

observed in a relatively restricted area on drifts of vegetation and in debris of houses that had broken apart, 95 percent were gallinules and rails.

A large percentage of the alligators that were on the refuge were swept along with the current and a few were found dead after the storm. One seven foot 'gator was killed in the kitchen of a house the next day. Many of the alligators that were moved off the refuge, thus losing its protection, were killed by alligator hunters. Although first indications were that the alligators suffered comparable losses to the other wildlife, it now appears that their losses were not excessive.

The after effects of the storm can probably best be described by pointing out that the refuge will be set back about two years in the planned development and management of the area. There will undoubtedly be a big decrease in the number of wintering waterfowl on the refuge, however, at the present time there is an abundance of blue winged teal and pintails. It is evident that the trapping success will be greatly decreased for the next few years until populations of muskrat and nutria build back up.

The future plans are to develop this large tract of marshland into an ideal wintering area for waterfowl and to produce as much other game and fur-bearing animals as possible, plus carry on a full load of marsh research. Plans have been made to construct low level wiers in most of the inlets within the next year. This will eliminate the daily fluctuation of the water level and reduce the salinity of the natural marsh ponds, thus increasing the productivity of these ponds for waterfowl and other forms of animal life.

### SUMMARY

Rockefeller Refuge, an 84,000-acre tract of marshland, was in the direct path of Hurricane "Audrey" and suffered an unknown amount of monetary damage, a loss of well over half of its game population, and one employee, Mr. D. A. Bertrand, his wife, and three-year-old grandson.

The trapping activity on the refuge will be reduced until the population of nutria build back up.

Most of the levees were damaged to some extent, however, where there was any vegetative cover on the levees they did not wash excessively. The most satisfactory levee cover in this area appears to be bermuda grass or St. Augustine grass.

Water control structures must be functional in design and compatible in utility with the surrounding marsh environs.

The survival of the two buildings constructed on pilings indicates that future houses should be constructed in a similar manner in this exposed coastal section of Louisiana.

## COTURNIX OR JAPANESE QUAIL INVESTIGATIONS IN THE UNITED STATES (A Progress Report—October, 1957)

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The name of a bird, the Coturnix or Japanese quail (*Coturnix coturnix japonica*)\*, was of little concern to workers in the wildlife field less than three years ago. Today the name Coturnix signifies one of the most interesting programs ever to sway the field of wildlife management since early in the century.

This paper is a partial coverage of some 1957 work that is in progress in several states working with the Coturnix quail. It covers some of the present

\* Some vernacular names of the Japanese or Coturnix quail are: Common quail; Stubble quail; Eastern Common quail; Asiatic quail; Japanese grey quail; Red-throated quail; Japanese migratory quail; King quail; Japanese King quail.

thinking on the Coturnix quail work, and it provides an idea of the scope of Coturnix quail releases up to mid-summer of 1957.

At this time, I shall not discuss the biology of the bird with which we are working, in either its native range or here in the United States. A 44-page progress report, covering the literature and many topics of interest on the Coturnix's biology was presented at the Twenty-Second North American Wildlife Conference. Copies of this paper can still be secured; it will also be available in the Conference Transactions.

A thorough discussion of the results of field experiments to date would be premature. We cannot harvest the wheat until the grain is sown and ripens; a similar case exists in Coturnix research today. While many interesting facts concerning the biology of the birds are now known, much remains to be learned from the basic research projects that are now in progress. Especially will we learn much from the many bird releases that have been made during the months of 1957.

In April, 1955, the Missouri Conservation Commission, as part of its investigation on the utilization of foreign upland game species, began studies of the Japanese quail as a bird that might fit well into historical Bobwhite range where Bobwhite habitat had deteriorated. Starting with 70 pairs of the birds, we had 3,600 quail available in the spring of 1956. By that time, considerable interest in the project had been shown by other states located in the range of the Bobwhite quail. This interest resulted in several states securing, from Missouri, starting stocks of Coturnix for the avowed purpose of studying the birds experimentally, in an effort to see if they would be desirable as a possible addition to the gamebird fauna and to determine if the birds were adaptable to establishment in the United States, or specifically in any state's boundaries.

Of the states showing particular interest in working with Coturnix quail, the following 15 states located in the Southeast and Midwest have worked to some degree with Missouri in the exchange of limited information, they are: Alabama, Arkansas, Georgia, Illinois, Indiana, Kentucky, Nebraska, Nevada, New Hampshire, North Carolina, Ohio, Oklahoma, Tennessee, Texas and Virginia.

