# PART I - ADMINISTRATIVE

## Section 1. General administrative information

**Title of project**

Rainbow Trout Net Pen Rearing Project

**BPA project number:** 9500900
**Contract renewal date (mm/yyyy):** 10/2000 ☐ **Multiple actions?**

**Business name of agency, institution or organization requesting funding**
Lake Roosevelt Development Association

**Business acronym (if appropriate)** LRDA

**Proposal contact person or principal investigator:**


| | |
|---|---|
| **Name** | Gene Smith |
| **Mailing Address** | 43573 Miles Creston Road N |
| **City, ST Zip** | Davenport, WA 99122 |
| **Phone** | (509) 725-8416 |
| **Fax** | (509) 725-8416 |
| **Email address** | BSmith6184@aol.com |


**NPPC Program Measure Number(s) which this project addresses**
10.8; 10.8B; 10.8B.3; 10.8B.4

**FWS/NMFS Biological Opinion Number(s) which this project addresses**

**Other planning document references**
Upper Columbia River Blocked Area Management Plan (e.g. regional plan developed for intergrated framework).

**Short description**
Resident fish substitution addresses unmitigated losses of salmon and steelhead attributed to development and operation of hydropower projects.

**Target species**
Rainbow trout

## Section 2. Sorting and evaluation

**Subbasin**
Upper Columbia Maintstem; Spokane Subbasin

### *Evaluation Process Sort*

| CBFWA caucus | Special evaluation process | ISRP project type |
|---|---|---|
| Mark one or more caucus | If your project fits either of these processes, mark one or both | Mark one or more categories |
| ☐ Anadromous fish<br>☒ Resident fish<br>☐ Wildlife | ☒ Multi-year (milestone-based evaluation)<br>☐ Watershed project evaluation | ☐ Watershed councils/model watersheds<br>☐ Information dissemination<br>☒ Operation & maintenance<br>☐ New construction<br>☐ Research & monitoring<br>☐ Implementation & management<br>☐ Wildlife habitat acquisitions |

## Section 3. Relationships to other Bonneville projects

***Umbrella / sub-proposal relationships.*** List umbrella project first.

| Project # | Project title/description |
|---|---|
| | |
| | |
| | |
| | |

### *Other dependent or critically-related projects*

| Project # | Project title/description | Nature of relationship |
|---|---|---|
| 9104600 | Spokane Tribal Hatchery O&M | Transfer hatchery fingerlings to net pens |
| 9104700 | Sherman Creek Hatchery managed by WDFW | Transfer Rbt to northernmost net pens |
| 9404300 | Monitor, Evaluate and Research the Lake Roosevelt Fishery | Creel checks, interview sportsmen, evaluate fishing success and conditions on reservoir |
| 9001800 | Rainbow Trout Habitat Improvement | Provide net pen fishery to reduce harvest of naturally producing stocks |
| 5228100 | Lake Roosevelt Kokanee Net Pens | Provide, design and construction plans; operation schedules; scope information based on Rbt nep pen practices |

## Section 4. Objectives, tasks and schedules

### *Past accomplishments*

| Year | Accomplishment | Met biological objectives? |
|---|---|---|
| 1995 | Began BPA funding process in April. Acquired NEPA exclusion, Received $8,000 to construct 150' of docks, purchase cable and build four new net pens. Rebuilt two pens at Hunters to increase active net pens from 18 to 24. Reared and released 330,000 | Expanded net pen production toward goal of 500,000 Rbt. |
| 1996 | Completed 140' of new dock and 6 net pens for Lincoln site. Completed 90' of dock and 4 net pens for Two Rivers Site. Transferred 540,000 Rbt from Spokane and Sherman Creek Hatcheries. Released 534,000 RBT. | Completed expansion of net pens to reach net pen production of 500,000 Rbt. |
| 1997 | Released 530,000 net pen rainbow. Replaced 60' of dock at Hall Creek; built 4 new replacement pens. Built 6 new pens for Kettle Falls Site. Replace two 20' dock sections at Kettle Falls Site. | Maintained and operated net pens to continue raising 500,000 RBT |
| 1998 | Updated special use permits. Updated & repaired pens. Acquire two damaged boats from USFWS - work and repair by volunteers. Built 4 net pens for Kettle Falls-Sherman Creek Site. Participate in BPA sponsored "Big Horn Show" booth. Release 540,000 Rbt. | Maintained and operated net pens to meet production goals of 500,000 RBT. |

