan, Hood River;
Harry Raymond Elmer, Lyons;
Willis Darrel Sims, Salem.

It was ordered that upon completion of a satisfactory lease with the City of Eugene for pond sites at Leaburg Dam on the McKenzie river, construction work at the McKenzie hatchery be started immediately in accordance with plans submitted by the Engineer at an estimated cost of \$58,841.

The program submitted by the director of game for the employment of six full time and 12 part time conservation assistants was approved. The men are to be used in maintenance and patrol of refuges and closed areas, including the posting of refuges and stream closures, operation of checking stations, assisting in routine census and development work in the district program, and cooperating with State Police in achieving effective patrol of strategic areas.

The meeting was adjourned until Thursday, July 10, 1947.

This and That

Fred Locke, field agent at Diamond Lake, collected quite a number of young brown trout from Silent Creek, one of the main spawning tributaries of the lake. This is the first evidence obtained of the natural spawning of brown trout from Diamond Lake. Very few have been taken there in past years and evidently they are maintaining their own by natural propagation. Brown trout have never been stocked at this lake by the Game Commission and they apparently either worked their way up Lake Creek, which appears somewhat doubtful, or were planted by some private individual on his own initiative. * * *

Also, at Lake 'o the Woods, Carl Bond, field agent working on trash fish control, reported that on June 3 he caught a nine-pound brown trout in a net set for trash fish. Brown trout have never before been reported from this lake. Evidently this fish likewise resulted from a private planting made by persons unknown years ago. Scales of the fish had "spawning" checks indicating it had spawned a number of times and its age was ten years. * * *

Breeder pheasants recently released from the game farms totalled slightly more than 4,000. * * *

The stream improvement crew of the Commission has completed cleaning up the Yachats River and has directed its attention toward removal of barriers in Coos county streams. * * *

A trap to catch carp has been installed in the Rogue River on a slough eight miles below Grants Pass as an experiment to find out whether or not adequate control can be exercised at a reasonable cost in both money and manpower. * * *

Fisheries field agents along the coast have been active in the salvage of fish being left stranded in pools by falling water levels, assisted by local sportsmen. The Tillamook county sportsmen are doing the major share of the work in their locality with nets borrowed from the game department. * * *

The reported heavy mortality of crappies at McKay Reservoir in Umatilla county was investigated by Dr. H. S. Davis, fish disease expert, who diagnosed the cause as being a bacteria, *Cytophaga Columnaris*, which heavily infested the gills and caused disintegration, resulting in the death of the fish. Dr. Davis reports that there is little chance anything can be done towards a cure in a body of water as large as McKay Reservoir because the cost would be too excessive. This disease was described by Dr. Davis originally in the eastern United States and since then he has found it prevalent in both adult and young salmon, trout and many species of warm water fishes such as bass, sunfish and catfish.

Control of Disease in Oregon Hatcheries

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to occur at even the best regulated hatchery. Once a disease makes its appearance the procedure to be followed will, of course, depend on the nature of the infection. If, for example, the disease is caused by an external parasite, the treatment will be very different from that required when the parasite occurs within the body. Again, bacteria may not be affected by a treatment which would destroy protozoa. But whatever the nature of the disease the proper treatment should begin as quickly as possible. It is much easier to stop an infection in its incipient stages than to wait until it has become epidemic. In fact, half the battle is the ability to recognize a disease in its earliest stages. If appropriate measures are adopted immediately it may be possible to stop the disease with practically no mortality.

Most parasites that live on the body and gills can be destroyed by chemical agents which kill the parasites without serious injury to the host. Copepods, however, are a notable exception since they are protected by a chitinous covering which is more resistant to chemicals than are the gills of the host.

The early fish culturists relied almost entirely upon common salt (sodium chloride) to kill external parasites. With most protozoans this treatment is quite effective when a three per cent solution is used. For more resistant protozoans such as *Costia* and with gyrodactylid worms, it is advisable to add glacial acetic acid at the rate of 1 to 500 and dip the fish in the solution for one to two minutes. Probably the most effective method of ridding the fish of protozoan and worm parasites is to expose them to a 1 to 4000 solution of formalin for one hour.

Neither salt nor formalin is of any value in treating fish suffering from a bacterial infection. Dipping them in a 1 to 2000 solution of copper sulphate for one to two minutes is probably the most effective treatment but it must be used with caution in soft water. The addition of three per cent salt is advisable since the mixture is less injurious to the fish than the copper sulphate alone. Great success in the use of "Roccal" is reported by Dr. F. F. Fish of the U. S. Fish and Wildlife Service. It is used chiefly as a prophylactic agent, the fish being exposed to a 1 to 50,000 solution for an hour. The treatment should be repeated at intervals of one to two weeks.

