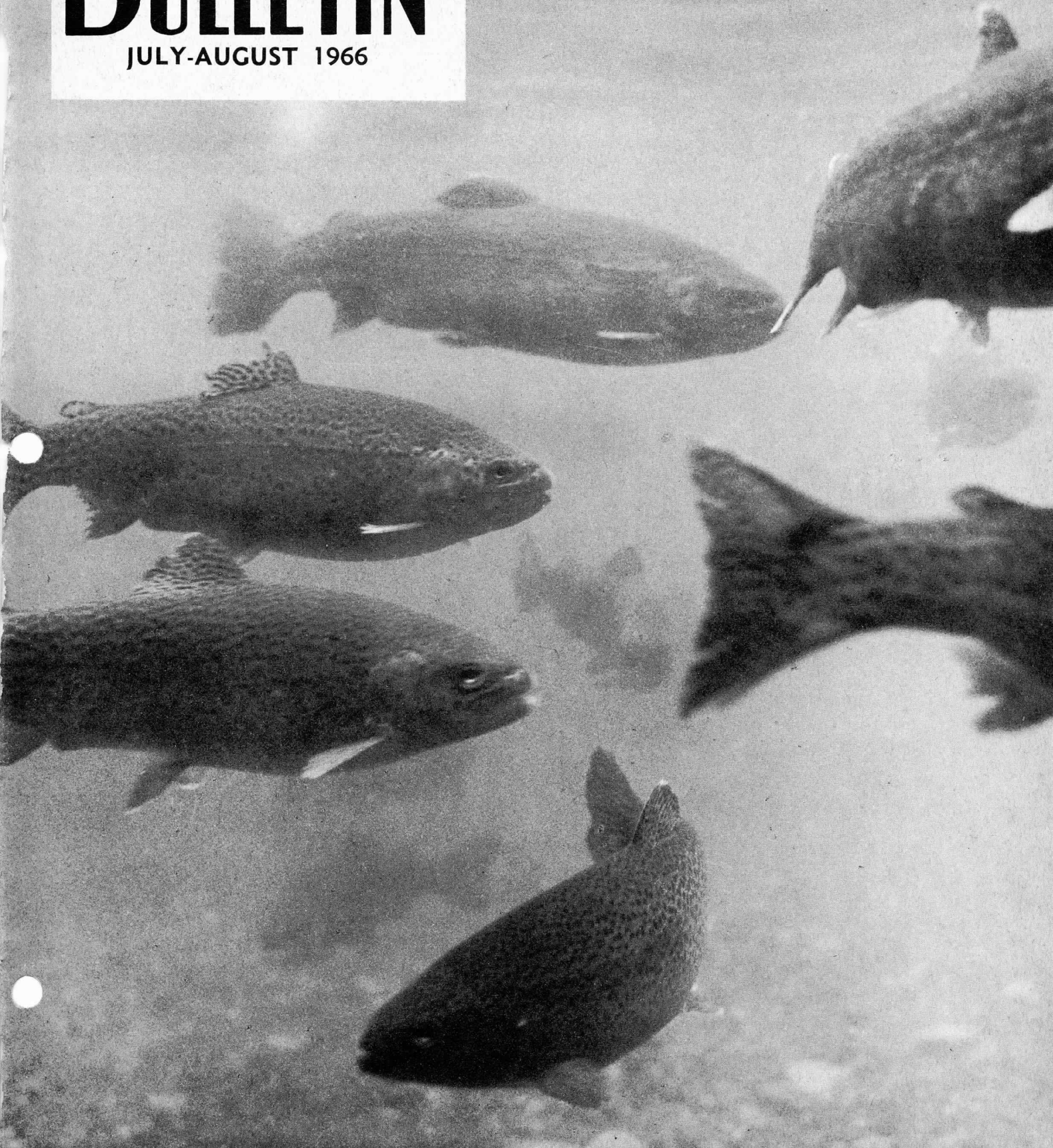


OREGON STATE  
GAME COMMISSION

# BULLETIN

JULY-AUGUST 1966



# OREGON STATE GAME COMMISSION BULLETIN

July-August 1966  
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## The Cover

Underwater shot of rainbow brood trout at the Roaring River Hatchery near Scio. (Photo by Ron Shay)

## BULLETIN HUNTER SAFETY TRAINING PROGRAM

### Instructors Approved

Months of April and May..... 37  
Total to Date..... 3,696

### Students Trained

Months of April and May..... 1,870  
Total to Date..... 93,824

### Firearms Casualties Reported in 1966

Fatal ..... 0  
Nonfatal ..... 10

## SMALL GAME REGULATION HEARING ON AUGUST 24

The Oregon State Game Commission will hold its annual hearing on regulations for small game and furbearing animals Wednesday, August 24, at its Portland headquarters, 1634 S.W. Alder St. The meeting will convene at 10 a.m.

