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Office of Inspector General

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION/ NATIONAL MARINE FISHERIES SERVICE

Northwest Fisheries Science Center
Seattle, Washington

NOAA Needs to Use Appropriate Funding Instruments to Acquire Support Services For the Northwest Fisheries Science Center

Final Audit Report No. STL-15753-4-0001/January 2004

Office of Audits, Seattle Regional Office

UNITED STATES DEPARTMENT OF COMMERCE
Office of Inspector General
Washington, D.C. 20230

JAN 12 2004

MEMORANDUM FOR: Helen Hurcombe, Director
Acquisition and Grants Office
National Oceanic and Atmospheric Administration

Dr. Usha Varanasi, Director,
NMFS Northwest Fisheries Science Center
National Oceanic and Atmospheric Administration

FROM: Michael Sears
Assistant Inspector General for Auditing

SUBJECT: *NOAA Needs to Use Appropriate Funding Instruments to Acquire Support Services for the Northwest Fisheries Science Center*
Final Audit Report No. STL-15753-4-0001

As a follow up to our draft report, dated September 26, 2003, this is our final report on the funding instruments used by NOAA to acquire support services for the Northwest Fisheries Science Center in Seattle. While conducting the audit of the Pacific States Marine Fisheries Commission (Audit Report No. STL-14956-2-0001, issued in September 2002), we became aware of issues requiring NOAA management's attention. We found that NOAA inappropriately used cooperative agreements to acquire support services from the Pacific States Marine Fisheries Commission. In addition, we found that due to the manner in which NMFS administered the cooperative agreements and a related contract with the commission, NMFS appeared to have an employer-employee relationship with the recipient's personnel, which would violate federal regulations.

We performed our audit fieldwork from April 8, 2002 to December 16, 2002 at the commission offices in Gladstone, Oregon, and at several NOAA locations-- Northwest Fisheries Science Center offices in Seattle, Manchester, and Mukilteo, Washington; Western Administrative Support Center (WASC) Acquisition Management Division in Seattle; and NOAA Grants Management Office in Silver Spring, Maryland.

In responding to our draft report, NOAA agreed with our recommendations and described actions planned or taken to implement them. After reviewing NOAA's response we are satisfied that the agency has taken appropriate steps to ensure utilization of the appropriate funding instruments relating to PSMFC projects and ensure that NMFS' oversight of the commission's employees avoids even the appearance that NMFS personnel are exercising continuous supervision and control over non-NMFS employees.

As a result, the response constitutes an acceptable Audit Action Plan as required by Department Administrative Order 213-5, Audit Resolution and Follow-up and, hence, a separate plan is not necessary. We appreciate the cooperation extended by your staff during the audit. Should you have any questions, please contact me at (202) 482-1934 or David Sheppard, Seattle Regional Inspector General for Audits, on (206) 220-7970.

Introduction

The National Marine Fisheries Service (NMFS) is responsible for preventing the extinction and protecting the habitats of marine fish, mammals, sea turtles, and anadromous fish (salmon and other species that migrate between the oceans and inland waters). Moreover, NMFS has Endangered Species Act (ESA) jurisdiction over anadromous fish; the agency's efforts in this area require working in partnership with a variety of local, state, and other federal entities.

Dams built and operated by the U.S. Army Corps of Engineers (Corps) impact salmon spawning and mortality rates. The Corps operates eight multiple-purpose dams on the lower Columbia and Snake Rivers through which salmon migrate to and from upstream spawning/rearing areas and the ocean.

Dams also play an important role in the transmission of electricity to the Northwest region. The Bonneville Power Administration (Bonneville) markets electricity from 31 federal dams in the region and also funds fish and wildlife mitigation.

The Pacific States Marine Fisheries Commission (PSMFC), authorized by Congress in 1947, is one of three interstate commissions dedicated to resolving fishery issues. The PSMFC addresses issues that fall outside state or regional management council jurisdiction, serving as a forum to reach consensus among state and federal authorities.