Not all of these states are doing a great deal of work with the birds, but a good many are engaged in rather extensive release programs. Some states not listed here, for example Iowa, are caring for a few Coturnix but, rather than enter into an intensive program, they are observing the progress of other states more deeply involved in Coturnix investigations. Undoubtedly much time, effort and money could have been saved if fewer states had been engaged in Coturnix quail experimentation at this early stage. A very few states could secure the preliminary answers on the species and should results prove favorable, encourage other states to come in on stocking phases of the program. It is too late for this now, however. Too many states jumped in just because it seemed the popular thing to do.

At this time, at least 16 states are engaged in Coturnix quail programs, where after being aware of the bird's existence for but two or three years, they have released at least 23,000 birds in 1956, and in excess of 207,000 birds in 1957. The latter figure is based upon minimum figures from only 13 of the 16 states canvassed. Think of it!—over 207,000 Coturnix quail were produced and released. Some of these were through channels of legitimate government research programs. Many were through public relations handouts to sportsmen of eggs and birds, some banded, some unbanded, in small releases of five and ten pairs to releases of over 7,000 birds per study unit. In this widespread activity, the known and unknown biological characteristics of the birds have been so exaggerated and glorified that sportsmen of all descriptions have joined to release additional hundreds of banded and unbanded quail and to help gather information on "our new" gamebird. This emergence of the sportsmen as a research investigator in many states occurred only after much misleading and exaggerated information had been broadcast. The Coturnix had been presented as most favorable for establishment—all that was needed was sufficient birds to get the species going. Unfortunately these utterances, in many cases, originated from our own professional field. The whole misconception started through poorly presented facts. Undoubtedly some misleading information was public-relations fodder to let the licensed buyer and the pressure groups know that

the old department was really going to town with something red-hot for them. I do not exaggerate; my files are well documented with releases and writings from all levels of game administration on the bright future that is held out for the Coturnix quail, a species of which we were practically unaware until three years ago.

Of 16 states providing some degree of information on their Coturnix work, practically all stated that in 1958 they would be making releases of sizes similar to those in 1957 or larger. Some states indicated that after 1958 releases would cease, should the field results of releases be discouraging.

In spite of the critical approach I have taken up to this point, there are aspects of the Coturnix work in some states that are most encouraging. Eight states working with the Coturnix have made definite attempts to control the release of experimental birds by making only game commission releases on special study areas where trained biologists can direct the work and where follow-up work is possible. It is unfortunate, however, that uncontrolled, unbanded and often unrecorded releases made by enthusiastic sportsmen place in jeopardy the interpretation of much data resulting from otherwise well-directed work and documented releases.

To date, several states have exchanged study programs and ideas with us in Missouri. These work-plans show that much basic information on the biology and behavior of the Coturnix in this country will be learned in the next three years. During the last two years much has been learned on the important subjects of drift, movements, migration, nesting, and production. A wealth of information on these subjects, especially on migration and staying qualities of the birds, should be determined in the year ahead. With over 200,000 birds released in 1957, we could learn much that might decide the future status of the Coturnix work in several game departments. This future status of the Coturnix work rests mainly upon the migration and movements of the birds in the next six months and the presence and absence of birds on release areas next spring.

We are unfortunate in having a highly migratory species with which to work. That the migrating tendencies prevail in this country's releases, has been shown only too well by returns from releases made in 1956. We have knowledge of minimal releases of 23,000 birds in 1956, from which, at the time of this writing, I have record of 197 returns; 148 of these returns came from the release areas where the birds were harvested. The remaining 49 returns from the 23,000 birds showed quite conclusively that the majority of the migrants moved southward considerable distances, although records show that the birds actually moved near and far in every direction.

Our Missouri studies of 3,600 birds released during the fall of 1956 have resulted in 13 band returns to date. All were recorded two or three months following liberation or after the Missouri hunting season in November. Five bands were recovered out of the state, in Texas, Mississippi, Kansas, Missouri-Illinois border and central Arkansas. Eight bands were recovered within 60 miles of release points, but generally in a southerly direction from the area of liberation. Our longest movement on record was from northern Missouri to Beaumont, Texas. We are looking forward to banding data from our 1957 releases of 20,148 birds. Returns from this year's total releases of over 207,000 Coturnix in this country may very well foretell the success or failure of this exotic species in the United States.