In treating diseases caused by internal parasites it is usually necessary to administer the drug in the food. The use of calomel and carbarsone in the control of *Octomitus* is familiar to most trout culturists. Either is mixed with the food in the proportion of 1 to 500 and apparently is equally effective, although the carbarsone is believed to be less toxic to the fish. A recent development in the treat-



Trailer house at Crescent Lake, one of two acquired by the Commission for use of field crews. Used in the summer by fisheries men, the houses during the hunting season will serve as checking station headquarters where other facilities are not available.

ment of fish diseases is the use of sulfamerazine in combating furunculosis. The treatment recommended by Dr. J. S. Gutsell of the U. S. Fish and Wildlife Service is to add six grams of the drug to the food required for 100 pounds of trout daily. The treatment should be continued for at least three weeks and during this time all the food should contain sulfamerazine. While Dr. Gutsell's experiments showed a marked improvement in the fish fed sulfamerazine, there is as yet no proof that a permanent cure can be effected with this drug.

In the case of parasitic worms which have a complicated life history, a very different method of control may be most successful. In addition to fish the worms have other hosts, such as snails, in which certain stages in the life cycle must be passed. Once the snails are destroyed an essential link in the life cycle is broken and further development of the parasites prevented.

It is apparent that in combating any infectious disease, it is necessary to sterilize all ponds in which diseased fish have been held and any nets, dishes or other implements which may have been contaminated. In most instances chlorine is the best disinfectant for this purpose. It can be purchased in the powdered form as "HTH" which has a very high content of available chlorine. The chlorine is released when the powder is dissolved in water, and enough "HTH" should be used to provide at least five parts per million of chlorine when a pond is filled with water and allowed to stand. If the nets are simply dipped in the solution or if it is to be used as a wash for disinfecting pond banks and dam boards, it should

Trash Fish Control Operations

Based on sample counts of representative areas, F. W. Smith, Jr., Field Agent for the Game Commission, killed an estimated 2,000,000 roach in the swampy areas south of Whitefish Creek on Crescent Lake the end of May. This is the main inlet of Crescent Lake and minnows have been greatly concentrated in this area for spawning purposes.

Similar control operations have been underway at Lake of the Woods and many hundreds of pounds of trash fish have been both trapped and poisoned. Those trapped have been shipped down to the Butte Falls Hatchery for use as fish food as noted in an earlier release. Carl E. Bond, Field Agent detailed to Lake of the Woods, has found that yellow perch fry are very easy to poison. They hang in the weeds and rocks close to the shore and it is a simple matter to spray the schools with rotenone. He found that 8 pounds of poison was sufficient to spray over half a mile of shoreline. Fry are very susceptible to the poison and die in from 5 to 10 minutes. Very few game fish are killed and practically no trout, although one or two have succumbed that got into the poisoned area.

contain about twenty-five parts per million of chlorine.

With the increased demand on Oregon hatcheries for more and larger fish, little abatement of the disease problem is to be expected. There is, nevertheless, every reason for optimism since our constantly increasing knowledge of fish diseases and nutrition will make for better control methods and production of the healthy, vigorous fish required for stocking.