NOAA awarded cooperative agreement number NA87FH0082, in April 1998, to the commission for a three-year period ending March 31, 2001. The total budget for the award was $3,207,915, which was funded directly by NOAA, although it received most of the funding through reimbursable agreements with the Corps and Bonneville, as shown in Figure 1 on page 3. The Economy Act provided the authorization for both the Corps and Bonneville reimbursable agreements with NOAA.

Under the agreement's terms and conditions, the commission staff was to provide the following support services at the NMFS labs in Manchester, Mukilteo, Pasco, and Seattle, Washington; and Hammond, Oregon.

- Monitor and record biological and spawning behavior data on captive fish broodstock population.
- Collect, handle, and mark juvenile or adult fish as determined by research protocol.
- Tabulate, summarize, and prepare initial analysis of data.

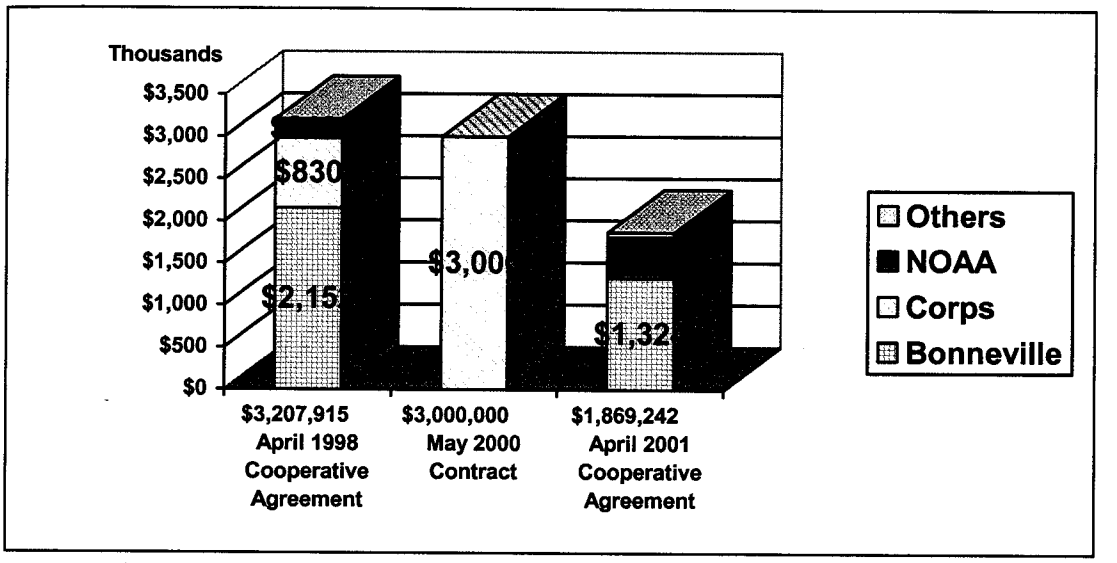

Figure 1: Award Fund Sources

In May 2000, NOAA entered into contract 50ABNF000048 with the commission to provide support services at an estimated cost of $3,000,000 over a three-year period. Although NOAA funded the contract, it received all of the money from the Corps through another Economy Act reimbursable agreement with NOAA. Under this reimbursable agreement, the Corps requested that NOAA enter into a contract rather than a cooperative agreement with the commission because the work was identifiable and did not require substantial involvement by the government. Specifically, the commission furnished support services, which included collecting environmental and biological data; providing physical, biological, or biochemical analysis; and providing the fabrication, installation, operation, maintenance and repair of research equipment at the NMFS labs in Pasco, Washington and Hammond, Oregon.

In April 2001 NOAA awarded the commission a second cooperative agreement (NA17FH1110) for $553,621 to perform similar tasks as those outlined in the 1998 cooperative agreement, limited to only the NMFS labs in Manchester, Mukilteo, and Seattle. These tasks were funded primarily by NOAA and Bonneville, as shown in Figure 1. The cooperative agreement was amended three times to increase the funding amount to $1,869,242 and was to be completed on March 31, 2003.

