

REPORT ON THE LOWER SNAKE WILDLIFE

MITIGATION PROPOSALS

June 1, 1974

Prepared By

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APPENDIX C

I. INTRODUCTION

In 1966, the Corps of Engineers, Walla Walla District requested the Washington Department of Game, and the Bureau of Sport Fisheries and Wildlife, USDI, to submit a report covering the impact (on wildlife) of all four dams (on the Lower Snake) and necessary compensation measures as a unit, which (they) could submit to Congress for approval and funding.

The first report was received from the BSF&W in November 1972. A follow-up report was prepared by the Corps and revised in April 1973, incorporating supplemental data from the fish and wildlife agencies. The Washington office of the Corps later recommended that the Walla Walla District retain consultants to

- a.) review the recommendations and other available data,
- b.) furnish a separate report evaluating the adequacy and feasibility of the proposals,
- c.) and to either concur in the recommendations,
- d.) or to present other means by which compensation of losses can be obtained.

I was contacted on 29 October 1973 regarding accepting the position as consultant and subsequently agreed. Due to the nature of the assignment and the short time schedule for report preparation, I asked two additional consultants to join me--Dr. Richard Shannon, Resource Economist, University of Montana, and James Posewitz, Administrator, Environment and Information Division, Montana Department of Fish and Game, Helena, Montana.

We visited the Walla Walla office of the Corps where we interviewed personnel, examined files and hearing transcripts, and on two occasions flew the length of the Lower Snake River, Union Flat Creek, Tucannon,

Touchet and Palouse Rivers. In addition, we visited Washington Department of Game District Offices in Walla Walla and Yakima and the State offices in Olympia where we interviewed the State Game Director and his personnel. They gave us full access to files and records and were extremely helpful in response to our questions. An extensive search of the literature relating to the wildlife and related land use practices of Southeastern Washington was made.

These materials were read to gain insight into the amount of research that has already been accomplished and to look for clues to support or deny statements made by the fish and wildlife agencies in their mitigation proposals.

In addition, we discussed key-points with resource specialists in Idaho and Montana. This preliminary report then, is based on our professional judgment, tempered by what we have read, heard, and seen. Our final report on June 30, 1974, will be a revision of this draft incorporating corrections and additions.

II. FAILURE OF THE WILDLIFE COORDINATION ACT

It has been stated that the goal of wildlife agencies is "...to maintain the productivity of ecologic systems at the highest level possible or consonant with other biological objectives; to retain the opportunity to manipulate habitats for the benefit of particular species; and to provide suitable (not always maximum) access to wildlife areas for harvest or other uses." We manage wildlife to prevent species extinction, to maintain productive ecosystems and to encourage and regulate beneficial uses of wildlife.

The specific responsibility of the Department of Game of the State of Washington is to preserve, protect, maintain, and enhance the wildlife resource for the people through regulations (enforcement) and continuing programs to provide maximum amounts of wildlife-oriented recreation for the people of the state. But state agencies seldom have the necessary authority to have full control (i.e., direct ownership) of land that may be needed for proper management of a wildlife species.

The commonest arrangement is through mutual cooperation. State fish and game agencies can become partners in negotiations (i.e., inter-agency agreements, examine permits, NEPA).

Most state constitutions fail to define clear-cut objectives for wildlife programs--vague, broad charges but with no implied veto power over all conflicting land uses. Federal agencies are also charged with responsibilities which may conflict with state game departments (especially in land use matters--i.e.--flood control, drainage, chemical spraying, prospecting for minerals in wilderness areas).

When direct conflicts arise in land use practices or priority allocations, wildlife generally loses. The wildlife agency is put in the role of sole defender of wildlife vs people and practices. They are called upon to defend water quality, scenic beauty, openspace recreation, often in the absence of a legislative mandate.

When conflicts in land use cannot be resolved and no provisions for priorities are established by statute, then they must be resolved through technologic or political adjustments. Mitigation is such an adjustment.

It should come as no surprise, however, to professional wildlife managers to learn that even with funds recently made available through mitigation processes that wildlife is still on the losing end. A recent report by the General Accounting Office states that the federal wildlife agencies in Interior and Commerce have either not known about the continuing losses of wildlife habitat or have done nothing to halt them. Lack of coordination of efforts, lax administration, cursory office studies, inadequate reviews and absence of recommendations were some of the charges brought by GAO against the agencies. They, in turn, usually blame the deficiencies on inadequate funding and staffing, a charge rebuffed by GAO.