FUR CATCH REPORT

1946-47 TRAPPING SEASON

COUNTY AND NO. TRAPPER'S REPORTS	OTTER	MINK	MUSKRAT	WILDCAT	FOX	SKUNK	WEASEL	RACCOON	MARTEN	CIVET CAT	*MISCEL- LANEOUS	TOTAL AMOUNT
No.	Amount	No.	Amount	No.	Amount	No.	Amount	No.	Amount	No.	Amount	
Baker	97	204	\$ 2,729.52	5064	\$ 6,433.84	8	\$ 6.96	16	\$ 14.56	78	\$ 1,332.24	\$ 10,908.16
Benton	69	98	1,311.24	479	627.49	84	73.08	275	266.75	69	34.50	2,494.93
Clackamas	77	10	2,421.78	668	875.08	65	56.55	198	192.06	23	11.50	3,894.15
Clatsop	166	643	8,403.34	3039	4,007.99	15	13.05	129	125.13	73	36.50	13,809.88
Columbia	119	36	3,090.78	2667	3,493.77	103	89.61	22	22.75	66	33.00	7,796.19
Coos	145	8	176.00	691	905.21	4	3.48	305	295.85	42	21.00	6,667.70
Cook	11	53	4,322.14	69	69.43	29	25.23	289	280.33	1	.50	359.49
Curry	44	11	147.18	337	337.98	118	102.66	55	50.05	93	46.50	2,946.16
Dachutes	62	19	1,592.22	258	3,443.99	3	2.61	5	4.85	191	204.96	7,720.15
Douglas	149	41	8,282.22	2629	3,991.69	7	13.92	9	8.19	36	614.88	11,306.63
Gilliam	3	3	40.14	299	391.69	2	1.82	2	1.94	98	49.00	421.70
Grant	43	3	1,137.30	46	60.26	7	6.79	29	28.13	1	.50	113.96
Harney	26	44	588.72	261	341.91	3	2.61	44	42.68	1	.50	146.18
Hood River	26	43	575.34	250	327.50	6	13.92	7	6.37	75	1,281.00	2,950.27
Jackson	156	78	1,043.64	5605	7,342.55	16	13.92	109	105.73	48	819.84	23,183.57
Jefferson	3	10	133.80	17	22.27	4	3.64	4	3.64	16	273.28	959.60
Josephine	52	46	615.48	2014	2,638.34	46	40.02	2	1.82	20	10.00	3,377.21
Klamath	67	31	1,137.30	9499	12,443.69	32	2.58	11	10.67	3	1.50	1,836.88
Lake	3	1	13.38	1040	1,362.40	25	21.75	282	273.54	82	1,400.56	14,296.45
Lane	212	621	8,308.98	2435	3,189.85	4	3.48	17	15.47	215	208.55	56.12
Lincoln	126	483	6,462.54	261	341.91	67	58.29	17	15.47	266	258.02	26
Linn	76	220	2,943.60	859	1,125.29	13	11.31	4	3.64	37	35.89	110
Malheur	143	7	154.00	8171	10,704.01	180	156.60	9	8.19	281	272.57	3,365.30
Marion	90	5	110.00	955	1,251.05	6	5.22	1	.91	5	4.85	1.58
Morrow	10	3	40.14	236	309.16	83	72.21	13	11.83	75	72.75	13
Mulmoh	67	108	1,445.04	2179	2,854.49	4	3.44	89	86.33	6	3.00	5,082.50
Polk	31	26	347.88	98	128.38	37	32.19	4	3.64	2	1.00	66.30
Sherman	2	1	13.38	3	3.93	5	4.35	13	11.83	136	131.92	5,689.26
Tillamook	90	310	4,147.80	682	893.42	35	30.45	28	25.48	23	22.31	52.14
Union	100	141	1,886.58	3966	5,195.46	1	.87	5	4.55	18	17.46	7,490.62
Walla	52	169	2,261.22	1728	2,263.68	4	3.48	63	57.33	94	1,605.52	6,209.95
Wallowa	47	57	726.66	2889	3,784.59	4	3.48	39	37.83	59	1,007.72	867.90
Wasco	27	62	829.56	267	349.77	66	57.42	6	5.46	3	1.50	6,578.67
Washington	44	91	1,217.58	418	547.58	88	76.56	144	139.68	23	11.50	11,062.91
Wheeler	3	1	22.00	237	310.47	8	6.88	7	6.79	5	85.40	2,379.63
Yamhill	33	39	521.82	77104	\$101,006.24	439	\$377.54	3738	\$3,625.86	10	5.00	1,232.00
TOTAL	2483	5349	\$71,569.62	77104	\$101,006.24	875	\$1,741.25	435	\$395.85	1138	\$19,437.04	\$208,876.15

*Includes returns from 1,881 coyotes, 65 badger, 31 opossum, 22 nutria, 22 cougar and 34 bear.

1946-1947 Fur Catch

This record of Oregon's fur harvest for the past season is compiled from the returns submitted by 2,245 out of the 2,585 licensed trappers and by 238 landowners who have permits to trap on their own land without a license.

Because of the shortage of space the total number of opossum, badger, coyote, cougar, bear and nutria is given for the entire states and not broken down by counties.

Since this is a fur report by trappers it does not represent the total kill of predators. Most predatory animals are hunted and trapped the entire year for bounties rather than their fur value and reports are not available on the total taken.

Although the market price on most furs dropped about 50 per cent last fall and remained low, the total number of animals taken is comparable with that of previous years. More muskrats and marten were taken but fewer mink.

Opossum have definitely become established in Clatsop county and despite a \$.024 average per pelt, 31 were marketed. All 22 nutria were trapped in Lincoln County near Toledo.

The present market price on long-haired furs, such as coyote, fox, raccoon and skunk is so low that few trappers will even skin one. This has caused a reduction in trapping pressure the last few years with a corresponding increase in animals in the wild. Since most long-haired fur animals are naturally predatory, a continued increase is not desirable.

Hearing on Hunting Seasons and Limits

The Oregon State Game Commission will hold at ten o'clock Friday, July 11, its annual hearing in regard to the hunting regulations for the current year. The meeting will be held at the Portland office of the Commission.

