



**FISH HEALTH MANAGEMENT
Grant F-75-R-9**

By:

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IDFG 95-40

November 1995

ANNUAL PERFORMANCE REPORT

State of : Idaho

Grant: F-75-R-9, Sport Fish Restoration

Title: Fish Health Management

Contract Period: July 1, 1994 to June 30, 1995

1. Fish health monitoring and management activities for hatchery enhancement.

a. Resident game fish hatcheries

American Falls Hatchery: Six inspection trips were made during the period to inspect three stocks (Hayspur, Hayden Lake, Trout Lodge) of rainbow trout. The most problematic fish pathogen continues to be *Flexibacter psychrophilus* (Fp), the cause of cold water disease (CWD). This pathogen and clinical disease was found in fish during the March, April and June inspections. During the September inspection, *Renibacterium salmoninarum* (Rs), the cause of bacterial kidney disease (BKD) was detected by ELISA (enzyme-linked immunosorbant assay). Mixed bacteria were detected including *Pseudomonas* spp. and *Serratia liquefaciens*.

Ashton Hatchery: Four inspection trips were made during the period to inspect four stocks (Henry's Lake brook trout, Colorado rainbow, Wizard Falls Atlantic salmon, and Hayspur rainbow trout). Pathogens detected included *Gyrodactylus*, *Pseudomonas*, and low Rs by ELISA. In September and February, pseudomonad bacteremias occurred.

Cabinet Gorge Hatchery: Kokanee (Sullivan Springs and Clark Fork stocks) were inspected in December and April. CWD and Rs (by ELISA) were detected in addition to some bacterial opportunistic pathogens. In April, bacterial gill disease (BGD) was diagnosed.

Clark Fork Hatchery: Four inspection trips were made during the period. These included inspections of Hayspur rainbow and Montana west slope cutthroat in August, landlocked Wolf Lodge fall chinook in September, Hayspur kamloop and Montana cutthroat in December, and Clark Fork cutthroat in May. Pathogens detected were IPN virus, Rs, and CWD, all in the December inspection of cutthroat, and Rs in the Clark Fork cutthroat trout in May (ELISA; low OD).

Grace Hatchery: During the period three inspections trips occurred for Hayspur rainbow, Blackfoot cutthroat, and Saratoga brown trout. Inspections of brood cutthroat occurred in June. Pathogens detected were Rs (ELISA, low OD in hatchery juveniles, but

both low and moderate OD in brood cutthroat) and CWD. Also diagnosed was BGD for which treatment was administered. This is the second straight year that moderate ELISA levels have been detected at Grace.

Hagerman Hatchery: Twenty inspection trips occurred during the period. Stocks requiring diagnostic evaluation were Henry's Lake cutthroat and cutthroat x rainbow hybrids, Trout Lodge rainbow, Montana west slope cutthroat, Hayspur and Ennis rainbow, Gloyd Springs kamloops. A plethora of fish pathogens and diseases have historically afflicted fish at Hagerman including IPN virus, CWD, IHN virus, Rs, parasites such as PKX, *Ichthyobodo (Costia)*, *Sanguinicola*, *Gyrodactylus*, BGD, environmental gill disease (EGD), columnaris, various bacterial septicemias, and gill mycoses.

Hayspur Hatchery: Eighteen inspections occurred during the period for Hayspur rainbow and Gloyd Springs kamloops primarily on spawning fish. In addition, one collection of wild fish below the hatchery for whirling disease examination occurred. The main pathogens of significance found at Hayspur for this period include Rs, CWD, and *Myxobolus cerebralis*, the causative agent for whirling disease (WD). Less prevalent problems include *Gyrodactylus* and secondary bacterial infections.

Henry's Lake Hatchery: Nineteen samples were collected in the spring and fall on brood brook and cutthroat trout. As in 1994, Rs was detected in both broods. Using the DFAT method, Rs was found at moderate levels in the brook trout and at low to high levels in the cutthroat trout.

Mackay Hatchery: One inspection was conducted this year on three stocks: Saratoga brown trout, west slope cutthroat, and Arlee rainbow trout. This station has traditionally had an exceptional hatchery disease classification, with only low levels of Rs found (ELISA).

McCall Hatchery: Two inspections were conducted for Fish Lake west slope cutthroat trout in August (juveniles) and May (brood). The brood have a history of low to moderate Rs (ELISA). This stock continues to be a major source for the high mountain lake stocking program.