This report is not the place to review the failure of the Coordination Act in its various revisions but rather to state the fact of its failure so as to clarify some of the problems to which we are addressing our efforts. There is simply not enough flexibility in the process of buying lands and easements, funding developments, conducting before and after studies and coordinating efforts of the state with two or more

federal agencies charged with multiple responsibilities. Rapid turn-over in federal personnel militates against the continuous efforts needed to manage resources properly. Contract researchers also lack the familiarity with the area that comes with continuous effort. State Game Departments usually lack the funds needed to do the extensive surveys before and after inundation at each new site. They do, however, possess the personnel or administrative vehicle for handling added staff on such assignments. We hereby recommend that efforts be made to assign study funds to the state agency as a contractor and that more trust be placed in the findings resulting from such efforts.

III. MITIGATION PROPOSALS

A review of correspondence, reports, and statements made during interviews leads to several generalizations on areas of agreement and of disagreement regarding the suggested mitigation proposals.

The fish and wildlife agencies have consistently stressed the losses of wildlife that have occurred as the result of the construction of four dams along the lower Snake River. They have pointed out the resulting loss of wildlife and of wildlife oriented recreational opportunities, whether it be by hunters or by non-consumptive users of the area--hikers, boaters, bird watchers, etc. They also feel that these loss estimates have been generally conservative.

The Corps of Engineers, while admitting the fact of loss, seemed disturbed by the generalized statements of destruction and wanted these losses "quantified and described in greater detail." The Corps felt that very little data had been presented to them for evaluation by their personnel. They would like to know if the estimates are reasonable and if the proposed solutions are practical responses.

In the brief period that we worked on this assignment it was obvious that a) far more material on fish and wildlife existed than was made available to the Corps, and b) that biological data collections can never match those generated by engineering activities due to the difference in the nature of the problems and the available methodology to determine best estimates. Two-party exchanges seldom function freely and efficiently and we feel that many of the delays and complications are inherent in the system as presently operated with split responsibilities and conflicting mandates.

III. (A.) STATEMENT OF ESTIMATES OF LOSSES,
AND EVALUATION:

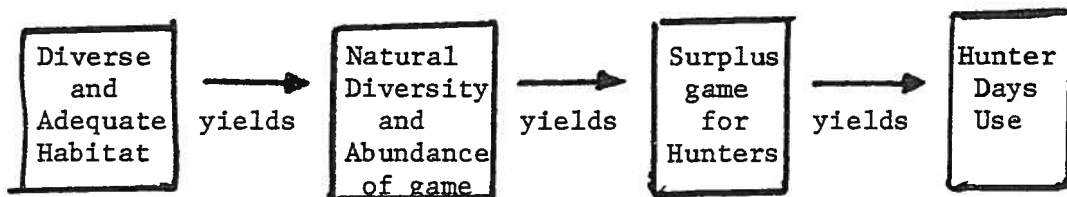
Losses of wildlife occur continuously in natural environments but if natality exceeds mortality, populations will increase at a variable rate. Because of the secretiveness and mobility of animals dispersed over space and time, and due to the lack of funds and trained personnel to do more intensive work, population data frequently is held suspect by the public who view game avocationally. The findings are also challenged by other scientists and engineers who deal with more easily quantifiable subject matter. In the absence of data prior to inundation it is very difficult to extrapolate from post-inundation data with any degree of accuracy. But if it must be done, as has been requested in the mitigation reports, then this becomes the primary responsibility of the fish and wildlife agencies.

Washington game biologists have used several management techniques generally acceptable to wildlife managers in preparing their estimates of losses--i.e., statewide harvest averages for deer in varying quality habitat, check station data, card questionnaires, field surveys before and after, if possible, or by comparison with similar areas elsewhere (i.e., Wells project). Hunting mortality can be calculated with fair accuracy but mortality or reduced natality induced by habitat changes such as inundation is far more difficult to assess.

Hunter-day use as an index of game abundance is a commonly used method and no workable substitute is available at present. Perhaps the relationships are more easily understood if we use a conceptual model.