The Commission will consider rules governing seasons, bag limits and methods of taking for upland game and furbearing animals. It also will select season dates and bag limits for migratory birds within the framework established by the federal government.

# Frank B. Wire

Oregon lost a dedicated supporter of its fish and wildlife program with the death of former state game supervisor, Frank B. Wire, of a heart attack at his home in Portland on July 5. Born in 1879 at Byron, Illinois, he would have been 87 in September.

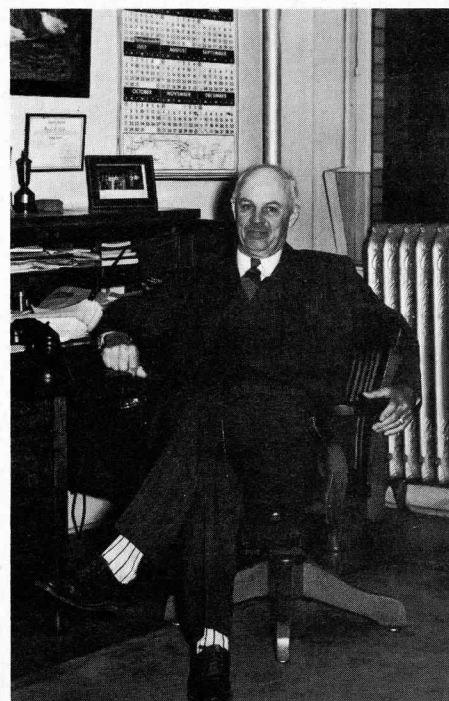
Frank, as he was widely known throughout Oregon and many other states, was appointed state game supervisor in April, 1932 and served for 15 years, which was a record for the position at that time. Resigning in 1947 because of ill health, he stayed on in an advisory capacity until June 30, 1953.

His service with the Commission spanned a period of great change. It started during the depression when the Commission had a small budget and its operations were concentrated chiefly on operation of its fish hatcheries and game farms. Then with the Commission participating in the cooperative wildlife research unit started in 1935 at Oregon State University and taking advantage of personnel trained in scientific fish and wildlife management, Frank was in charge of development of today's management program. He heartily endorsed the new approach, and most of the present division and section chiefs in the game department started their careers with his encouragement and support.

Coming to Oregon when he was only five years old, Frank grew up in the Willamette Valley where he mastered the arts of hunting and fishing to which he was devoted for the rest of his days. Enthusiasm bubbled at the prospect of each hunting or fishing trip as if it were the very first one. He was proficient with rifle and shotgun, getting his buck each year except for last season. Bird hunting was tops too, especially in the days of his favorite pointer, "Queenie." She not only found the birds but also won numerous awards in field trials. To many he perhaps was more noted as a fly fisherman. He built fly rods and tied flies, this activity keeping him busy particularly in his retirement years.

He was a Spanish-American war veteran, enlisting at a tender age. He attended Albany College and University of Oregon. He was a past president of the Western Association of Game and Fish Commissioners, and held membership in the Fly Fishers Club, the Izaak Walton League, Wildlife Federation, Outdoor Writers of America, Deschutes Club and Wauna Lake Club.

Survivors are his wife, Haddie; a daughter, Mrs. Sally Kincaid, and seven grandchildren.



**FRANK B. WIRE**

*Frank Wire (around 1940) seated at his roltop desk in the Game Commission office in the old Oregon building. With an open door policy, he was readily accessible to all who wanted to see him, public and employees alike.*