Nampa Hatchery: Thirteen inspections were conducted at Nampa during the period. Twelve stocks were involved in diagnostic fish losses. The important diseases are CWD (occurred five times) and motile bacterial septicemias. Rs continues to be detected at very low levels (ELISA). This station continues to lack the serious fish pathogens.

Sandpoint Hatchery: One inspection occurred in April on Montana west slope cutthroat trout. Personnel also inspected the Wolf Lodge Creek fall chinook (see Clark Fork narrative), which progeny are incubated normally until eye-up at Sandpoint, then moved to Nampa. This year some of this stock hatched before movement to Nampa.

In summary, 67 diagnostic cases (clinical fish losses) were investigated and 102 inspection trips were made where 747 and 5,364 fish, respectively, were sampled for laboratory examination.

b. Anadromous fish hatcheries

Clearwater Hatchery: 21 inspection and diagnostic cases for Dworshak and Selway B steelhead; Crooked River, Rapid River, Powell, Selway and Red River spring chinook. Diagnostic cases involved columnaris (2), aeromonad septicemias (2), alimentary intoxication (1). Pathogens detected include IHN virus in brood steelhead at Dworshak NFH and BKD in Red River and Selway spring chinook.

Crooked River Satellite: 7 inspection cases for spring chinook and B steelhead. Rs was the major pathogen. *Ichthyophthirius multifiliis* has been a problem in the past.

Hagerman National Fish Hatchery: one diagnostic examination in April of two groups of Sawtooth A steelhead. Low Rs (ELISA) and clinical losses from ERM (enteric redmouth disease caused by *Yersinia ruckeri*) were detected.

Magic Valley Hatchery: 9 inspection trips made on three (Dworshak, East Fork, Pahsimeroi) stocks of steelhead. Low Rs (ELISA) detected in the March inspection (Pahsimeroi and East Fork). In July and again in January, CWD and motile aeromonad septicemia (MAS) caused mortality in a group of Dworshak steelhead, and in January minor fish losses occurred in the Pahsimeroi stock from furunculosis.

McCall Hatchery: Eight inspection trips were made to McCall to examine South Fork summer chinook juveniles, and eight sample collections of brood chinook were made to the South Fork trap. One juvenile inspection had low Rs (ELISA.); from brood inspections BKD was the most prevalent health problem. IHN virus was detected in ovarian fluids from one female, and *Ceratomyxa shasta* (Cs) spores were found in another adult.

Niagara Springs Hatchery: Eleven inspection trips were made to examine Hells Canyon and Pahsimeroi stocks of A steelhead. Rs and IHN virus were pathogens isolated during inspections. Fish losses were attributed to IHN, CWD, and motile bacterial septicemia; clinical furunculosis occurred concomitant with one case of IHN.

Oxbow Hatchery: Eleven inspections of brood stock Hells Canyon and Oxbow A steelhead were conducted from January to May. Pathogens detected were Rs and Cs.

Pahsimeroi Hatchery: Six inspection trips of juvenile Pahsimeroi summer chinook were made. Also, 12 samplings were made on brood stock Pahsimeroi A steelhead. Pathogens detected in both juvenile chinook and brood steelhead included WD and Rs.

Powell Satellite: Eleven samples were collected from Powell brood stock spring chinook during August and September. IHN virus was isolated from 6 cases, totaling 12 females positive of 71 examined. Rs was also detected (ELISA) at low-moderate OD levels. Juvenile spring chinook held in the pond were inspected, and Rs (ELISA) was detected at low levels.

Rapid River Hatchery: Eight inspection trips for Rapid River juvenile spring chinook and eight disease samplings on brood stock spring chinook were collected. Pathogens and diseases in the juveniles were Rs, EIBS, *Myxobolus sp.*, CWD; pathogens in returning brood stock were IHN virus, BKD, and Cs. Future testing will be done to specify the myxobolid parasite.

Red River Satellite: Four inspection trips for juvenile Red River spring chinook, and five samplings of brood stock spring chinook were conducted. Pathogens included Rs (low - moderate ELISA) in both age groups. *I. multifilis* has been a problem in the past.