Hunters are afield in anticipation of success and generally success is enhanced if the hunter selects an area inhabited by game animals,

preferably lots of them. This condition inevitably leads to more hunters or to more days afield per hunter or both. Thus it should be more frequently acknowledged that hunter days formerly spent pursuing game species reflected a total habitat quality that in its diversity also produced unquantified amounts of non-game species. It would appear as follows:



Then it also follows that improvement of habitat--i.e.--more vegetative cover, a greater variety of plants, more ecologic niches, and improved year around water supplies would be expected to improve conditions for game and non-game animals alike. Specific recommendations for enhancing conditions for individual species should result from the studies recommended in the preliminary mitigation reports of the cooperators.

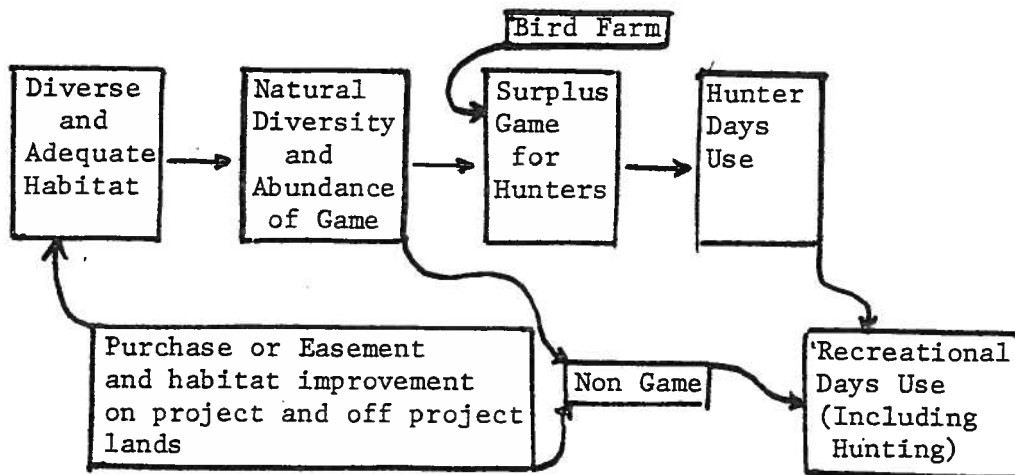
Evaluating losses in man/days use involves benefit/cost ratios that often appear to be too high. The State prefers to use the units of habitat needed to replace the amount of game necessary to duplicate the man/days use (pre-project). This may also involve enormous costs of reestablishment. The State feels that an attempt should be made to replace the resource "in kind" and that an increase in man/days use will follow. Since they didn't destroy the resource it should not be their responsibility to rebuild it. Hence cost considerations should be left to the responsible agency, based on the recommendations of qualified

biologists in the B.S.F. & W. and State Department of Game.

The State feels that immediate replacement is needed for the loss of recreation, which involves a broad spectrum of wildlife. In the special report summary prepared by Ohliger and Mains (July 1973, Pg. 54) this view is supported. "Full compensation of project-caused losses to wildlife require that these displaced animals be replaced in numbers and kind or that man's use level of these resources be maintained with a satisfactory alternative."

Replacement in numbers and kind is a stated goal but parts of this objective will be more difficult to achieve and will take more time. The State feels that a bird farm should be constructed to produce pheasants that will provide this immediate replacement. They point to the generally accepted practice of fish hatcheries and artificial stocking as a precedent.

The model now looks like this:



The Bureau of Sport Fisheries and Wildlife performed the calculations for man-days use based on raw data supplied by the Washington Department of Game. The State agency approaches the problem by

stressing the average population for each species, its potential yield, and its relative importance in the future. The B.S.F. & W., faced with limited funds and personnel, preferred to use the more general index of man-days use, determined from data supplied from the State. We believe they both tell the same story.

The 1964-1966 surveys conducted by the State in the project area were combined with statewide surveys of hunter success, population yield, and local surveys to achieve density per acre figures. From this they calculated gains or losses from pre-to-post project conditions. (For statistical accuracy, refer to the testimony of Dr. Scott Overton, Oregon State University, as reported in the P.U.D. transcripts of the Wells Project.)