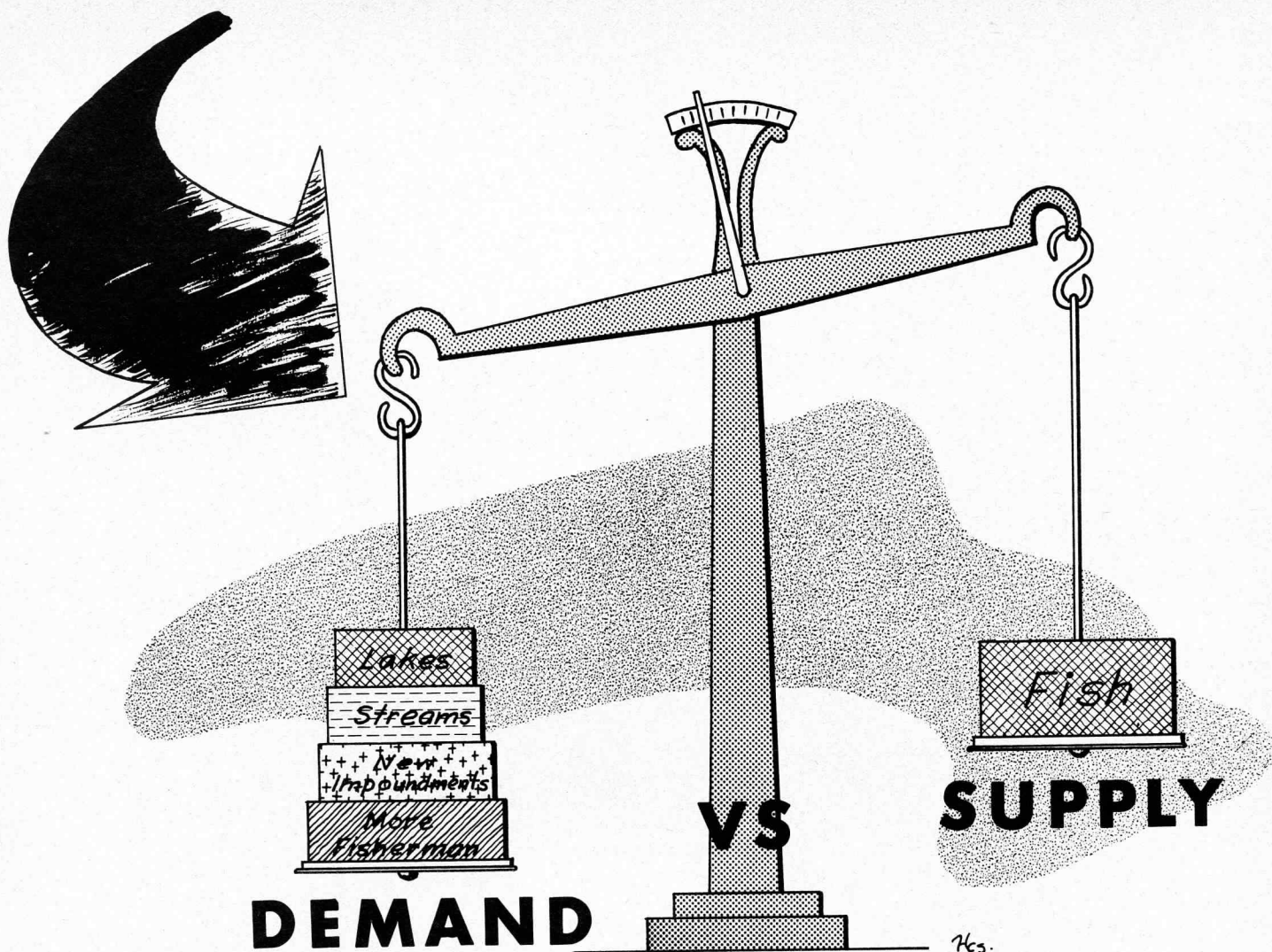
Also initiated under his supervision twenty years ago was the Game Commission Bulletin. Browsing through some of the "Supervisor's Columns" written in 1946 for the Bulletin, the editor ran across the following paragraph indicating that fall was a favorite season, so many of which he was able to enjoy in his lifetime:

"Signs of Fall . . . This is one time of year when you need neither calendar nor clock to tell what season it is. When, upon arising in the morning and going out to the yard to take a couple of deep breaths, you feel the urge to reach for your gun to see if it is cleaned and oiled and to make sure there is plenty of ammunition—then you know that it is fall and the approach of the deer season is close at hand.

"Indians and animals, hunters and fishermen, all have this same instinctive feeling. Fish, too. For instance, take the Deschutes river. Fishing is good from spring until about the first of July—then the fish hunt the deep holes and do not come out until early fall, when they really start hitting again.

"And when the bear are seen hunting up the huckleberry patches, fall is here for sure."





By C. C. Jensen, Fish Culture Supervisor

"**H**AS THE GAME COMMISSION stocked this area yet? — How many fish will be stocked in Long Lake this year?" This is the conversation often heard when a group of anglers congregate on the stream, around the campfire, or in a meeting hall. Generally, the answer, if a Game Commission representative is present, sounds like this. "Yes, the area was stocked but at a rate somewhat less than in former years."

Actually, what has happened is that the Game Commission has been required to expand fish production each year to meet demands but has received no additional funds to cover the expansion. Money that should have gone into the repair and updating of facilities and equipment has been used in most instances to buy fish food and pay for the other ever-increasing costs of fish propagation. As the number of stocking areas (primarily lakes and reservoirs) has increased, it has been necessary to decrease allocations in many areas and sometimes

delete a stream entirely to make the distribution of fish more equitable.

The fish propagation program, consisting of 15 hatcheries and numerous egg-taking stations, is one of the most expensive activities engaged in by the Game Commission. During a typical year, approximately 45 million eggs are incubated and hatched. Eggs from hatchery brood fish account for approximately 60 percent, 23 percent are eggs from fish trapped in the wild, and 17 percent are imported into the State from other sources on a trade basis. Rainbow, cutthroat, brook, and golden trout account for about 87 percent of the eggs collected within the State. Steelhead, including summer and winter varieties, make up about 7 percent while salmon contribute 6 percent. Included among the salmon are the popular kokanee which provide spectacular sport fishing in some of the lakes and reservoirs. Atlantic salmon also are included under this category. Oregon is the only state in the union which main-

tains an Atlantic salmon brood stock and rears domesticated offspring of this type.