Sawtooth Hatchery: Ten inspection trips to check juvenile Sawtooth, Pahsimeroi and East Fork spring chinook and Pahsimeroi and Sawtooth A steelhead were taken. In addition, samples from brood Sawtooth spring chinook and steelhead from East Fork and Sawtooth were collected or received during the respective spawning period. Rs was detected in brood and juvenile steelhead and chinook. Clinical BKD was detected in the East Fork spring chinook in the preliberation exam. WD was detected in juvenile and brood steelhead, and Cs was detected in brood chinook.

In summary 205 diagnostic and inspection trips were made when 801 sick and 2852 normal fish were sampled for laboratory examinations.

c. Fish health recommendations for improvement of hatchery and brood stock operations

In the past at American Falls Hatchery, low levels of Rs have been found by ELISA; however, this year one pool had a moderate OD level. The Rs culling program at Hayspur, source of eggs for American Falls, Grace, Nampa and Hagerman, should be reevaluated for effectiveness.

At Ashton Hatchery ELISA readings for Rs continued to be low; nevertheless, the Rs situation will be evaluated with future inspections.

Because of the proximity of Cabinet Gorge Hatchery to Clark Fork Hatchery, caution is needed to prevent inadvertent spread of fish diseases by vehicle, personnel, or equipment.

At Clark Fork, recommendations have been made to develop well water to provide pathogen-free water for incubation and early rearing to mitigate the losses from BKD and IPN which occur regularly. In addition, continual emphasis should be made for hatchery

personnel to exercise caution in visiting nearby hatcheries (Sandpoint and Cabinet Gorge) to prevent inadvertent spread of pathogens through equipment, trucks, etc.

Because of Clearwater Hatchery's proximity to Dworshak NFH and the latter hatchery's long and severe history of IHN epizootics, plans have been implemented to prevent IHN episodes. Because the reservoir (hatchery water source) has resident kokanee, that tested positive for IHN virus in the past, additional observation should be made in hatching fish for unusual mortality. The importance of maintaining strict isolation between resident trout programs and anadromous fish on station is continually stressed. Stocking of Dworshak reservoir should not be done, but if absolutely necessary, certified clean stocks should be used.

At Crooked River satellite, Dworshak adult fish should not be placed above the weir. Doing so amplified BKD and IHN in both resident and hatchery stocks.

At Grace Hatchery, recommendations have been made to remove fish from the springs, head boxes and pipes and seek improvements to the springs.

At Hagerman Hatchery most diagnostic cases have more than one malady. Numerous recommendations have been provided to remedy the situation; some have been and others are in the process of being implemented. The disease problems at Hagerman have increased this year compared to 1994. As bird netting construction is completed and means to completely eliminate birds and small mammals from raceways are implemented, disease problems will reduce. Delaying the use of belt feeders in the hatch building until fish are older and off starter diets will help avoid septicemia and BGD.

At Hayspur Hatchery this year the levels of Rs in some brood groups was high (ELISA and fluorescent antibody test). Even though brood are being injected with antibiotics to control Rs and progeny from high brood fish are culled, the levels of Rs apparently increase gradually over time. In addition, WD was detected at low levels in catchable and adult (replacement) rainbow trout. As this station supplies rainbow eggs to several stations, continual caution needs to be exercised to avoid or minimize Rs transmittals.

At Henry's Lake Hatchery, culling progeny eggs from Rs positive parents has been a recent Rs management practice; nevertheless, Rs has apparently increased in these stocks over time. Culling by use of more sensitive techniques, ie, ELISA, may be necessary, and recommendations have been made to implement a more aggressive program to reduce Rs transmission to eggs and their transfer to hatcheries receiving them. The appearance of furunculosis in fish at Ashton, that were transferred as eggs from Henry's Lake, and the apparent increase in prevalence of Rs in Henry's Lake have brought about more stringent disinfection of eggs and equipment to prevent the recurrence of furunculosis and the need to reevaluate an effective means of reducing Rs at Henry's Lake.

Mackay Hatchery presently has a very favorable fish disease classification. Of concern at Mackay is the transport of untested stocks of fish to this facility thereby causing disease problems and loss of present status. Because of this, management caution must be exercised to enhance fish health.

At Magic Valley IPN virus causing low mortality has occurred for a few years in juvenile steelhead. The virus is vertically transmitted from adults returning to Pahsimeroi. Care should be taken to include stringent egg-take practices, culling, and restricting out plants of positive fish. Each year the hatchery should be thoroughly sanitized following fish release.