Selecting a proper sample size is a difficult problem with mobile wildlife species, especially in arid country bisected by rivers and streams supporting riparian vegetation. The flooding of the river bottom and the massive rock rip-rapping accompanying railroad construction introduces further variables. Wildlife in peripheral areas are dependent seasonally on riparian areas and construction and flooding disrupt these complex ecological relationships. Important winter habitat may be eliminated by micro-climatic changes just as surely as by inundation.

The lost riparian habitat type probably cannot be compensated for by manipulation of project lands to produce key big game browse species, for example, with much hope for enduring self-sustaining success. Consequently, all species dependent upon that type can be acknowledged as permanently diminished. Wildlife just does not move uphill as the

waters rise.

Perhaps the most difficult assignment facing game biologists was in preparing estimates of the losses of wildlife that probably occurred due to inundation of the four reservoir areas. We have explored this at length with Wendell Oliver of the Washington Department of Game and have taken the liberty of enclosing his letter of April 11, 1974, detailing how the figures were arrived at. We don't know if his data is correct or not--so we can only assume the correctness of the data and then test the calculations and conclusions.

The selection of the lower two projects for comparison was unfortunate in that they were generally judged to be the poorer sites for game. Since they were being compared with harvest data pooled for all four sites it raises some question about the validity of the comparisons. In this case the error is on the conservative side.

Little is to be gained from further challenge of the methods by which the loss estimates were obtained. The degree of loss will never be accurately known and our recommendation is to accept the calculations as presented by the wildlife agencies in good faith. It is not possible nor should it even be attempted to make total counts of game species and total mortality losses to all causes for game management purposes. The indices of game abundance used by most game departments are more useful and less costly techniques whose refinements would rapidly escalate expenditure of both time and effort for very little return.

III. (B.) NON-GAME CENSUS RESULTS

A preliminary report filed with the Washington Department of Game by C.M. Chambers details the results of a wildlife census conducted by Chambers in riparian vegetation along Little Goose Reservoir and Lower Granite Project Site. These sites were selected because they had previously held the highest game population (peaking at Little Goose and declining downstream) and were thus expected to have supported correspondingly high numbers and varieties of non-game, specifically birds.

Three census routes were selected in each area with the hope that some clues might be obtained as to the relative effects of reservoir construction as reflected in animal diversity and abundance. Riparian draws tributary to the Little Goose Reservoir were sampled to test the theory that wildlife "move up the hillside" in response to inundation of their habitat.

A comparison of the three census areas at the two sites is as follows (my summary):

| | Little Goose area | | | Lower Granite area | | |
|--------------------|----------------------|----|----|-----------------------|----|----|
| | #1 | #2 | #3 | #1 | #2 | #3 |
| No. of Species | 4 | 0 | 3 | 9 | 21 | 22 |
| No. of Individuals | 9 | 0 | 10 | 23 | 61 | 71 |

The results confirm what biologists have learned in other studies at other sites--a diverse habitat with a variety of ecologic niches can be expected to produce abundant wildlife and great variety. In this case the riparian vegetation provides this ideal habitat for many more kinds and numbers of wildlife than does a disturbed site. Averaging the three census

routes for each study site yields 2.3 species at Little Goose vs 17.3 species for Lower Granite. The average number of individuals counted on each of the census areas was 6.3 and 51.6 respectively. The evidence from this small study is overwhelmingly in favor of the undisturbed site as a more favorable habitat even though it may not have been the better of the two sites before disturbance.

It is our feeling that if adequate studies had been conducted before and after construction at each site, similar evidence would have been obtained. But since it wasn't, extrapolation, bits of evidence such as this, and comparisons with projects elsewhere, (i.e., the Wells Project) will have to suffice. The mass of evidence in the literature, on the ground and from intuitive reflection leads us to believe that the wildlife losses were probably underestimated.

Wildlife under stress react by moving, dying or adapting. If adjacent habitats are inadequate or fully occupied, a movement into the area by new individuals creates further stresses and losses. Adaptations, if they develop at all, generally occur over very long time spans and cannot be relied upon as a solution to the problem at hand. Loss of productivity following dislocations and stresses is a very difficult figure to assess and must be extrapolated from empirical evidence.