### *Objectives and tasks*

| Obj 1,2,3 | Objective | Task a,b,c | Task |
|---|---|---|---|
| 1 | Expand net pen program to release 500,000 Rbt annually | a | Organize, supervise, and participate in the production of new net pens |
| | | b | find new sites for pen locations. |
| | | c | seek volunteer workers |
| | | d | purchase materials |
| | | e | secure special use permits |
| | | f | meet quarterly to work with Lake Roosevelt H. C. T. |
| 2 | Build a volunteer in-kind work force to carry out and maintain | a | recruit and organize volunteers at various sites on the reservoir |

| | | | |
|---|---|---|---|
| | program | | |
| | | b | set up meetings to coordinate volunteers for construction, maintenance, feeding schedules and other work related functions |
| | | c | speak to groups to secure in-kind work force, equipment, and donations |
| 3 | Operate and maintain the net pen program as an ongoing project | a | order materials needed in a timely fashion to maintain net pens |
| | | b | build new docks |
| | | c | order new nets, cable, and rigging to replace worn out equipment |
| | | d | inventory all equipment |
| | | e | coordinate and participate with volunteers at all sites to build/repair pens |
| | | f | assure fiscal responsibility for budget purchases and equipment maintenance |
| | | g | provide quarterly reports to BPA |
| 4 | Coordinate with Lake Roosevelt Fisheries Management Team to enhance the harvest of net pen rainbor | a | participate in decision making processes with LRHCT concerning best time of release of fish from pens |
| | | b | review in creel survey and floy tag collection |
| | | c | work to achieve the biologic objectives for Lake Roosevelt as set forth in the Fish and Wildlife amendments |
| | | | |
| | | | |

### *Objective schedules and costs*

| Obj # | Start date mm/yyyy | End date mm/yyyy | Measureable biological objective(s) | Milestone | FY2000 Cost % |
|---|---|---|---|---|---|
| 1 | 10/1999 | 6/2000 | Rear and release of 500,000 Yearling Rbt from pens in June | 500,000 Rbt production | 36.00% |
| 2 | 10/1999 | 9/2000 | Volunteers recruited to build, repair docks and pens to feed fish. Cost from budget is for | 53 volunteers | 18.00% |

| | | | | | |
|---|---|---|---|---|---|
| | | | coordinator only. | | |
| 3 | 10/1999 | 9/2000 | Continued annual releases of 500,000 Rbt yearlings averaging 3-6 per pound. Construction, repair maintenance of pens. | 500,000 Rbt release. All sites repaired and ready for fish. | 44.00% |
| 4 | 10/1999 | 9/2000 | Harvest of net pen fish to aid in the protection of naturally produced rainbow as a target goal of the program. | | 2.00% |
| | | | | **Total** | 100.00% |

**Schedule constraints**
Operation of reservoir drawdown and refill has an adverse effect on net pen operations.

**Completion date**
On-going

## Section 5. Budget

**FY99 project budget (BPA obligated):** $96,461

### *FY2000 budget by line item*

| Item | Note | % of total | FY2000 |
|---|---|---|---|
| Personnel | Coordinator/Secretary-Treasurer | %48 | 47,643 |
| Fringe benefits | Health Insurance/Benefits | %9 | 9,460 |
| Supplies, materials, non-expendable property | Paper, Printer Supplies | %1 | 940 |
| Operations & maintenance | Building Materials, Maintenance of Equipment, Fuel, Fish Food | %34 | 34,257 |
| Capital acquisitions or improvements (e.g. land, buildings, major equip.) | | %0 | |
| NEPA costs | | %0 | |
| Construction-related support | | %0 | |
| PIT tags | # of tags: | %0 | |
| Travel | Meals, Lodging, Mileage | %1 | 800 |
| Indirect costs | | %0 | |
| Subcontractor | | %0 | |
| Other | Liability Insurance, Phone, | %7 | 6,900 |

| | | | |
|---|---|---|---|
| | Advertising, Publications | | |
| **TOTAL BPA FY2000 BUDGET REQUEST** | | | $100,000 |

### *Cost sharing*

| Organization | Item or service provided | % total project cost (incl. BPA) | Amount ($) |
|---|---|---|---|
| WDFW | Fish Food | %10 | 20,000 |
| LRDA | Volunteer Hours 5,600 @ $10.00/hr. | %28 | 56,000 |
| LRDA | Volunteer & other donated use of Equipment/Boats | %8 | 15,000 |
| Lake Roosevelt Monitors | Tagging; floy tag return analysis | %2 | 4,000 |
| UCUT & STI | Donated dock moorage for pens and boats at Two Rivers Marina, Keller Marina, Seven Bays Marina | %1 | 2,400 |
| **Total project cost (including BPA portion)** | | | $197,400 |

### *Outyear costs*

| | FY2001 | FY02 | FY03 | FY04 |
|---|---|---|---|---|
| **Total budget** | $98,000 | $100,000 | $100,000 | $102,000 |