McCall Hatchery is a major source for trout planted into high mountain lakes. Many of these released trout have tested positive for Rs, the cause of BKD. Surveying high mountain fish for pathogens to determine prevalences and effects will continue. Recommendations include the segregation rearing of these stocks and culling of Rs positive fish at McCall Hatchery to reduce transmission of Rs to wild trout and anadromous fish in waters fed by high mountain lakes. At McCall hatchery, a disease culling program is recommended which will reduce levels of Rs and still maintain a viable genetic base. For anadromous fish, a BKD segregation program has been implemented.

Nampa Hatchery presently has a very favorable fish disease classification because of its lack of serious disease problems. Continued surveillance by hatchery and support personnel will help protect this station's favorable disease status.

At Niagara Springs recommendations have been made to cover the springs, at least at the bridge, and to provide bird netting to reduce the annual introductions of IHN virus and accompanying epizootics.

At Oxbow, an injection program to reduce vertical transmittal of pathogens should be implemented should an INAD be approved for OTC injections.

Pahsimeroi has a long history of whirling disease. The means for reducing the impact of this pathogen have long been established and recommended. These include developing clean water sources and holding fish in concrete ponds. Because of the proximity of Pahsimeroi to Sawtooth Hatchery, careful planning should go into every activity between hatcheries to avoid pathogen transfer.

At Powell satellite IHN virus showed up in 12 of 43 adult spring chinook in 1994. Extra caution should be taken to avoid a virus incident at the station or at Clearwater. Because of the recent IHN virus findings at Powell, the planting of Dworshak chinook should be curtailed there.

At Rapid River recommendations have been made to improve water quality for incubation, to limit out plants (resident and anadromous) above the hatchery, and to seek means for BKD segregation.

Sandpoint Hatchery continues to have A1 hatchery classification; however, because of the proximity of Clark Fork and incubation of progeny from free-ranging, wild fish at Sandpoint, caution needs to be exercised to maintain this status. A program to develop specific pathogen-free west slope cutthroat for mountain lakes should be implemented at Sandpoint.

In summary, brood inspections were conducted for 218 cases, involving 4502 resident and anadromous sport fish. There are 15 stations which handle brood stock, either on or off site.

d. General needs to enhance fish health General recommendations made for all hatchery personnel and management include 1) require disease certification documentation for all imports of fish and eggs into Idaho; 2) always be suspicious about receiving any fish. It is best to receive only eggs which have been certified with disease-free status. Fish can not be certified; they always are carriers of something. Require prior disease history before receiving fish at a station; 3) water from fish transports is also suspect for deleterious plants and invertebrates; 4) everything possible should be done to prevent introduction of new pathogens and control/reduce fish pathogens present at facilities. 5) disease-free inspections and elimination of clinical episodes of disease are the goals. Attaining these goals is another means of accomplishing the legislative mandate to preserve and protect the resource present in public waters which receive hatchery fish. Good disease control and prevention measures are a means which will promote expanding programs in the future without jeopardizing the health of wild fish at -the release site.

e. Fish health accomplishments Accomplishments at hatcheries involve team efforts with pathology providing recommendations, support by the Fisheries Bureau, and ultimate implementation by hatchery personnel.

At American Falls, Mackay, Nampa and Sandpoint the very best fish health classifications have been maintained.

At Cabinet Gorge, the decision was made to phase-out the captive brood stock program. This was important because the continual appearance of clinical BKD since 1993 had dropped the hatchery from a class A to class C rating.

At Clearwater Hatchery personnel operate under strict isolation and disinfection requirements to prevent and control the introduction of fish pathogens endemic to Dworshak NFH. Eggs from Dworshak to Clearwater are tested to assure they are from virus negative parents. IHN virus problems have been nonexistent at this facility due to use of these controls, team efforts and good management.

At Hagerman and Nampa hatcheries, bird netting structures were or are presently being installed, respectively. These structures will prevent the entry of birds and small mammals which are often surface carriers of problematic fish pathogens.

At Hagerman, completion of the Tucker Springs pipeline, covering the springs, and removal of resident fish from the springs have all helped reduce the number of severe fish mortalities in fish incubated and reared in water from this source.

At Hayspur, an extensive effort to reduce Rs in progeny rainbow trout has been ongoing for several years. This effort has required extreme effort of both hatchery and pathology personnel. In 1995 *M. cerebralis* reappeared in catchables and in the replacement brood. As a result, the catchable program was terminated, and the replacement brood and one group of catchable trout were disposed. This move was needed because this station is a major source of rainbow trout for Idaho's programs, and further contagion was unwise.