III. (C.) ECONOMIC AND PLANNING CONSIDERATIONS

In examining the nature of the problems that appear to exist between the parties to the dispute, it appears to us that an additional problem also exists. The Army Corps of Engineers defines the loss solely in habitat terms, in other words as strictly a biological and physical loss. The State of Washington Department of Game on the other hand, while recognizing the biological and physical loss, defines the problem in terms of human wants, needs, and satisfactions. It appears to us that in recognizing this difference as being real and paramount lies the solution to adequate and effective mitigation. The physical and biological loss is largely in terms of riparian habitat: counting both sides of the river, about 300 miles of such habitat. Given the riprap requirements, much of this loss is irreversible and adjacent developments do not mitigate for riparian loss. A lesser amount of available and reasonable public access for hunting and wildlife or wildlands recreation has similarly been lost or adversely affected. The loss can be stated in terms of numbers of birds and mammals and within a range reasonable men can agree upon. We state these losses as approximating the following based on the reports we have examined:

| | <u>Numbers of</u> | <u>Use or hunter/day/year</u> |
|----------------------------|-------------------|-------------------------------|
| Deer | | 9,000-12,500 |
| Fur bearers | 2,000 | |
| Geese | | 800-1,200 |
| Pheasants | } | 25,000-30,000 |
| Chukar | | |
| Quail | | |
| Non-game birds and mammals | 3,100 acres | 25,000-100,000 |

What then can be done to mitigate these losses? Monetary values can't be placed on intangible benefits but the costs of providing intangible benefits can be computed.

Dollar values per hunter-day measure the amount users would be willing to pay, if payment were required, to avail themselves of the wildlife resource. Therefore, opportunity costs represent the minimum value placed on wildlife. Very little research has been done to determine dollar values per non-hunter day but judging by recent trends it may prove to be considerable.

We may not be able to calculate these values but we can estimate what it costs to provide replacements, such as hunter/use days as reflected in the bag.

Partial mitigation can be accomplished by substantial enhancement of lands acquired for the project by the Corps or on lands adjacent to project lands. Such measures should include habitat development on lands dedicated permanently to wildlife management. While habitat development is also an essential aspect of developed recreational areas, such development--in our judgment--should not be considered mitigation of wildlife losses. In our judgment the development of "interim use" lands that are not dedicated to permanent wildlife habitat management should be done by the Corps but should not be considered as a part of mitigation. Only enhancement that can be considered as reasonably permanent (estimated life of the project) should be considered as mitigation for the losses incurred. That the Corps will enhance all project lands dedicated to other uses is taken for granted;

after all, that is what quality recreation-resource development and quality public land management is all about. It is a continuing responsibility of all public land managers.

We do recognize that the project has probably enhanced one wildlife aspect and use. Substantial increases in recreation-boater use does include more people enjoying the wildlife--particularly birds--that are in the canyon. We also note that such use as it increases tends, in addition, to have an adverse effect on wildlife numbers and diversity compared to pre-project development.

While in our judgment all of the proposed mitigation activities should be accomplished to the maximum extent possible, it is also our collective judgment that something substantially less than fifty (50) percent of mitigation can be accomplished by these measures on project lands and on those lands immediately adjacent.

Where does this then leave us? A means to provide the equivalent of more than 20,000 hunter days annually for the life of the project is a reasonable solution.

To recapitulate: The Corps should begin immediately to carry out on all project lands wildlife habitat improvement measures as a portion of mitigation. Together with the Game Department an agreed to action program of such developments should commence.

Planning for such measures of greater magnitude as, for example, development of new "live streams", a bird farm, and similar measures should commence immediately and be action programs by the Spring of 1975.

Planning an action program with the Game Department and the Area Conservationist of the SCS to provide for habitat development, a bird

stocking program and for hunter or public access should begin immediately. An action program should be completed by June 30, 1975. The program of habitat development, acquiring of easements and public access should begin within the following year, and be completed by September 1977.

During this time frame and following to about 1980 the biological studies appropriate and agreed to by the parties involved should be undertaken. This work should be jointly planned and contracted for and cannot be done adequately without a continuing commitment to fund, and unless a complete plan of action is planned in advance.

Provision should also be made to compensate for inflation that appreciably reduces the financial resources available during the typically protracted negotiation and study periods.