**New reservoirs, old reservoirs, lakes, and streams** brought back into production through fish rehabilitation programs have increased the demands for fry and fingerlings, which in such situations produce angling economically. Hatchery ponds have been operated at heavier than prudent levels for fingerling production and even then the demands cannot be met.

The burden of fingerling production has fallen heaviest on the three constant temperature stations (Oak Springs, Wizard Falls, and Klamath Hatcheries) because the fish grow faster where good temperatures prevail all year. The fish liberated from these stations, because of their size, generally show a greater survival in the wild environment. They grow rapidly in the warm water and are large enough for planting in late spring to take advantage of the good growing season which starts at that time in the lakes and

(Continued on Page 4)



Trapping spawning kokanee from the Breitenbush River to provide supply of eggs for hatcheries. Kokanee are stocked primarily in lakes.

## Demand vs. Supply

(Continued from Page 3)

reservoirs. Later hatching eggs, which produce fingerling fish for fall plants, are less desirable because the fish miss the summer growing season and are forced to enter a fall and winter environment that is less adaptable for good growth.

To keep up with the increasing demands, additional ponds will have to be constructed at the stations with the most favorable water temperatures. Construction costs for ponds have risen just as they have for houses or highways, and money must be found to build them.

**The catchable trout program**, the most costly activity of the fishery program and one which the Commission has been forced to curtail in recent years, provides an excellent fishery in streams like the Willamette, McKenzie, Clackamas, Metolius, Deschutes, and many others where anglers concentrate by the thousands. Lakes where study and experience have shown that fingerling plants would not do the job; such as, Clear Lake on the upper McKenzie; coastal lakes; and Lost, Frog, and Trillium Lakes in the Mt. Hood area; are maintained primarily by legal plants. Reservoirs in the Willamette drainage system (Detroit, Cougar, Dorena, Hills Creek) and others throughout the State catering to tens of thousands of fishermen are maintained as production waters through liberation of legal-sized fish. In the near future many new reservoirs will need stocking to satisfy the fishing pressure. Additional fish will necessarily

mean additional ponds—some to be added at existing hatcheries while others will be incorporated into new stations.

Better techniques in rearing, better feeds, and additional knowledge provided through steelhead research have enabled the Game Commission to rear steelhead to the exact specifications required for good returns to the stream as mature adults. Up to 10 percent return has been realized from yearling plants while the average is about 4 percent. The steelhead program has been expanded to the maximum under existing funds and yet the anglers keep coming. Along some of the coastal streams last winter, anglers arrived at their selected fishing spots the night before to make certain that they would have an available spot from which to fish the following morning.

The summer steelhead rearing program is much more difficult to manage than the winter steelhead program. Summer steelheads are slower growing and thus need warmer water to reach that critical size which apparently is necessary for their return to the streams as adults. As a result, many of these eggs and fry are transferred into the Game Commission's warm-water stations which are already operating beyond their normal capacity. If this important fishery is to expand to streams in the Willamette Valley (McKenzie, Willamette, Clackamas, Santiam) and possibly into central and eastern Oregon, it will be necessary to construct a new hatchery facility with proper water temperatures to rear satisfactorily this tremendous game fish.

The hatchery program on spring chinook has generally been confined to the Rogue and Umpqua Rivers. Up to 200,000 salmon yearlings have been reared at the Rock Creek and Butte Falls Hatcheries each year for release into the two major streams. Continued marking and recovery programs have shown that returns to the fishery from Umpqua-released fish have averaged about 5 percent over the past few years. On the Rogue River last year, returns to the fishery totalled almost 6 percent and information concerning returns is not yet complete. Unprecedented returns like these come about only through painstaking fishery research programs which take years, people, and money to complete. As an example, spring chinook in completing their life cycle, spend one year in the hatchery ponds growing to the smolt stage. Upon release in the stream, they migrate to the ocean and spend three to four years attaining adulthood before returning to the stream of their birth. Meeting them on the banks, at counting stations, in canneries, fish houses, and in hatchery egg-taking stations are the biologists and the fish culturists who record their life history for the calculators. This is essential to developing and maintaining a successful program, but it is also expensive and all costs have risen in recent years.

**Coho salmon** have received a great deal of attention in the past few years, and because of their abundance the Game Commission has begun a new phase of coho salmon management. Eggs obtained from the Fish Commission have been in-

(Continued on Page 5)



Nimble-fingered women marking fish prior to release. Cooperation of anglers is sought in reporting to the Game Commission any marked fish caught.