Objective, Scope, and Methodology

The purpose of the audit was to determine whether NOAA appropriately used cooperative agreements to acquire the services specified. Our fieldwork included interviews with NOAA officials and reviews of grant files, financial records, and supporting documents. We did not analyze the Northwest Fisheries Science Center's internal controls, nor did we rely on the center's computer-processed data.
In conducting our audit, we used criteria established in applicable laws, regulations, and guidelines including the Federal Grant and Cooperative Agreement Act of 1977, Federal Acquisition Regulation, Part 37-- Service Contracting, and the Department's *Interim Grants and Cooperative Agreements Manual.*

This audit was conducted in accordance with *Government Auditing Standards* issued by the Comptroller General of the United States, and was performed under the authority of the Inspector General Act of 1978, as amended, and Department Organization Order 10-13, dated May 22, 1980, as amended.

A PROPERLY ADMINISTERED PROCUREMENT CONTRACT SHOULD BE USED TO ACQUIRE SUPPORT SERVICES

We found that NOAA was inappropriately using cooperative agreements as the funding instruments to acquire support services from the commission. Since the services acquired under both the 1998 and 2001 cooperative agreements were for the direct benefit or use of the federal government, NOAA should have used a procurement contract to acquire the commission's services. Further compounding this situation were indications that an unauthorized employer-employee relationship existed between NOAA and the commission staff.

Cooperative Agreements Were Inappropriate Funding Instruments for Acquiring Support Services

In obtaining support services for the Northwest Fisheries Science Center from the Pacific States Marine Fisheries Commission, NOAA entered into two cooperative agreements with the commission.

Chapter 63 of Title 31 of the United States Code, "Using Procurement Contracts and Grant and Cooperative Agreements," which codified The Federal Grant and Cooperative Agreement Act of 1977, prescribes the specific criteria by which executive agencies must select the appropriate legal instruments for the acquisition of property and services and in providing federal financial assistance. Section 6305, on the use of cooperative agreements, states that:

> An executive agency shall use a cooperative agreement as the legal instrument reflecting a relationship between the United States Government and a State, a local government, or other recipient when – (1) the principal purpose of the relationship is to transfer a thing of value to the State, local government, or other recipient to carry out a public purpose of support or stimulation authorized by a law of the United States instead of acquiring (by purchase, lease, or barter) property or services for the direct benefit or use of the United States Government; and (2) substantial involvement is expected between the executive agency and the State, local government, or other recipient when carrying out the activity contemplated in the agreement.

In contrast, 31 U.S.C. Section 6303, on the use of procurement contracts, provides that:

> An executive agency shall use a procurement contract as the legal instrument reflecting a relationship between the United States Government

> and a State, a local government, or other recipient when – (1) the principal purpose of the instrument is to acquire (by purchase, lease, or barter) property or services for the direct benefit or use of the United States Government; or (2) the agency decides in a specific instance that the use of a procurement contract is appropriate.

NOAA used the incorrect instrument when it entered into two cooperative agreements with the commission to obtain support services. Under both cooperative agreement Nos. NA87FH0082 and NA17FH1110, NOAA sought services which directly benefited its own in-house research.

Under cooperative agreement NA87FH0082, NOAA required the commission to perform 31 specific tasks during the award period ended March 31, 2001. We found during our audit that these tasks consisted of services provided by the commission for the direct benefit of NOAA. For example,

- In one of the tasks related to NOAA's research on smolt migrations of Wild Chinook Salmon, the commission's technician primarily assisted a NOAA project leader and other federal employees in the maintenance, transportation, and distribution of research and fish marking equipment. As a direct application to the government research, the technician also assisted in the maintenance and retrieval of environmental monitors.

- In another task related to NOAA's research pertinent to the Redfish Lake Sockeye Restoration Broodstock Program, the commission's fish biologist followed NOAA experimental protocols to collect, preserve, and record various behavioral, physical and morphological data. As an immediate benefit to federal researchers, the biologist further assisted in culturing the brood, observing the behavior, and evaluating the survival of the salmon.

These services are clearly for the direct benefit or use of the Federal Government. As such, a contract is the appropriate funding instrument. The commission provides similar support services for the direct benefit of the government under the current cooperative agreement NA17FH1110 with the NOAA.