III. (D.) PROJECT LANDS

The first mitigation priority for the Corps is in the development of project lands, probably less than half of which have any potential for wildlife. Of the potential wildlife sites on the project, there are further problems with the uncertainties of "interim use" decisions, harassment by construction activities and river traffic, and marginal potential for achieving an increase in wildlife productivity without expensive and ephemeral habitat treatments. All acres are not created equal. The quality and potential of river bottom habitat has probably been consistently underestimated by biologists and almost certainly by engineers.

Obviously any project lands identified by biologists as having potential for wildlife should be developed as soon as possible using funds available now. Lands with potential but an uncertain future (i.e., "interim use" restriction) should not be charged to the mitigation account. Neither should development of habitat for non-game species adjacent to or on recreation areas be charged to wildlife mitigation.

Goose islands and grazing pastures are the most suitable developments for certain project lands. The State should not be expected to put expensive developments on questionable acreages such as Mile 25 just because the acres are available. The potential is nil and should not be included in the development plans.

Perhaps a more productive management decision would be to prevent needless destruction during construction activities. This can still be achieved during the final stages of construction at Lower Granite.

On suitable lands not jeopardized by "interim use" provisions and undue human harassment, standard rehabilitation techniques such as

plowing, planting, fertilizing, watering and fencing can be applied.

The Corps has the machinery and manpower and should, in cooperation with State biologists, be able to agree on a plan of management.

Administrative studies on project developments should be carried out for future evaluations as part of general operating costs.

III. (E.) OFF-PROJECT LANDS

The most realistic approach contained in the report lies in the development of off-project lands which have a known potential for wildlife--particularly those areas in the growing monoculture of wheat farming typical of some of the tributaries to the Snake River. Here opportunities exist to reclaim both riparian and valuable upland and habitat diversity.

There are two proposals designed to compensate for the loss of upland game species by obtaining easements from private property owners. In one instance the proposal is to complement the construction and placement of watering devices and in another to allow access to 14,260 acres of land surrounding 660 acres of acquired fee land proposed for the preservation of upland game bird habitat.

In the case of acquiring easements for hunting purposes, it is a practice of questionable value unless land use can also be appropriately affected. Access to depleted range lands or vast areas of summer fallow can only be of questionable value. Some control on land use intensity or over major changes in land use should be granted with these easements.

The main problem here is to get the approval and funds to proceed with negotiations with landowners, appraisals, and finally purchase. Rather than tie the off-project costs to a dollar figure, which is rapidly being whittled away by inflation and speculation, the agreement should be based on a fixed acreage. It is urgent that action be taken on project and off-project lands simultaneously. This condition applies to both fee purchase and easements, both of which should be correlated with similar negotiations for fisheries mitigation.

Land owner willingness to sell is not viewed as a problem by the State, despite the spirited opposition that arose at the Dayton and Colfax hearings last summer. We have stressed the urgency for immediate steps toward purchase and easement based on the continuing destruction of terrestrial and aquatic habitat by private owners adjacent to the project (i.e., Lower Tucannon River - April-May, 1974).

III. (F.) STUDIES

To compensate for wildlife losses, a number of studies were proposed. These included developing a comprehensive plan for habitat improvement on project lands, formulation of a plan for waterfowl habitat replacement and a survey of adjacent lands to identify sites with potential for habitat improvement projects. In all cases these studies are financed at approximately \$20,000 per year. We are sure the authors now recognize that these were extremely conservative cost estimates, and a more realistic figure to place a biologist in the field for a single season is more nearly \$25,000 to \$30,000 per year.

Perhaps the only recommendation we can make here is to get on with the studies as soon as possible.

III. (G.) HABITAT DEVELOPMENT

In addition to the proposed short and long term studies, a number of habitat developments are proposed. Many of these proposals are valid, but their critique is perhaps inappropriate until the suggested studies are completed and the specifics are available for evaluation. There does seem to be, however, a tendency to attempt to manipulate vegetation, particularly in the on-project proposals. While most of the proposals, particularly as they pertain to revegetation, seem to be concerned with animal ecology and the appropriate forage plant species, there does seem to be a tendency to ignore plant ecology and the dictates of soil, slope, exposure and other factors relevant to the needs of individual plant species. Attempts to manipulate vegetation without proper site alteration will probably result in a gradual return to the plant species originally replaced. Jackrabbits, beaver and deer will eliminate new plantings unless protected by adequate fencing, another costly and dubious prospect.