## Section 6. References

| Watershed? | Reference |
|---|---|
| ☐ | Griffith, JR and AT Scholz. 1991. Lake Roosevelt fisheries monitoring program, Annual Report 1990. Bonneville Power Administration. Portland, OR. Project No. 88-63. |
| ☐ | Peone, TL, AT Scholz, JR Griffith, S Graves and MG Thhatcher. 1990. Lake Roosevelt fisheries monitoring program. Annual Report 1988-89. Bonneville Power Administration, Portland, Oregon. |
| ☐ | Shields, JP and KD Underwood. 1996. Measurement of Lake Roosevelt biota in relation to reservoir operations, 1995 Annual Report. Lake Roosevelt fisheries and limnoligical reasearch, 1995, Annual Report. Bonneville Power Administration. Portland, OR. |
| ☐ | Underwood, KD, JP Sheilds. 1995 Lake Roosevelt Fisheries Monitoring Program, annual report 1995. Bonneville Power Administration. Portland, Oregon. Project No. 88-63 |
| ☐ | Underwood, KD, et al. 1996. Lake Roosevelt Fisheries and Limnological Research. Annual Report. 1995 Annual Report Table 4.4, Page 103. Bonneville Power Administration. Portland, OR. |

| | |
|---|---|
| ☐ | Voeller, AC. 1996. Measurements of Lake Roosevelt biota in relation to reservoir operations, Annual report 1993. Bonneville Power Administration, Portland, Oregon. Project No. 94-43. |
| ☐ | Voeller, AC. 1996. Measurements of Lake Roosevelt biota in relation to reservoir operations, Annual report 1993. Bonneville Power Administration, Portland, Oregon. Project No. 94-43. |

# PART II - NARRATIVE

## Section 7. Abstract

The specific need for net pen rearing of rainbow trout *(Ocorhynchus mykiss)* in the blocked area above Grand Coulee Dam is directly related to the operation of the reservoir. Reservoir drawdowns during late winter and spring result in a high rate of entrainment of rainbow trout through Grand Coulee Dam. The production goal for the net pen program includes annually releasing 500,000 yearling/catchable size rainbow trout to aid in reaching a angler harvest goal of 190,000 trout. The objective is to hold rainbow fingerlings received from Lake Roosevelt hatchery programs for net pen rearing from September through May to reduce loss of fish by entrainment as well as predation. The net pen program initiated and operated by volunteers had been in operation for several years before becoming part of the resident fish program as listed in the 1994 Columbia Basin Fish and Wildlife Program 10.8b. The net pen program, having been monitored for several years, is shown to be an effective approach to increase rainbow harvest. Survival or rainbow in the reservoir, natural and hatchery origin alike, is primarily limited by spawning habitat and other factor associated with reservoir operations. An alternative approach had been to release fingerlings directly into the reservoir in late summer or early fall and subject them to the rigors associated with the drawdown. The expectation of the net pen program is to provide a consistent fishery in the blocked waters above Grand Coulee Dam regardless of the extent of the drawdown. The extent and duration of the drawdown and refill can be predictable to some degree based on normal flood control precautions. Excessive snowpacks in January, February, and March can severely affect the operation of the reservoir. The net pens can compensate for these conditions. In consideration of the time frame for the net pen program, it appears to be a solution for the ongoing problem. This goal and methods of this project compliments ongoing natural rainbow trout habitat enhancement project. The net pen rainbows are fall time shoreline spawners whereas wild Lake Roosevelt rainbows spawn in tributaries during the spring period. Therefore, spawning interactions between the two stocks is not a problem. Also, since reservoir elevations are high during the time the spawning period of the net pen rainbows followed by a drawdown period, none if any originating alevins/fry are expected to survive. Monitoring of the net pen program is performed by the Lake Roosevelt Monitoring/Data Collection Program. This program facilitates tagging studies of net pen fish and performs abundance and creel surveys to constantly monitor and evaluate the net pen rearing program on the Lake Roosevelt and tributaries fisheries.

## Section 8. Project description

### a. Technical and/or scientific background

The net pen program was initiated by the late (deceased 1997) Mr. Win Self, a prominent advocator of Lake Roosevelt fisheries restoration projects, land developer and owner of Seven Bays Estates. In 1985, Mr. Self started the program by personally financing the rainbow trout and building supplies for pen rearing. Mr. Self performed all this work in coordination with the National Park Service and Bureau of Reclamation, federal agencies involved in managing the Grand Coulee Dam project Area. These fish were stocked in pens in the fall and fed until spring or early summer. The program grew primarily due to Mr. Self's efforts to get other groups of volunteers to build and stock fish through the winter months to be released at the start of prime fishing weather. Fishing improved, and enthusiasm for the net pen program grew as well. What really appears to have happened is that the net pen fish were being fed during the drawdown of the reservoir and being released as the water level was reaching 1275-80 feet. Full pool elevation is 1290. These fish were released as yearlings.