Although NOAA used a cooperative agreement in the above noted examples, agency officials entered into a contract with the commission in May 2000 to obtain similar services at the NOAA labs in Pasco, Washington and Hammond, Oregon because, according to a commission official, the Corps had requested that NOAA use a procurement contract.

Recommendation

We recommend the NOAA Office of Finance and Administration, Director of Acquisition and Grants, take the necessary actions to ensure that appropriate funding

instruments are used to acquire support services for the NMFS Northwest Fisheries Science Center.

NOAA's Response to Draft Audit Report

NOAA concurred with our recommendation. In its response, NOAA stated that the Grants Management Division has provided training to the center's program officers relating to the use of grants versus contracts. For PSMFC projects, NOAA's response stated that it will request the center to include a certification that the projects to be performed are not contractual by nature. In addition, NOAA stated that the Grants Management Division will continue to confer with the Department's Office of General Counsel to ensure that the correct funding instrument is used for proposed funding to PSMFC. Finally, NOAA stated if contractual elements are discovered, the Grants Officer will, after conferring with the Director of the Acquisition and Grants Office, transfer those elements to the Western Administrative Support Center for review and funding as a contract.

NOAA agreed that some of the activities funded under the cooperative agreements were for the direct benefit or use of the federal government and that, as of last year, these activities have been suspended under the cooperative agreements, and are now funded through appropriate contracts. However, NOAA asserted that its research activities involving captive broodstock technology and marine fish culture are for the benefit of the scientific community at large, state agencies, tribes and other recipients and as such are appropriately funded through a cooperative agreement.

OIG Comments

We commend NOAA for taking immediate and appropriate actions to address our recommendation. After reviewing NOAA's response to the draft report, as summarized above, we are satisfied that the agency has taken appropriate steps to ensure utilization of the appropriate funding instruments relating to PSMFC projects.

NMFS Should Avoid Prohibited Employer-Employee Relationships with Commission Staff

As set forth in Subpart 37.1 of the Federal Acquisition Regulation (FAR), federal agencies are prohibited from awarding personal services contracts unless such a contract is specifically authorized by statute. The hallmark of a personal services contract is the establishment of an employer-employee relationship between the government and the contractor's personnel, and the government is expected to obtain its employees by direct hire under competitive procedures, not through a personal services contract. Subpart 37.104(c) 1 of the FAR provides that:

> An employer-employee relationship under a personnel service contract occurs when, as a result of (i) the contract's terms or (ii) the manner of its administration during performance, contractor personnel are subject to the

relatively continuous supervision and control of a Government officer or employee.

Specific "descriptive elements" are provided in Subpart 37.104(c)2 as a guide to assist agencies in "assessing whether or not a proposed contract is personal in nature." Among these elements are whether:

1. the contractor's performance takes place on site at the agency;
2. the government provides tools and equipment to the contractor's personnel;
3. the work performed by the contractor is applied directly to the integral effort of an agency in furtherance of its mission;
4. comparable services are being performed within the federal government by civil service employees; and
5. the need for the service to be performed is likely to exceed one year.

During our review, we observed that NMFS employees appeared to be treating the commission workers as NMFS employees during the performance of both the cooperative agreements.

We found that the commission personnel, working under the cooperative agreement, were subject to relatively continuous supervision and control by NMFS employees. For example:

- *NMFS supervisors directed work of commission staff at the various labs.* Each of the eight employees we interviewed stated that they relied on the NMFS supervisors for direction of their work activities and considered the NMFS employees as their "supervisors."
- *NMFS supervisor recommended monetary awards for commission employees.* A NMFS supervisor recommended to the commission that seven employees receive a specified monetary award for services related to a NMFS presentation. Each employee received the recommended monetary award.
- *NMFS supervisors authorized the hiring of commission employees.* Of the 14 commission employee files we reviewed, we found that a NMFS supervisor signed the commission's documentation authorizing the hiring of all 14 employees.
- *A NMFS center supervisor authorized the cost of living allowance and promotion for a commission employee.* A NMFS supervisor authorized a COLA and promotion of a commission employee working at the Manchester Field Station in January 2000.