In Missouri, we are now engaged in our third year of work on the Coturnix. During 1955 and 1956 we concentrated on hatchery production techniques of the birds, along with limited release of birds in the fall of 1956. During 1957 we have released 20,148 banded birds in six study localities. In the final release phase of our present investigation, approximately 10,000 adult birds will be liberated in the spring of 1958. Future releases hinge upon the outcome of our investigation program. For several years following the 1958 release, we will be concentrating on field investigation of the birds to determine their presence or absence, abundance, dispersal and production.

We, like other states now working with the birds, have our release experiments set up, our pen studies on behavior and production going, and our field studies on observation and inventory technique in operation. Several small items of basic

interest have been learned; the bulk of information remains to be harvested in the months ahead. At this time it would be premature and misleading to draw too many conclusions from 1957 data. I am sure that all working with the bird must have similar feelings.

However, some of our thinking and limited findings on Missouri's 1957 work might be of interest to many of you.

Our field pen experiments on the reproductive biology of the Coturnix have led us to believe that the female quail, with a well-hidden nest, must be able to get away from the male or she will never be successful in bringing off a clutch; the male just will not leave her alone. In 16 field pens, measuring from 12 by 12 to 12 by 15 feet square and having good cover, the hens made as high as four nests and clutches per pen, but in no case were they able to complete incubation. The cock wouldn't permit it. In our three field pens, measuring more than 20 by 30 feet, hens in all three sections were successful in bringing off their first clutch. More light remains to be shed on this subject.

At this writing (October 15, 1957), field data on the 1957 spring releases of both 9-month-old birds and 10-week-old birds of the year show that both age groups have produced young on the release areas. Reports on production by young-of-the-year, the 10-week-old releases, are just as favorable as the production from the older birds. Data at this time are far from complete.

We have received comments from other states on the difficulty of observing birds and securing field data. You are not alone in this. An item in our work is the difficulty of field observation on the Coturnix, once he has settled down on the release areas. This has been doubly difficult in Missouri, as we now have a drouth aftermath of extremely heavy and dense cover throughout the State. Much of our field findings will have to come from fall and winter studies, through dog work and harvest of birds on and around our study areas.

Up to now, and during the follow-up years of our investigation, it has been and will be unlawful to import or release Coturnix quail in the State of Missouri. By mid-1958 we will have invested over \$96,760.00 in Coturnix investigation, with several more thousand dollars obligated for follow-up on our experiments.

Our aims in this work are today the same as they were when we banded the first bird for release—that of determining the desirability and possibility of having the Coturnix quail as a naturalized addition to our upland game fauna. At no time have we endeavored to make wild, large-scale establishments of the bird, although the nature of our mass releases might lead the uninformed in such matters to believe just this.

Our early research on the behavior of the migratory strains of Coturnix quail and their wide dispersal and migratory pattern indicated that substantial releases of the birds would be necessary to secure indices to the answers that we were seeking. Only through fairly heavily stocked releases do we believe that the answers can be secured. After we are satisfied as to the actual status that the Coturnix may achieve in Missouri, we may either close or continue our Coturnix project. Should we find that the Coturnix is the bird of tomorrow, as he has been so prematurely described, we feel that the sportsman will lend a helping hand in getting the bird established. This will be a phase of exotic gamebird work for which he (the sportsman) is best qualified—and not one of basic research, for which he is most definitely *not* qualified by training or experience. By recognizing this status of the hunters of our State, we feel that we are operating our Coturnix project properly and honestly. We have undoubtedly, if we are to judge by activities of some other few states, saved our department and our sportsmen a goodly sum of time and money.

The full study of the Coturnix quail work in this decade is far from written. If the final outcome is a failure, we can be sure that it will go down in sporting annals as a colossal one. On the other hand, should that slim possibility of permanent establishment become a reality, we will be able to thank our lucky stars for the chips falling our way, for memories of ignorance, errors, and blunders grow dim in the glory of success.

Let's all endeavor to improve and strengthen our present Coturnix work along basically sound lines and try to dwarf the errors that we have committed to date in the name of sound game management. Here's hoping that, despite our shortcomings, we can write finis to the Coturnix work of the 50's in terms of pleasing success.