# Demand vs. Supply

(Continued from Page 4)

cubated and hatched in four of the coastal hatcheries. The resulting fingerlings are presently being planted in selected Cascade and coastal lakes. In the Cascade lakes they will fill a niche in the lake management program and will provide the angler with a silvery fighter of superb quality. For the coastal lakes, the coho may prove an exceptional game fish. On those lakes which have access to the sea, coho will probably move out as yearlings and return after two summers in the ocean.

Two years ago the Game Commission dedicated the first warm-water fish production center in Oregon. Bass, crappie, catfish, bluegill, and many other suitable species will eventually be reared at this station. As the number of public fishing ponds and small lakes are increased, so will the demand for warm-water species multiply.

As a possible supplement to the production of hatchery fish, the Game Commission has initiated a rearing pond program. Its purpose is to determine methods for rearing salmon and steelhead smolts under natural pond conditions. Thus far, Medco Pond (70 acres) on the Rogue, Whistlers Bend (30 acres) and Hemlock Meadows (64 acres) on the Umpqua, and Lint Slough (80 acres) on Alsea Bay have been brought into operation.

Medco Pond has primarily been used for experimental rearing of summer steelhead for the Umpqua and Rogue Rivers. Whistlers Bend has been planted with spring chinook for several years. Hemlock Meadows was stocked with summer steelhead in 1964 and again in 1965. Lint Slough, a brackish backwater lagoon, has been stocked with summer and winter steelhead, coho salmon, fall chinook, and Atlantic salmon.

Success of the rearing ponds is difficult to measure because changes in operation are constantly being carried out as additional findings are made. Summer steelhead liberated from Medco Pond have shown surprisingly well in the Rogue River. Coho reared in Lint Slough for 90 days made a tremendous growth. Upon release in the spring, the fish migrated to the ocean and returned as adult fish the following winter—one year ahead of schedule. If impoundment rearing proves successful and practical, it will be necessary to increase our salmon and steelhead egg-takes to meet the demand for additional eggs. In that case, it might also be advisable to acquire and construct new rearing ponds—a costly but reward-

ing venture for the angler. If they do not prove practical, additional hatchery production will be necessary.

From 1961 through early 1964, major replacements (pipelines, intakes, residences, cold storage, brood ponds) were made at approximately ten hatcheries. Since 1964 no major capital improvements have been made in spite of need that is critical at some stations. There has just not been money available over operating costs.

Two important changes in fish cultural practices starting in 1957-58 were largely responsible for reducing the cost per pound of rearing fish. Probably the most important is the advent of commercial-type dry feeds for fish feeding. The second most important is automation.

Dry feeds of marginal quality were available on the market as early as 1955, but the Game Commission did not start experimenting with pelleted foods until 1958. Today, dry and frozen pelleted foods have proven to be a huge success. No longer does the hatchery crew have to spend one-third of its time in the feed room grinding liver, horse meat, tripe, and fish products in preparation of the daily ration. They also are no longer faced with the constant unloading and storage of incoming truckloads of frozen animal and fish products—some packages weighing up to 140 pounds. Pellets from commercial manufacturers come packaged ready-to-eat in easy-to-handle 50 pound bags. The pellets are nutritionally balanced and are readily accepted by the trout, steelhead, and salmon.

Dry pellets have readily adapted to automatic feeding. Pellet feeders with a

capacity of 100 pounds of pellets each are presently spreading the feed over the surface of hatchery ponds in 14 of the Game Commission's 15 hatcheries. Fry feeders are utilized in the troughs and small nursery ponds at stations where small fish are started. The feeders are controlled by panels of mechanical wizardry which allow the operator to set the time and intervals of feeding for each group of fish. The manpower saved in this operation has been tremendous. This manpower at the hatchery has been utilized to improve and expand production, to help in the liberation of fish, and to carry on other related jobs in fish management.

Other automatic devices, designed to ultimately improve and cut down on the cost of hatchery operations, are constantly being studied. Only the lack of funds prevents further development along this worthy line of endeavor.

Because areas now being stocked are creating a heavy drain on the already overtaxed hatchery facilities, new facilities must be developed to keep up with the increasing demand for fish. Maintenance of top production under austerity financing has reached the breaking point of the physical facilities. If the present level of production is to be maintained, much less increased, funds must be forthcoming to do the job.

## REPORT YOUR MARKED FISH

*This scene on a popular fishing lake typifies the increasing stress on angling waters throughout the state.*



# The Willamette Basin Review

By William E. Pitney, Chief, Basin Investigations Section

"Hey, Bill! How do we build a dam to help your fish?"

"Huh! What?"

"We've got to dam up Stony Creek to stop floods and store water for irrigation. We know there are trout and salmon in it. How can we build the project to help the fish rather than hurt them?"

"Oh! Well now, you've got to—ah—er—well, you—gosh, Hank, I don't know."

"WHAT? — Golly, man, you've been yelling for years about our ruining everything. Now we want to build a project that will help fish and game too, but you've got to tell us how to do it."

"Okay—I'll tell you, but give me a little time. This is going to take some thought."