Although our audit did not focus on evaluating NMFS' relationship with the commission during the performance of the contract with the commission, NMFS officials told us that the contract was being managed in the same manner as the cooperative agreements.

Given the above circumstances, it appears that a prohibited employer-employee relationship may have existed in the administration of the two cooperative agreements and the contract because the commission's personnel were subject to relatively continuous supervision and control by NMFS employees. To avoid this problem in the future, NMFS needs to ensure that it does not manage its support services contracts in such a way that they become or have the appearance of prohibited personal services contracts.

Recommendation

We recommend the Assistant Administrator for Fisheries take the necessary actions to ensure, as part of the procurement process, that NMFS' oversight of the commission's employees avoids even the appearance that NMFS personnel are exercising continuous supervision and control over non-NMFS employees.

NOAA Response to Draft Report

NOAA concurred with our recommendation. In its response, NOAA stated that subsequent to our audit NOAA staff attended workshops that provided guidance for avoiding personal services contract. Moreover, PSMFC will reportedly appoint site supervisors to act as intermediaries between NOAA and commission staff. The site supervisors will have responsibilities for recommending awards, promotions, and other personnel actions.

OIG Comments

We again commend NOAA for taking immediate and appropriate actions to address our recommendation. After reviewing NOAA's response to the draft report, as summarized above, we are satisfied that the agency has taken appropriate steps to ensure that NMFS' oversight of the commission's employees avoids even the appearance that NMFS personnel are exercising continuous supervision and control over non-NMFS employees.

cc: John J. Kelly, Deputy Under Secretary of Commerce for Oceans and Atmosphere
Gary Reisner, Chief Financial Officer, NOAA
Michael J. Nelson, Chief, Grants Management Division, NOAA
Mack A. Cato, Director, Audit, Internal Control, and Information Management Office

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
OFFICE OF FINANCE AND ADMINISTRATION

OCT 23 2003

MEMORANDUM FOR: Michael Sears
Assistant Inspector General for Auditing

FROM: for William Broglie Mark A. Cato
Chief Administrative Officer

SUBJECT: *NOAA Needs to Use Appropriate Funding Instruments to Acquire Support Services for the Northwest Fisheries Science Center*
Draft Audit Report No. STL-15753-3-XXXX/Sept. 2003

Attached is the National Oceanic and Atmospheric Administration's response to the Office of Inspector General's draft audit report on the use of funding instruments to acquire support services for the Northwest Fisheries Science Center in Seattle. The response was prepared in accordance with Department Administrative Order 213-3.

We appreciate the opportunity to respond to your draft audit report.

Attachment

Printed on Recycled Paper

NOAA Comments on the Draft OIG Report Entitled
"NOAA Needs to Use Appropriate Funding Instruments to
Acquire Support Services for the Northwest Fisheries Science Center"
(STL-15753-3-XXXX/September 2003)

Recommended Changes for Factual Information

Page 5, last paragraph: Keep only the first sentence to this paragraph.

OIG Statement: "We discussed the two cooperative agreements in question with the grants officer currently responsible for the awards."

Page 5, last paragraph: Delete the second and third sentences from this paragraph. Then replace deleted sentences with the language as follows:

The application narrative as submitted had been modified from the initial submission to ensure that a cooperative agreement was the appropriate instrument. While there were some indications that the recipient was in a gray area towards contractual type work, lengthy discussions among the program office, applicant, and Grants Management Division resulted in an application that was appropriately funded as a cooperative agreement. However, it appears that some of NOAA's subsequent requirements seemed to indicate that a contract instrument would be more appropriate for certain activities to meet project goals.

General Comments

The OIG audit reports the finding that "NOAA did not use cooperative agreements appropriately to acquire support services from the Pacific States Marine Fisheries Commission (PSMFC)." Furthermore, the report found that NMFS "appeared to have an employer-employee relationship with the commission's personnel," which would violate federal regulations.