Hatchery production normally was introduced as fingerling plants in the fall and consequently were subjected to the annual flood control, water budget and ESA required reservoir operations which all lead to excessive drawdown problems. Over time, it became more difficult to coordinate the net pen program, the fund raising and the organization required to expand the program. The result was a decline of net pen production and an apparent need of funding for a coordinator and maintenance and operation support. The basic problems addressed by net pen rearing from September until June are of three types. Two of these are directly related to the drawdown effects of the reservoir and the third, predation, refers to releasing fingerlings versus yearlings.

Drawdown directly affects entrainment. Water retention times below 30 days apparently reduces fish densities in Lake Roosevelt through entrainment, thereby negatively impacting the fishery (Voeller 1996; Thatcher el al. 1993 and 1994; Peone et al. 1990; Griffith and Scholz 1991). In general, lake elevations below 1240 feet MSL coincide with water retention times below 30 days in Lake Roosevelt (Griffith and Scholz 1991; Thatcher et al. 1993 and 1994).

Creel surveys seem to support the theory that severe drawdowns adversely affect harvest rates. According to harvest reports, the number of rainbow harvested in 1994, a low drawdown year, totaled 494,460. This was partly due to carryovers from the previous years' net pen release which also followed a minimum drawdown-quick refill year (Underwood et al. 1996). In 1996, a drawdown of 82 feet resulted in a harvest of only 76,915 rainbows. There also was a reduction of angler trips in 1996 due to dewatering of boat ramps during the spring drawdown which prohibited anglers from accessing much of Lake Roosevelt during the spring (Underwood et al. 1996).

The economic impact on the reservoir appears to be related to drawdown impacts on the fishery as well. The economic value attributed to the Lake Roosevelt fishery was $19.1 million dollars in 1994, a minimum drawdown high harvest rate year (Underwood and Shields 1994). In 1996, the economic values dropped to $7.6 million dollars associated with the 82 foot drawdown (Underwood et al. 1996). In contrast to the value

of the fishery before the hatchery and net pens programs came on line, the economic value was $2.8 million dollars in 1985 (Beckman et al. 1985). The BPA funds approximately $700,000 dollars annually to the hatchery and net pen programs, the return as seen by the economic increase since 1985, unquestionably pays for itself.

Based on research and understanding of the operation of the reservoir, stocking strategies have evolved in an effort to best manage the fishery according to very specific objectives. Stocking strategies are controlled by the Hatchery Coordination Team where as Lake operations are controlled by natural, political and economic forces (runoff, flood control, power production, irrigation). Members from WDFW, the Colville Confederated Tribes, and the Spokane Tribe of Indians make up the coordination team and are charged with determining size and numbers of fish to be stocked, and the best times, locations and most effective methods. Recommendations from the Hatchery Coordination Team are as follows: 1. Continue to hold net pen rainbows until after maximal drawdown is reached to minimize entrainment. Entrainment rates appear to be reduced during periods of increasing water levels. 2. Operate Lake Roosevelt as indicated in the Northwest Power Planning Council Fish and Wildlife Program (amended in September, 1995.) This program recommends maintenance of water levels above 1,250 feet mean sea level and water retention times above 30 days.

**b. Rationale and significance to Regional Programs**

The Lake Roosevelt net pen project has been recommended as a way to deal with stocking problems, hatchery production schedules and problems relating to reservoir operations, entrainment, and drawdown. The Hatchery Coordination Team recommended the stocking and rearing of 500,000 Rbt in net pens in the blocked area above Grand Coulee Dam. This recommendation is included in the biological objectives 10.8B.3 of the 1995 Fish and Wildlife Program (FWP) 1995-4.

The net pen program also relates to the Upper Columbia Mainstem Subbasin objectives and strategies to enhance rainbow trout production in the upper mainstem and at the same time provide the strategy of reducing pressure on native stocks of rainbow while restoring their habitat. Section 10.2A of the 1995 FWP shows concern for artificial introduction of fish already inhabited by native stocks of the same species. The concern is basically for the effect for the long-term sustainability of native stocks. Concerns include competition, predation, and inbreeding with existing resident fish.

The genetic integrity of native stock rainbow seems not to be in jeopardy due to their tendency to move to tributaries to spawn whereas net pen stocks are shoreline spawners. Investigation of the tributaries by stream walking, electrofishing, trapping and other methods have not shown net pen fish to inhabit these native trout spawning waters. It is felt that artificial stocking of rainbows either by net pens as yearling class fish or by directly stocking fingerlings from the hatchery tends to reduce the harvest of native stocks thereby helping to enhance their recovery.