It CERTAINLY will! And it will take a lot of study, too.

This conversation could very well have taken place about any one of a number of projects over the last six or eight years. Fish and wildlife management people were not too well prepared to answer all the questions that were asked. Neither were the people who were interested in other types of water-oriented recreation; nor a lot of others, including those associated with industry, agriculture, and other aspects of land management. Thus an awareness of inadequate planning developed which eventually led to studies like the comprehensive WILLAMETTE BASIN REVIEW.

The Corps of Engineers started major development of Willamette water resources in about 1940, principally as a means to control periodic floods. Bureau of Reclamation planning followed closely and both are thinking in terms of "bigger and better" projects for the future. Private and public utilities have generating, water storage, or diversion structures to provide for their residents or customers. Some of these pre-date federal developments by many years.

Emphasis to provide outdoor recreation, including specific features to help increase game animals and fish, generally has occurred only within the current decade. Before that a number of incidental benefits occurred here and there, but they came to pass by the grace of God rather than from any actual planning. Even within the past several years of specific planning for one or another of the outdoor recreation forms has been pretty much a hit-and-miss situation.

Many people from a number of differ-

ent governmental agencies—local, state, and federal—and from private industry recognized there were inadequacies in project planning. They recognized, too, this lack pertained not only to recreation, fish and wildlife, but to a lesser degree was true also for flood control, irrigation, power, navigation, industrial and municipal water supplies, and other water uses. The authorization for some water projects claimed they were multipurpose, but the evolution of their planning did not always make them so in the true sense of the word.

How were these discrepancies to be overcome? Or, in other words, "Hey, Bill! How do we build a dam to help your fish?"

In 1961 Congress authorized the Corps of Engineers to make a comprehensive study of all water and related land resource needs in the Willamette River Basin. Under other authorizations dams, reservoirs, and diversions had been or were being planned and constructed for specific or multipurpose reasons. The 1961 Act called for a review of all purposes—flood control, navigation, irrigation, power generation, domestic, municipal and industrial water supplies, water quality control, erosion and siltation control, recreation, and FISH AND WILDLIFE BENEFITS.

Similar studies are being or will be developed for 32 other major river basins or regions throughout the United States, but the Willamette Basin is one of the first to embark on a Type II study. This means it is sufficiently detailed that the final report can be used to justify congressional authorization of future actions and appropriations.

No single agency had the resources nor the technical ability to do the total job. Many agencies and organizations at the federal, state, county, and municipal levels have general or specific responsibilities which bear on the factors involved. Some 37 are actively cooperating to provide for a successful Willamette Basin study.

The Columbia Basin Inter-Agency Committee was assigned the task of coordinating and overseeing the general aspects of this review. Specifics of the overall study are directed by a Task Force, which is chairmanned by the representative for the State of Oregon. Federal agencies represented are the Departments of Agriculture; Army; Interior;

Commerce; Labor; Health, Education and Welfare; and the Federal Power Commission. Under this administrative organization labors a diversity of committees including that dealing with fish and wildlife resources.

It is the latter with which we are principally concerned in this writing. To coordinate all study activities of the several agencies involved, the U. S. Fish and Wildlife Service has assigned a full-time biologist and also designated other regular employees to the study. Since the entire Willamette Basin lies within the State of Oregon, the Fish Commission of Oregon and the Oregon State Game Commission must bear the brunt of developing the biological data required by the review.

The Game Commission assumed the responsibility to assemble these data and prepare a report of the present status and use of the fish and wildlife resources. This section of the overall report has just been completed.

Much remains to be done. What are the future needs of the resources and the desires of the people, especially of the generations yet to be born? How many hunters and anglers will be in the forests and fields and on the streams in the year 2020? What kind and how much food and cover will the game animals and birds need to satisfy those demands? How much water will any given stream need to produce adequate numbers of fish? How will existing and future lakes and reservoirs influence the greater public demands for outdoor recreation? All these and many other questions should be answered before a truly comprehensive report is pro-

(Continued on Page 8)

*Basin investigations crew members check recording thermometer used to determine air and water temperatures of a stream.*





## HUNTING SAFETY FILM AVAILABLE AT LOW COST

The 16 mm, sound, color film, "Hunting Safety," that has proved to be such a valuable asset in firearm safety instruction, is now available at \$75 a print from the Oregon State Game Commission. A preview print may be obtained.

This interesting twenty-two minute film, originally produced in a cooperative effort by the game departments of Idaho, Oregon and Washington, tells the story of a family enjoying a big game and upland bird hunt. The firearm safety theme is subtly woven through the entire film.

## KELLY BUTTE RANGE OPEN

Multnomah County Sheriffs' Reserve, sponsor of the shooting range at Kelly Butte, S.E. 95th & Powell Boulevard, announces the range is now open to the public each Saturday and Sunday from 12 noon to 6 p.m. for pistol and rifle practice. Receipts from the 50 cent fee per gun will be used for range improvement.