Although the NOAA grants review process did not reveal an inappropriate funding mechanism (contract versus cooperative agreement) or inherent employer-employee relationships, in practice, some activities could be interpreted as support services and gave the appearance of an employer-employee relationship between NOAA and PSMFC staff. In response to OIG on-site reviews performed during 2002, support activities conducted by PSMFC staff since 2002 are covered under contracts, and NOAA staff have been trained to avoid even the appearance of employee-employer relationships. NOAA staff took action in response to OIG comments well before the formal submission of the draft audit report.

Specific Comments

Page 4, paragraph 3, 1st sentence:

OIG Statement: "...NOAA was inappropriately using cooperative agreements as the funding instruments to acquire support services from the commission. Since the services acquired under both the 1998 and 2001 cooperative agreements were for the direct benefit or use of the federal government, NOAA should have used a procurement contract to acquire the commission's services."

We concur that some of the activities funded under the cooperative agreements were for direct benefit or use of the federal government. These included research and facilities support activities at the NOAA research stations in Pasco and Manchester, Washington and Hammond, Oregon. As of last year, these activities under the cooperative agreements have been suspended and are now funded through appropriate contracts.

However, the research activities (not support activities) on captive broodstock technology and marine fish culture we view as appropriately funded through a cooperative agreement, because the benefits of the work accrue to: 1) the scientific community at large through publication in the peer-reviewed scientific literature, and 2) state agencies, tribes, and other recipients. Furthermore, the work is fully collaborative with substantial involvement between NOAA and PSMFC researchers. We discussed the funding mechanism for the PSMFC collaboration with NOAA Grants Management Division, which agreed that the benefit to the public scientific community and the substantial involvement statement make a cooperative agreement the correct funding mechanism.

Most of the currently funded cooperative work with PSMFC staff involves culture of salmon and marine fish stocks and development of captive broodstock technology for fish resource enhancement programs. The salmon captive broodstock research provides information to technical oversight committees consisting of the Idaho Department of Fish and Game, Oregon Department of Fish and Wildlife, and Columbia River Inter-Tribal Fish Commission. The marine fish research provides information to the Washington State Department of Fish and Wildlife and the Makah tribe.

Various research projects and publications are also fully collaborative and not led only by NOAA Fisheries staff. In fact, some collaborations also include staff from the University of Washington. Evidence of these collaborations is found in the peer-reviewed scientific literature (see attached selected list of publications).

NOAA Response to OIG Recommendations

Recommendation 1: We recommend the NOAA Office of Finance and Administration, Director of Acquisition and Grants, take the necessary actions to ensure that appropriate funding instruments are used to acquire support services for the NMFS Northwest Fisheries Science Center.

NOAA Response: We concur. The Grants Management Division has provided training on grants versus contracts to the Program Officers of the NMFS Northwest Fisheries Science Center. For PSMFC activity, we will ask the Northwest Fisheries Science Center to include a certification that the projects to be performed are not of a contractual nature. The Grants Management Division will continue to confer with General Counsel of the Department upon receipt of all applications proposed for funding to the PSMFC to ensure use of the correct instrument. If contractual elements are uncovered, the Grants Officer will confer with the Director, Acquisition and Grants Office, for transfer of those elements to the Western Administrative Support Center (WASC) for review and funding as a contract.

Recommendation 2: We recommend the Assistant Administrator for Fisheries take the necessary actions to ensure, as part of the procurement process, that NMFS oversight of the commission's employees avoids even the appearance that NMFS personnel are exercising continuous supervision and control over non-NMFS employees.

NOAA's Response: We concur. In response to the OIG audit, NOAA staff attended workshops conducted by NOAA WASC during 2003 in which guidance was provided to avoid personal services contracts. NOAA staff were instructed not to direct work of commission staff, not to recommend monetary awards for commission employees, not to authorize the hiring of commission employees, and not to authorize costs of living allowance and promotion of commission employees. It was made clear to NOAA staff that they must avoid even the appearance that NMFS personnel are exercising continuous supervision and control over non-NMFS employees. PSMFC will appoint site supervisors to act as intermediaries between NOAA and PSMFC staff. Site supervisors will have responsibilities for recommending awards, promotions, and other personnel actions.