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The Duck Situation

On May 21 and 22, Dr. Clarence Cottam, Assistant Director, and W. E. Crouch, Chief of Game Management of the Fish and Wildlife Service, held a meeting in Portland with the state agencies and sportsmen on the present migratory waterfowl situation, which was one of a series of eleven meetings held throughout the United States. The game departments of Washington, Montana and Oregon were invited to be represented as well as various federal agencies at the first day's session. A meeting for the general public was held the second day.

The picture painted was far from a rosy one as all facts presented showed a downward trend and, therefore, a contemplated curtailment of the season and bag limit. Figures quoted pointed out that in 1945 the duck population was 105,000,000; in 1946, 80,000,000; and in 1947, 54,000,000. This inventory was taken in January by 1,200 employees and with the help of state agencies.

The money spent by sportsmen in harvesting last year's duck crop was \$300,-

000,000 and the duck stamp sales show an ever increasing stress on migratory waterfowl hunting, which, it has been brought out before, applies also to fishing, upland bird and big game hunting. Duck stamp sales have increased approximately 300 per cent from 1935 through 1946 as shown below:

1935.....	635,000
1938.....	893,000
1939.....	1,000,000
1940.....	1,111,000
1943.....	1,389,000
1946.....	2,000,000

The loss of birds was not all blamed to the hunters' kill. Other factors are drought in the northern nesting grounds, botulism, lead poisoning, crippling and predatory losses. In spite of the discouraging facts, Dr. Cottam feels that the season should not be closed but shooting days and bag limits curtailed. He stresses more refuges, both state and federal. The government has 180 refuges throughout the United States now and according to their ideas, this is entirely inadequate.

Heretofore the United States has been zoned from east to west, a northern, a

central and a southern zone. Present thinking is that these divisions should be by flyways from north to south. The following data by flyways is interesting.

	% Duck		
	% Bird Population	% Stamps Sold	% Kill
Pacific Flyway ..	27%	19%	25%
Central	33%	25%	29%
Mississippi	25%	42%	37%
Atlantic	15%	14%	9%

You will note that the Central flyway, which is just east of the Pacific flyway, is in the best position, having 33 per cent of all the ducks and 29 per cent of the kill. The Pacific flyway, which, of course, is our own coastal areas as far back as Utah, had 27 per cent of the birds and 25 per cent of the kill. So that it can be seen the western portion is in a much better position than eastern United States and could stand more liberal regulations, either with more shooting days or a somewhat larger limit.

It is also of interest to note that 52 per cent of the Pacific flyway kill last year was in California. The success ratio per hunter is interesting.

California ..	3.7 birds per hunter
Nevada	2.7 birds per hunter
Utah	2.5 birds per hunter
Oregon	2.2 birds per hunter
Washington ..	1.7 birds per hunter

Dr. Cottam made the statement that the good old days of long seasons and big bags were gone forever and our thinking must be revamped. No more can a hunter kill all the birds he can carry and the sport must not be rated by numbers of birds. There are many things that can be brought home in the bags beside ducks. There are those pink sunrises in the crisp fall mornings. There are those high flocks of geese with that honk that always thrills one. There are the yellow and red coloration of the ash and maple and the crisp air, which one can breathe to the bottom of his lungs and perhaps if one stays in his blind and shoots straight enough, he may bag a mallard greenhead or a long, white-necked sprig, and when he gets home he's tired but happy and has a memory that lingers long.

JULY CALENDAR

General trout season Apr. 26-Oct. 15
Salmon and steelhead over

20" Entire year
Jack salmon under 20" Entire year
Spiny-rayed fish Entire year
Bear Entire year
Cougar, wolves, other
predators Entire year

Waterfowl Success Ratios

Success ratios for the 1946 waterfowl and other migratory bird seasons are given in the tables below. These figures were obtained by inspection of hunters' bags at the end of a day's hunting. All inspections were made by Game Commission field agents. The number of hunters checked is not an adequate sample when compared to the total number of hunters purchasing duck stamps, but it will be of aid in showing the trends of waterfowl present and harvested in Oregon over a period of years.

Summer Lake public shooting grounds success ratios are presented for comparison.

1946 WATERFOWL SUCCESS RATIO

Area	Birds per Man Day			
	Ducks	Geese	Coot	Total
East of Cascades	1.60	.37	..	1.97
West of Cascades	.94	.17	.10	1.21
Statewide	1.22	.25	.06	1.53

1946 OTHER MIGRATORY BIRDS SUCCESS RATIO

Area	Birds per Man Day	
	Band Tailed Pigeon	Mourning Dove
East of Cascades	2.55
West of Cascades	5.32	.08

1946 SUMMER LAKE SUCCESS RATIO

Area	Birds per Man Day		
	Ducks	Geese	Total
Summer Lake	1.46	. 71	2.17