It follows that if wildlife losses occurred as a result of habitat destruction, then habitat restoration or development should reverse the process. Unfortunately, it isn't that simple. Generally the chance for success is directly proportional to the quality of the land being developed. Good money and efforts should not be squandered on poor sites, regardless of ownership.

An estimate by a Walla Walla nurseryman for development of Mile 25 and New York Bar was set at \$4 million. This points up the virtue of maintaining existing habitats rather than attempting to replace them artificially.

III. (H.) BIRD FARM

It is finally recommended that a bird farm be constructed to produce 20,000 birds per year to be planted on project and acquired lands. This is a questionable practice, particularly when viewed in terms of its continual maintenance costs and the permanent benefits accruing to the species as a result of this practice.

Several suggestions have been proposed--a new hatchery could be built with mitigation funds, and would replace the old, inefficient farms at Kennewick and Walla Walla. The site could be on federal land at McNary or on lands provided by Washington Department of Game. The operation and maintenance costs could be negotiated. One choice might be a 20-40 year period as a test of the ability of the Department to restore habitat on designated wildlife lands with gradual phasing out of the bird farm. Another possibility would be to purchase quality birds from a private source for release for "X" years.

Whitman County used to be the top pheasant producing area in the State--can it be restored? It isn't likely that the future recreational hunting demands will ever be met on steadily deteriorating habitat on adjacent private lands.

Planting pheasants to provide for immediate replacement of lost recreational opportunity may be a reasonable alternative if coordinated with measures to repair habitat along stream courses and through purchases, easements within the general vicinity of the project. Cooperation with the Soil Conservation Service may well provide the necessary vehicle of replacement of riparian habitat, conversion of steep palouse slopes to brush and grass, and providing for and developing public access.

IV. SUGGESTIONS FOR CORRELATING FISHERIES AND TERRESTRIAL MITIGATION

In many cases the consideration of fishery resources and game resources are related. For example watershed maintenance and riparian vegetation improvement will enhance fish, game and non-game species. They are also related in that available financial resources must be committed in a manner that returns the greatest permanent benefit to all species involved and subsequently to the human utilization of those species. Opportunities do exist for projects with these multiple benefits. Consequently financial commitments considered must be viewed in the perspective of their impact on both the primary objective and associated benefits that should accrue to related species. A fish hatchery for example offers no benefits to related species while watershed rehabilitation does.

To compensate for fisheries losses, the following features were suggested for anadromous fish species: a hatchery and associated trapping and holding facilities to rear the progeny of 2,290 adult female fall Chinook salmon, a hatchery and associated trapping and holding facilities to rear the progeny of 2,145 adult female spring and summer Chinook salmon, a hatchery and associated trapping and holding facilities to rear the progeny of 3,390 adult female steelhead trout.

All these facilities have been suggested in addition to the work already accomplished at the dams in question involving both upstream and downstream fish passage facilities. Since these anadromous species complete their life cycle in the Pacific Ocean, it seems quite reasonable and logical that augmenting anadromous fish stocks naturally produced in a now somewhat degraded tributary system can easily be accommodated

throughout the remainder of their life history.

Construction of these facilities should be authorized and commenced immediately and they should not be contingent upon reaching final agreement on all fish and wildlife compensation necessitated by the Lower Snake River Project.

Resident fish species also have been severely altered by the project in question. In order to compensate and mitigate for the incurred losses, it has been suggested that these rainbow trout be planted on a put-and-take basis in Asotin Creek and Touchet, Walla Walla and Tucannon Rivers in an attempt to compensate for the loss of 67,500 stream-angler days.

Before construction of the trout hatchery, it is strongly recommended that the practice of put-and-take planting in the streams suggested for that program be critically evaluated. This probably can be accomplished using current hatchery capacity. The impact on both resident trout and anadromous steelhead must be understood before planting catchable rainbows is commenced.

This particular request seems to run contrary to the objectives of (a) maintaining a steelhead fishery, and (b) increasing the existing angler-day opportunity. As mentioned previously, considerable effort has gone into passing steelhead trout over dams to eventually reach some of the tributaries identified for the put-and-take rainbow program. In these tributaries the steelhead will spawn and their young will remain for a considerable time prior to smolting and migrating back to the ocean. During this period they will be dependent upon the carrying capacity of the parent stream, subject to its limitations and in

competition for food, cover and space.