Publications Authored Primarily by PSMFC Employees (Underlined)

Fairgrieve, W. T., and M. B. Rust. 2003. Interactions of Atlantic Salmon in the Pacific Northwest. V. Human Health and Safety. Fisheries Research 62(2003): 329-338.

Nicklason, P. M., H. J. Barnett, R. Johnson, and M. Tagal. 2003. Modified silage process for fish and fish processing waste. *In* B. Pfeutzenruter. (ed.). 2nd International Seafood By Product Conference. Anchorage, AK.

Nicklason, P. M., H. Barnett, and J. K. Babbitt. 2003 (Submitted). A high speed, high yield water evisceration system (WES) for the production of minced fish and surimi from bycatch and underutilized fish stocks. Journal of Aquatic Food Product Technology.

Rathbone, C. K., J. K. Babbitt, F. M. Dong, and R. W. Hardy. 2001. Performance of juvenile coho salmon (*Oncorhynchus kisutch*) fed diets containing meals from fish wastes, deboned fish wastes, or skin-and-bone by-product as the protein ingredient. Journal of the World Aquaculture Society 32:21-29.

Publications Authored Primarily by NOAA Researchers in Collaboration with PSMFC Employees (Underlined)

Berejikian, B. A., E. P. Tezak, and A. L. LaRae. 2003 (In press). Innate and enhanced predator recognition in hatchery-reared chinook salmon (*Oncorhynchus tshawytscha*). Env. Biol. Fish.

Berejikian, B. A., W. T. Fairgrieve, P. Swanson, and E. P. Tezak. 2003 (In press). Current velocity and injection of GnRHa affect reproductive behavior and body composition of captively reared chinook salmon (*Oncorhynchus tshawytscha*). Can. J. Fish. Aquat. Sci.

Berejikian, B. A., E. P. Tezak, S. Riley, and A. LaRae. 2001. Territorial behavior and relative competitive ability of juvenile steelhead reared in enriched and conventional tanks and a natural stream environment. J. Fish. Biol.

Berejikian, B. A., E. P. Tezak, T. A. Flagg, A. LaRae, E. Kummerow, and C. V. W. Mahnken. 2000. Social dominance, growth and habitat use of age-0 steelhead (*Oncorhynchus mykiss*) grown in enriched and conventional hatchery rearing environments. Can. J. Fish Aquat. Sci. 57:628-636.

Berejikian, B. A., E. P. Tezak, and A. LaRae. 2000. Female mate choice and spawning behavior of chinook salmon (*Oncorhynchus tshawytscha*) under experimental conditions. J. Fish Biology 57:647-661.

Riley, S. C., H. Fuss, and L. L. LeClair. 2003 (Submitted). Effects of hatchery-reared juvenile chinook and coho salmon on wild juvenile salmonids in two Washington streams. North American Journal of Fisheries Management.

Strom, M. S., L. D. Rhodes, S. C. Corbett, C. K. Rathbone, and L. W. Harrell. 2003 (Submitted). Use of antibiotics and new vaccines to reduce mortality from bacterial kidney disease in chinook salmon: study the efficacy of other vaccines. *In* B. A. Berejikian (ed.). Research on captive broodstock programs for Pacific Salmon Research. Annual Report to Bonneville Power Administration. Contract No. 99-AI-17859.

Publications Authored Primarily by University of Washington Employees With Collaboration of PSMFC Employees (Underlined) and NOAA Fisheries Employees

Alcorn, S. W., A. L. Murray, R. J. Pascho, W. T. Fairgrieve, and K. D. Shearer. 2003. Effect of a feed additive containing fish processing by-product hydrolysate on the nonspecific immune functions of juvenile coho salmon (*Oncorhynchus kisutch*). Aquaculture. (217): 529-545.

Murray, A. L., R. J. Pascho, S. W. Alcorn, W. T. Fairgrieve, K. D. Shearer, and D. Roley. 2003. Effect of a feed additive containing fish processing by-product hydrolysate on the nonspecific immune functions of juvenile coho salmon. Aquaculture.