## LAND MAMMALS CHART

For the small sum of fifty cents you may order a wall chart showing in color 13 major land mammals found or previously present in Oregon. A brief life history, identification features and general distribution caption each color print. A map shows the areas of distribution. Send your order to the Game Commission.

## Gene Morton Honored

K. E. "Gene" Morton, superintendent of the Game Commission's Wizard Falls Hatchery, last month received the 1966 award for "Conservationist of the Year" from the South Riverside Kiwanis Club of Portland.

At the Wizard Falls station since 1948, Morton has worked out many new techniques in hatchery operations. These include development of the famous Morton fish grader, now used by many other states; the Morton fish combine; and improved feeding equipment. His work with Atlantic salmon has resulted in the Wizard Falls station being the only hatchery producing Atlantic salmon eggs from its own brood stock.

Judges selecting Morton as the outstanding biologist in Oregon in fish and wildlife conservation were: Tom McAllister, outdoor editor for the Oregon Journal; Dr. Thomas Scott, head of the Department of Fisheries and Wildlife at Oregon State University; and George Eicher, fishery resource analyst for Portland General Electric Company.

GAME BULLETIN

# Application Deadlines Near

Copies of the synopsis of big game regulations set by the Game Commission at its May meeting are now available at all license agencies. Because of some changes in seasons and approaching deadlines for filing applications for controlled tags and permits, hunters should be consulting the new regulations.

The black-tailed buck deer season, October 1-30, is a week longer than that for mule deer, October 1-23. Unit hunts for both species start on October 15. The Rocky Mountain elk season was set for October 29 - November 27, with the unit permit hunts starting November 12. The Roosevelt elk season this year is November 12-27, starting two weeks later than the Rocky Mountain elk season.

Applications for controlled tags or permits must be filed before deadline dates shown in the table below. Applications for controlled season tags may be

obtained from license agencies and the \$5 fee for antelope or deer tags must be submitted with the application. The fee of \$10 for goat or sheep tags will be collected from successful applicants and should not be sent in with the application.

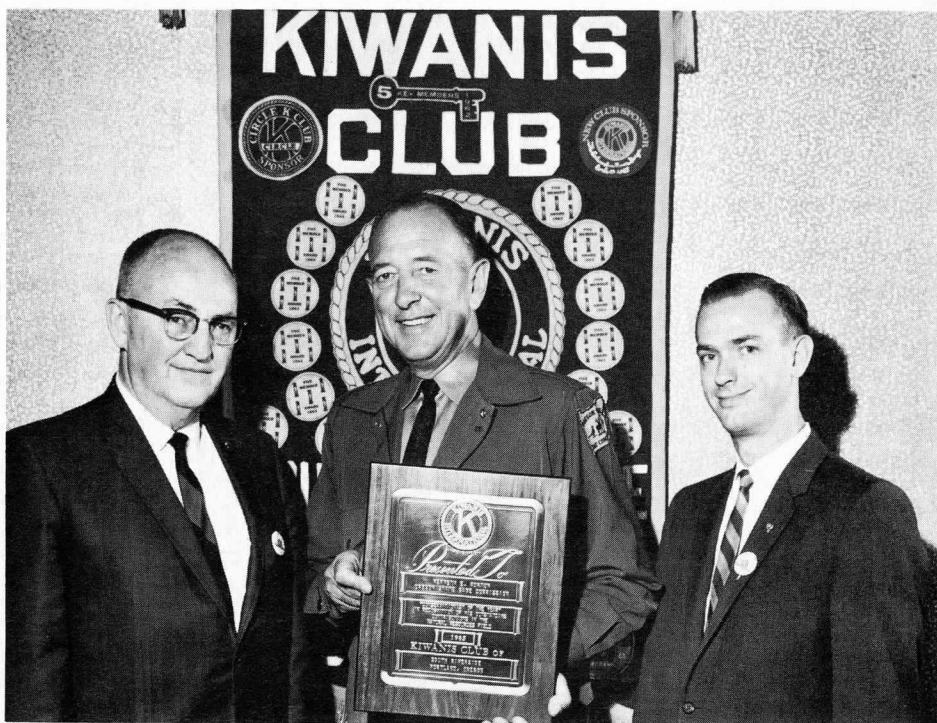
Unit permit applications are issued with the general deer or elk tags.

Party applications of not to exceed two for antelope or elk, and not to exceed four for deer, are permissible.

Only resident licensed hunters may apply for controlled tags or permits. Persons receiving an antelope tag after 1961 are not eligible to apply this year. Those receiving an antlerless elk permit after 1962 are ineligible to apply for a 1966 permit. No person is eligible to receive more than one controlled season deer tag in 1966. No person may receive more than one sheep or goat tag in a lifetime.