Section 10.8B of the 1995 FWP addresses the need to substitute for the loss of steelhead and salmon as a partial mitigation. Resident fish substitution in these blocked waters help to mitigate. Section 10.8B.3 recommends that the net pen program already in existence, operated by volunteers, be expanded to rear 500,000 net pen rainbow by 1997. The fingerlings are to come from the Spokane Tribal Hatchery, as it was the source

previous to 1995. As one measure of success, a target goal of 190,000 angler harvested rainbows annually was predicted from a plant of 500,000 fish.

The harvest rates are determined by the Lake Roosevelt Monitors. The target harvest can be effected negatively by severe drawdown as referred to earlier. The use of net pens as a logical component to the resident fish supplementation program has been supported by the Lake Roosevelt Monitors (Underwood, KD; JP Shields and MB Tilson) (Peone et al, 1990; Griffith and Scholz, 1991; Thatcher et al 1993). Studies show that fingerlings reared in net pens for nine months can be raised to an average of 3-4 to the pound by release. Individual fish grow to 1.5 pounds after 6 months in the reservoir and 3 pounds by one year after release. Approximately thirty-five to fifty-seven percent of the rainbow trout released from net pens are harvested by anglers (Peone et al 1990; Griffith and Scholz 1991; Thatcher et al 1993).

**c. Relationships to other projects**

Projects listed under the 1995-4 FWP funded by Bonneville Power Administration are interrelated and collaborative in nature. They include the following: Project #9104600 Spokane Tribal Hatchery at Galbraith Springs: The Spokane Tribal Hatchery and the net pen program work closely together. The Hatchery Coordination Team recommends the number of rainbow to be transferred from the hatchery to the net pens beginning in early September. The Spokane Tribal Hatchery also transfers rainbow fingerlings to Sherman Creek Hatchery raceways in April to be reared eventually in the Kettle Falls, Hall Creek and Hunters net pens. This transfer from the Spokane Tribal Hatchery allows for more open raceways to extend the growth of fingerlings until they are placed in net pens at a size range of 14-20 per pound in September. The Sherman Creek Hatchery is project #9104700.

Project #9404300 the Lake Roosevelt Monitoring/Data Collection Program is the result of a merger between two projects. The Lake Roosevelt Monitoring Program (BPA No. 8806300) and the Lake Roosevelt Data Collection Project (BPA No. 9494300) These projects were merged in 1996 to continue work historically completed under separate projects. The objectives of the monitoring program include 1) collect data on zooplankton biomass, density, and limnological characteristics. 2) assess entrainment of tagged net pen rainbow. 3) determine angler harvest and pressure, average size of fish harvested and economic value of the fishery. 4) estimate the relative abundance of fishes in Lake Roosevelt. 5) Conduct dietary analysis of kokanee, Rainbow, and Walleye. 6) Back calculate length at age of Kokanee, Rainbow, and Walleye using scales. 7) Investigations, ongoing, to determine critical period(s) for olfactory imprinting of Kokanee salmon. 8) Assess the best times, locations for release of Kokanee to reduce entrainment, and improve returns to creel and egg collection sites.

The net pen program works closely with the Spokane Tribe of Indians and Confederated Colville Tribe of Indians which encompasses much of the blocked areas above Grand Coulee Dam. Thirteen of the net pens are located on Tribal marina docks or at bay areas accessed by Tribal land and roads. The Roosevelt Recreation Area is managed by the US Park Service. There are no docks allowed on reservoir waters unless permitted by the Park Service. The net pen program is required to obtain a special use permit for all docks and net pens at each of the nine sites.

The WDFW participates in helping to manage the Kettle Falls net pen sites and also assists in providing fish food in a cooperative project between them and the volunteer program that exists with the net pen organization (LRDA).

The LRDA net pen program has received a Shoreline Management Act exclusion for the operation of the fishery. The Colville and Spokane Tribes have asked for an assessment of net pen impacts on the water environment of Lake Roosevelt. It is about two-thirds completed. The study is being contracted to Beak Consultants Incorporated and conducted by Rensel Associates Aquatic Science Consultants.

At the present time, the presence of another net pen program for resident fish production on the various Subbasins are quite limited. There are commercial ventures and agency programs on the Lower Columbia but relevance, species, and water level conditions are not equivalent.

**d. Project history** (for ongoing projects)

The net pen program was started in the late 1980's by the late Mr. Win Self (deceased 1997). Mr. Self developed the Seven Bays Community near Fort Spokane on the Columbia River. In an effort to improve the fishing, he raised money, mostly his own, to build net pens and buy fish food. He would raise as many fish as he could afford to buy and acquire fish food through donations. When money ran out to buy food, he would release the fish.

After a short time, fishing improved and people along the reservoir and fishermen began to expand the program. They organized and incorporated into a non-profit group named Lake Roosevelt Development Association (LRDA). Net pen development grew to a number of about 26 located at six sites on the river. Some in kind support was obtained for fish food and small grants were applied for.