It is also assumed that at the present time there is some form of resident trout population in the streams identified. The planting of 93,000 pounds of legal or catchable-size rainbow trout raises the question of the environmental impact on the resident fish and the immature steelheads occupying these same streams. Several studies recently completed have demonstrated that the planting of large numbers of hatchery fish actually has the effect of depressing existing resident fish populations. If this condition does exist, the risk would certainly be taken that the expenditure identified to boost angler-days would actually be providing less angler opportunity for resident fish and seriously impairing the rearing capacity of the streams for steelhead trout.

Improved carrying capacity of the streams in question probably can only be improved through improving stream habitat, and funds expended for compensating the lost angler-days should be directed toward a program of habitat improvement rather than a program that superimposes an artificially high population of hatchery trout into a habitat whose carrying capacity is static or possibly declining due to adverse land use practices.

A final mitigation recommendation for fisheries losses is the acquisition of 150 linear miles of stream of known high quality steelhead fishing. This is an excellent recommendation and should be expanded to include stream habitat improvement measures such as stream-bank fencing and general watershed improvements.

V. POSSIBLE ALTERNATIVES

In reviewing the bulk of material available, several alternatives come to mind that should be investigated as part of the recommended studies.

(1) The continuous blanket riprap identified as a major problem in the project area seems unnecessary and should be unnecessary with reasonable alternative. Assuming riprap is basically for protection against wave action, narrow breaks, particularly in the vicinity of the mouths of side canyons, would seem to be an attainable goal.

If these breaks could be made, and perhaps accompanied by a lateral ditch in appropriate areas, water for big game and other wildlife could be made accessible. If protection from wave action is still absolutely essential at these areas, perhaps structures such as log booms could be strung across the mouth of the break in the riprap and afford sufficient protection. If the riprap is located in places where the river current is still perceptible enough to be a problem, it would seem that riprapping would be unnecessary on the deposition side of the river's curvature. An accommodation could be made in these places for breaks or gaps in the blanket riprap.

(2) The question of providing water in now arid side canyons has been widely discussed. The potential of lifting water from the impoundments and either providing a substantial sustained flow or providing a minimal trickle flow are worth exploring. In order to capture the imagination of the engineers, a research proposal should be made that includes at least the following features:

(a) the potential of lifting water, its dependability, and its

- total production using wind-supplied energy;
- (b) the impact of an interruptible flow on vegetation in an arid canyon environment;
 - (c) an evaluation of the impact of an interruptible flow on an arid canyon's wildlife population; and
 - (d) the dependability of irrigation water lifted x feet using wind-supplied energy.

In no case should this proposal be converted to a dependency on hydro or fossil fuel energy.

(3) The Corps of Engineers could initiate a hydraulic evaluation of the Tucannon River with emphasis toward channel stability as related to channel length and vegetative bank cover. Purpose of the study would be to restore a hydrologic equilibrium as nearly as possible through obtaining an appropriate channel length to accommodate the gradient between the headwater and mouth of the Tucannon River. The ultimate purpose of this evaluation is to restore an optimum aquatic habitat for the rearing of steelhead and resident trout species.

(4) A trust fund be established perhaps using the financial resources identified for the trout hatchery and bird farm for the purpose of altering land use patterns to the benefit of upland game and watershed quality. Some of the methods could be:

- (a) to obtain conservation easements,
- (b) make available financial incentives for landowners to increase their brushy areas in wheat-growing regions.
- (c) financial incentives to allow riparian vegetation to recover

where currently overgrazed, and

- (d) direct payments to encourage landowners to abandon the practice of diversified ranching now combining marginal livestock operations along with grain farming with an insufficient range land resource.

If the trout hatchery and bird farm ideas were abandoned, a fund of about \$4 million in capital costs plus additional financial resources made available out of the operating and maintenance payments that would be required for the aforementioned facilities could be established. The interest payments to such a fund could be utilized to initiate a cooperative program with appropriate landowners. In the event that the program failed to live up to expectations, the capital resources would still be intact to attempt another alternative such as outright acquisition of critical habitat areas.

In considering the mitigation, and perhaps some of the suggested alternatives, it should be stressed that immediate commencement of mutually agreeable projects is appropriate. There is no need to wait for agreement on all proposals before initial funds are committed.