## CLOSING AND DRAWING DATES FOR 1966 TAGS AND PERMITS

Kind of Tag or Permit	Application Closing Date	Drawing Date
Antelope, Sheep, Goat and Controlled Season Deer Tags	5 p.m. July 20	10 a.m. July 26
Unit Deer Permits	5 p.m. August 3	10 a.m. August 9
Elk Permits	5 p.m. August 23	10 a.m. August 30



Gene Morton, superintendent of the Wizard Falls hatchery, shows off plaque indicating his selection by the South Riverside Kiwanis Club as "Conservationist of the Year." At the left is Les Adams, Club president. Third man is Dave Shipley, in charge of the annual award program as chairman of the Agricultural and Conservation Committee.



Measuring velocity of stream enables field biologists to compute stream flow.

## The Willamette Basin Review

(Continued from Page 6)

duced at the completion of the study in 1969.

What kind of information is needed and how can it be used to answer these questions? First, the Game Commission called on the data and background experiences that had been gathered by the four resident game management biologists and their three fishery counterparts stationed within the Willamette Valley. Other staff technicians were detailed to fit these pieces together as well as to search all available literature for other needed data. People were seasonally employed to make physical habitat surveys.

The Game Commission already had been developing minimum flow requirement data for most of the streams throughout the watershed. Where needed, biologists of the Oregon Fish Commission and the U. S. Fish and Wildlife Service joined this department to make special surveys to determine population levels, total production potentials, factors limiting production, contribution of the anadromous fish to the various sport and commercial fisheries, hunter distribution and success, projections of future demands, and economic evaluations. One special study, contracted to the Statistics Department at Oregon State University,

was to determine total angler use and their preferences.

As the fish and wildlife work progresses, so does that of the other committees. Some are developing needed data on all forms of outdoor recreation. Others are interested in the future of industrial developments. Flood control, hydroelectric power needs and potentials, agriculture and irrigation requirements, timber resources and forest products, river navigation, population and economic projections, and water quality are important pieces of the whole picture. All have a place when planning for the future; hence, all must be adequately considered when developing the basic recommendations for the future of the Willamette Valley's land and water resources.

Some of the things that have been considered by the fish and wildlife technicians include the examination of some 540 potential dam and reservoir sites located throughout the drainage. Preliminary examinations, and in some cases more detailed studies, indicate it may be possible to construct a dam at any one of these points. Economics and geology will preclude serious consideration of some; but to prepare for any eventuality, the wildlife management agencies must consider all as being potential. Our evaluations need to show if migratory fish would be blocked, if vital fish spawning and rearing areas might be lost or their potential reduced, if important big game range and upland game habitat would be affected, if the reservoirs may provide additional angling areas for future needs, and if the stored waters could increase flow or improve quality which may now be restricting production. The other committees are making similar reviews to determine if a dam at one or another of these sites would be beneficial or damaging to their interests. When this has been done from all viewpoints, a much clearer picture will exist as to which should be given serious consideration for future development and which should be dismissed from further thought.

Industrial expansion within the Willamette Valley will be great over the next fifty years. Much of this will be for the purpose of processing forest products. Others will be in the nature of handling or processing the diversified agricultural produce. Heavy industry will develop in many forms. All of these will require changes in the use of land and water.

Land will be required as sites for factories, canneries, warehouses, and other facilities. Homesites, market places, and highways for the greatly increased population will change many areas.

Agriculture undoubtedly will be restricted to a reduced portion of the valley land areas; consequently farmers must intensify their efforts on those that remain. Many farms not now irrigated or drained will be in the future to increase production. The use of fertilizers and other chemicals will be accelerated, which could affect water pollution.

All of these things will have an impact upon fish and wildlife habitat and the animal populations. Not only will there be more people demanding the right to hunt and fish but most of them will have more time and money to spend on these pursuits. In effect, this will tend to pyramid the demands for opportunities to participate in these forms of outdoor recreation. Wildlife management, of course, will have to be intensified and expanded to keep pace.

The Game Commission and other fish and wildlife agencies have given much time and effort to the Willamette Basin Review over the past four years. Much additional effort will be needed to complete the work. These groups look upon this study as an opportunity to give greater consideration to the problems associated with management in face of increased emphasis on water and land developments. From the total study it should be possible to predict many of the problems which will arise in the future rather than having to wait until they happen before any real effort can be devoted to finding solutions.

With answers to the questions of what land and water will be available and what can be done with it, a general course for future fish and game management can be charted with better reliability. This would include definite features as a part of water development projects for the benefit of fish and game. It might even include the addition of features in existing projects. It definitely would include means to lesson damages to fish and game by future construction. With the understanding which will go along with this information, we believe that in the future we should be able to answer our opening questions with—

"About that Stony Creek project, Hank, here is what we want you to do..."

### Oregon State Game Commission Bulletin

1634 S.W. ALDER STREET  
P.O. BOX 3503  
PORTLAND, OREGON 97208