After time, organization, time commitments, and volunteers dwindled. The number of active pens dropped to twenty. It became apparent that organization and financial support were going to be needed to maintain the program that was producing a fishery with a reputation for one and a half pound to four pound fish and limits that could be obtained in a matter of a few hours. BPA had been supplying fish for the net pens after it became apparent that the pens worked well in Lake Roosevelt because of the manner in which the Lake is operated for flood control. These fingerlings were being transferred from the Spokane Tribal Hatchery to the net pens in September and reared through the drawdown and refill period to be released around the first of June. This operational plan bypassed the entrainment problems, predation by walleyes, and reduction of zooplankton that was associated with the drawdown. (Griffith and Scholz. 1991; Thatcher et al. 1993 and 1994).

LRDA applied for a maintenance and operation grant from BPA and went through the CBFWA selection and approval process. The project was approved in 1994-95 as LRDA (Sponsor) and Lake Roosevelt Trout Net Pens (Title). The project number is 9500900.

Semi-annual and annual reports are sent to the project supervisor as well as Scope of Work, objectives, tasks, and time lines for completion and or maintenance. Quarterly reports are given to the Hatchery Coordination Team at meetings in which all members give oral reports and plan the hatchery strategies for Lake Roosevelt. Summary reports

on transfers of fish to net pens, growth rates, release dates, and out plant sizes and numbers are sent to the project supervisor at completion of those tasks.

Adaptive management plans are formulated and discussed at the LRHCT Quarterly Meetings. Reports by the Lake Roosevelt Monitors/Data Collection Team keep us apprised of what is happening in the waters above Coulee Dam. Hatchery managers, net pen coordinator, and members from WDFW, Tribes and Eastern Washington University Fishery Research group all share information. Adaptations occur from these reports and discussion thereof.

The LRDS net pen program has been operating as a funded program since 1994-95. To date, the moneys spent per year are: 1995, $62,863, not a full year; 1996, $115,000; 1997, $23463, balance $72,137 obligates; 1998, $99,775. Summary of Accomplishments: From 1995 until fall of 1997 over 360 feet of docks were constructed by volunteers. Fourteen new net pens were built and stocked with Rbt. The goal of 500,000 net pen reared Rbt was achieved according to 10.8B.3 (FWP) biological objectives. Eight existing pens were rebuilt and reoutfitted. A six pen array of pens and 100 feet of docks was established at the Lincoln site. A four pen array was attached to the Two Rivers Marina Docks (Spokane Tribal). 1998: Four new pens constructed for Hall Creek site, outfitted with new docks and self-adjusting anchoring system. Eight new net pens were built for the Kettle Falls sites. These were equipped with new nets. Remote sites were set up with automatic feeders and solar chargers to achieve better dispersal of net pens in hard to reach sites. The volunteer roster is at 53 and includes members from nine sites and represents over 2,400 man hours of labor annually.

**e. Proposal objectives**

Objective 1: Expand the net pen program to release 500,000 Rbt annually by 1997. FWP 10.8.B.3 The proposals put forth in the biologic objectives set a goal of production for the net pen program which expand the program from 20 pen to 26 pens by 1997. With average fall pen populations of 15,500 fingerlings, the total reached 490,000. The summer plant of six pens at Kettle Falls averaging 6,000 fingerlings per pen adds 36,000 additional Rbt for a total of 526,000. Mortality was estimated at 6,000 for a net production of 520,000 yearlings released at mean size of 4.2 per pound. (Smith, G. Annual Report)

Objective 2: Build a volunteer, in-kind work force to build and maintain the net pens, docks, and to be feeders at the various net pen sites. LRDA, the original net pen program developers, were awarded a maintenance and operation contract in 1995. It is the function of the coordinator to organize volunteers at nine sites on the 150 mile long reservoir. The volunteers and coordinator work together to build pens and docks in the three summer months. Volunteers operate 45 net pens at nine sites. The current roster of volunteers includes 53 men and women. Work is ongoing for 12 months out of the year.

Objective 3: Operate and maintain the volunteer based net pen program as an ongoing project. The nature of reservoir operations is such that it is important to maintain the net pen program to provide a constant supply of harvestable fish in the Lake Roosevelt Area that forms the blocked area above Grand Coulee Dam. This has been ongoing since the mid to late 1980's, but has been expanded to maintain a production of 500,000+ Rbt each year. Net pens in operation have been expanded from 20 to 45 pens.

Objective 4: Increase the annual angler harvest of net pen Rbt to 190,000 annually (10.8B.3) biological objectives FWP. This objective is included in biological objectives for Lake Roosevelt net pens as an expected outcome of net pen production of 500,000 Rbt. annually. Some would say this is not technically justified as an objective that is measurable. The Lake Roosevelt Monitors and Data Collection Team have used data from creel surveys, interviews, floy tag collections, and other data to assess harvest rates for the past ten years. Although not fully accurate, the data provides indices of yearly fluctuations in harvested Rbt which are usually directly related to reservoir drawdown and refill schedules.

**f. Methods**

The net pen program tends to be broken down into three scope of work phases annually. The fall phase involves transferring fish from the Spokane Tribal Hatchery and the Sherman Creek Hatchery to the net pen sites. The winter and spring months are primarily fish rearing months and pen maintenance projects associated with drawdown and other abiotic conditions which occur randomly. The summer months are associated with maintenance, repair, and replacement projects. Scope/Tasks for June, July, August: Yearling fish are released in late May or early June. Sample weights are taken in all forty-five pens prior to release. Samples of 100 rainbow trout are taken from each pen randomly. Size ranges from 3 to 6 fish per pound. After release, all nets are pulled at each site. They are cleaned and hung up to dry. These nets will be stored during the summer months. At some sites, net pen frames are removed, blocked up, and stored until September. Maintenance projects and new construction occurs primarily in the months of July and August. Each site is assessed for damage and/or replacement needs. Materials needed for required repair are purchased. The net pen coordinator sets up project work schedules for each site and notifies volunteers. Common problems include replacement of dock boards, hinges, cables, anchors, and winch repair. Net pen frames require replacement or repair as well as top frames which support bird netting. Nets must be inspected and repaired before storing. New construction occurs during August. This includes building new docks and net pen frames either to expand the program or replace worn out or damaged docks and frames. New nets are ordered after assessing the condition of washed nets at each site. Scope/Tasks for September through mid-November: Starting the first of September, nets are returned to the net pen sites and attached to the frames. Schedules are set up for the sequence of sites to be stocked, and volunteer schedules are set. Net pen transfers occur for two consecutive months allowing for a day to hang nets and a transfer of two loads of fish per day from the hatchery. Feeding schedules and volunteer lists are organized at each site as it becomes stocked. Scope/Tasks for late November through May: Organize all volunteer groups at the nine sites and set up feed schedules. Weigh fish, take water temperatures, and set up food allotments. Distribute fish food to all storage sites near each net pen site. Develop plan of action to adjust for drawdown and refill as well as high winds, and freeze ups. Arrange for boat in schedules to service and refill automatic feeders at two remote sites. Do everything possible to hold fish until refill level and zooplankton count become favorable for release. These tasks relate directly to the effort needed to address the objectives of producing 500,000 rainbow trout annually and the maintenance and

operation of pens using volunteers to perform the tasks related to in the scope of work. Volunteers bring an abundance of skill and varied backgrounds to the program. Fifty-three volunteers participate in the net pen program at this date. They provide over 5,600 man hours annually. They often donate the use of their boats, power equipment, and their specific skills, as well as giving of their time. The method whereby the success of the program will be analyzed is primarily the function of the Lake Roosevelt Monitors/Data Collection Team. The data collected by the monitors is brought to the table during the Hatchery Coordination Team meetings. Reservoir conditions and other data enter into operational decisions made by this group. Strategies and biological objectives call for rearing of fingerlings in net pens during the fall, winter, and spring months to increase survival rates which are adversely affected by drawdown. Specifically, these problems are entrainment of fingerlings and zooplankton. The results expected from the net pen program relate to the objective of rearing and releasing 500,000 net pen Rbt annually. This objective was met in 1995, 1996, 1997, and 1998. Each of these years, however, were somewhat different in terms of flood control measures and refill rates. The eighty-two foot drawdown in 1996 resulted in a very low harvest rate and a very high entrainment rate. Factors that effect the success of the net pen program are mostly related to reservoir operational decisions. These decisions are effected by several factors, but the most serious is related to flood control measures. Drawdowns below 1240 feed MSL and water retention flows below 30 days apparently reduce zooplankton and fish densities through entrainment. (Voeller 1996; Thatcher et al. 1993 and 1994; Peone et al. 1990; Griffith and Scholz 1991)s.

## g. Facilities and equipment

The net pen coordinator operates out of an office in his home which is equipped with a file cabinet and a desk from the government surplus supply depot. Also in the office is a personally owned computer, printer, and fax machine. The secretary/treasurer previously used a borrowed computer, but has included in the FY99 budget a computer. Her office is also located in her home and is equipped with adequate personal office supplies. The net pen coordinator's own shop serves as a site for much of the construction activities of the program. Volunteers provide most of their own tools and equipment. Water Craft: The net pen program acquired a twenty-six foot fiberglass inboard drive boat from the US Fish and Wildlife/BPA surplus. It has been refurbished to be used for net pen projects. It came with a Caulkins trailer. Also from the USFW, we acquired a 21 foot Valco aluminum boat previously sunk on the Snake River. It was repaired by volunteers and equipped with a 115 horse used Evinrude obtained from the Lake Roosevelt Monitors. Fish food storage is donated by the Seven Bays Estates Homeowners Association—their unused swimming pool shower rooms. We purchased an eight foot by twelve foot storage shed for storage of maintenance equipment and new nets. Other storage for fish food and areas for summer drying and storage of nets has been donated at various sites on the reservoir by friends of the program including the US Park Service. Other equipment includes a 16' flat bed trailer with electric brakes, a 5hp fire hose pump and 150' of fire hose (three years old). A 5hp generator (three years old), 24 automatic feeders and solar chargers, various wrenches and tool sets, one 1996 GMC half ton 4WD pick-up 76,000 miles, leased.

**h. Budget**

The personnel portion of the budget includes a full time coordinator paid at the rate of $17.61 an hour for 260 days. The LRDA Secretary/Treasurer is paid at the rate of $11.56 an hour for 780 hours per year. Health insurance is paid for the net pen coordinator. Liability insurance coverage is provided for the LRDA board members and volunteers. The majority of the work is provided by volunteers with the money from maintenance and operation used to purchase materials to build the docks and net pen frames to rear the fish. The nets and some automatic feeders are also purchased with M/O monies. Fish food has been added to our M/O budget for FY2000 on a 50/50 share basis with WDFW. In years past, they have provided all the feed. Due to cut backs in their program, and their budget predictions, we have delegated $7000 in M/O FY2000 for fish food. The telephone becomes important in organizing the fifty plus volunteers along the lake. They are located is seven base areas situated near the net pen sites. Our telephone expense is based at $175.00 per month. A phone call saves in time and mileage. Lodging expenses allow $800 for mileage, lodging, and meals. This budget item is rarely used, but is in place primarily for the necessity of traveling to Portland for meetings if need be, and also for the annual Big Horn Show (BPA Sponsored) booth in March of each year in Spokane. The use of volunteers in this program allows for a great deal of man hours to be used to perform the work required to build and maintain the net pens as well as the day-to-day feeding of the fish located in 45 pens at seven of the sites along the 150 mile stretch of reservoir. The only pay received by the volunteers is a T-shirt (advertising) and an annual picnic at the end of the summer.

## Section 9. Key personnel

Secretary/Treasurer: Kaye Anderson—780 hours annually. Duties are to serve as secretary for all LRDA meetings, to keep accurate records, keep board members informed of meeting agendas, keep minutes. As treasurer, she accurately reports all expenditure records, pays bills, and keeps financial records for all meetings. Qualifications: Kaye has been finance director and executive director for Columbia School District for 26 years. She was acting secretary for LRDA as a volunteer previous to the receiving of the grant.

President of LRDA: Roy Graffis, volunteer. Duties are to conduct LRDA meetings regularly in the presence of board members and guests. Qualifications: Roy has a masters degree in education and served at Superintendent of schools for the Columbia School District. He was also a charter member of LRDA and was instrumental in developing the net pens at Hunters Campground on Lake Roosevelt.

Net Pen Coordinator: Gene Smith—260 days at 8 hours per day. Duties: To recruit volunteers at the various net pen sites on the lake, to mobilize volunteers into work groups for each site, to coordinate all activities involved in building, maintaining, and locating pens at strategic locations along the 150 mile stretch of Lake Roosevelt; to oversee management of all net pen operations including scheduling activities and

timelines for stocking fish, feeding schedules, and releasing schedules; to work closely with the managers of related programs according to FWP measures and the Lake Roosevelt Biological opinions. Qualifications: B.S. Ed degree, University of Idaho, 1961. M.S. Ed degree, University of Idaho, 1964. M. S. + 45 credits with emphasis in biology. 31 years teacher/Athletic Director/football and basketball coach. Last 29 years teaching biology, anatomy, zoology at Reardan High School. 29 years working with booster club volunteers in fundraising, overseeing K-12 athletic programs, coaches, and funding for the Reardan School District.

## Section 10. Information/technology transfer

Blueprints of net pen construction and cost analysis have been shared with many interested parties on the West Coast and in Canada. Fishery enhancement groups, clubs, and private resort owners have requested and received information on net pen construction and organization of volunteers as well as networking cooperative agencies. Plans have been sent to California Kokanee enhancement organizations, Canadian Fishery directors, Washington Water Power Wildlife directors, and Eastern Washington University Wildlife and Fishery Department. A booth to disseminate general information is shared with BPA and other Lake Roosevelt projects at the Big Horn Show in Spokane in March. Meetings are attended with speaking engagements to explain the operation of the net pen program and to solicit volunteers. Quarterly reports are sent to the BPA project director and shared with the Hatchery Coordination Team.

## Congratulations!