At Magic Valley Hatchery, IPN virus did not appear in juvenile steelhead for the first time in the last 3 years. The efforts of personnel at Pahsimeroi during egg-take and at the hatchery during and after rearing have been instrumental in this success.

At Rapid River Hatchery, the annual event of "fuzzy tail" or caudal mycosis has been reduced to acceptable levels. This occurred because of changes in pond design and feeding routine, thus reducing the build-up of fecal waste and unused food, which were a source for fungus. In addition, BKD segregation and culling have helped control Rs at Rapid River.

At Red River, a new pond design has allowed easier treatment of *I. multifilis*.

At all anadromous hatcheries, erythromycin feedings and injections have been instrumental in reducing Rs. In addition, juvenile segregation based on Rs levels in parents has also been effective in reducing BKD prevalence in juveniles.

f. Reports Reports include the annual resident fish hatcheries report for 1994, monthly LSRCP reports, monthly disease summary report. Presentations were given on fish disease status in Idaho at anadromous fish management meeting; MT; at Department hatchery managers meeting; at PNFHPC semi-annual meeting at Portland, OR. Videos have been prepared for lab, public, and fishery and hatchery personnel on fish diseases and laboratory practices. Reports in AFS/FHS re intraperitoneal injection methods and first documented finding of WD in whitefish.

g. Production studies and surveys to enhance fish health Several studies have become increasingly important for implementation as fish disease data has been generated.

For several years OTC injections have been given to brood rainbow trout at Hayspur Hatchery to inhibit possible vertical transmission of *F. psychrophilus*, which is a problem at

hatcheries receiving eggs from Hayspur. The primary recipients of these eggs are American Falls, Grace, Nampa, Hagerman hatcheries.

Beginning in 1993, a Rs culling program using a modified fluorescent antibody test was begun at Hayspur. It is hoped that this sensitive method will allow more adequate detection of Rs at low levels in ovarian fluids, thereby reducing the transmission of Rs to progeny.

Progeny from one Hayspur rainbow female, that had a high Rs levels in kidney ELISA, are being reared in the Eagle wet lab and tested periodically to evaluate vertical transmission of Rs.

Progeny from one Hayspur rainbow female, that had high Rs levels in ovarian fluid MFAT, are being reared in the Eagle wet lab and tested periodically to evaluate vertical transmission of Rs.

Specific pathogen-free sentinel fish have been placed in several areas of the lower Snake River quasi annually since 1990 to survey for *Ceratomyxa shasta* above Oxbow. This parasite, if present, may affect trout populations in Brownlee Reservoir.

2. Implementation of fish health programs in Idaho

a. Fish health transfer policy implementation The statewide fish health transfer policy was completed in 1986. Development of new information on the effect of various pathogens and legislative mandates have resulted in more recent policy drafts. In 1994 the Idaho Department of Agriculture was required to draft a comprehensive policy. The IDFG draft policy has been used as a template for aiding management in decisions; complete implementation by the Department is needed. In addition, the IDFG is signatory to the Pacific Northwest Fish Health Protection Policy, which provides general, regional guidelines for promoting fish health. And lastly, the Department is a party to the IHOT (Integrated Hatchery Operations Team) policy which addresses fish disease concerns in the region.

b. Warm, cool and cold water fish inspections Fish species which have been inspected for diseases include of tilapia, koi carp, channel catfish, bullhead catfish, suckers, sculpins, bull trout, whitefish, brook trout, rainbow trout, steelhead, spring, summer and fall chinook, sockeye, kokanee, cutthroat trout, kamloop rainbow, rainbow x cutthroat hybrids, brown trout, kamloop x steelhead hybrids.

c. Protected and endangered fish inspections Eagle Hatchery is Idaho's site for captive brood production for endangered Redfish Lake sockeye salmon. There were 194 cases of Redfish Lake sockeye, most involving 582 subadult mortalities and spawners, during the period. 27 of those cases involved fish inspected during egg-take, and two cases involved juveniles. Rs was detected in 27 individual fish and in one group of 230 juveniles. Other pathogens isolated were motile aeromonads, *F. psychrophilus* and several bacterial

species of insignificance. The more prevalent diseases by cases included mycoses (32, including several gill mycoses and internal mycosis), tumors (9 cases with lymphosarcoma the most prevalent (6 cases), and motile aeromonad septicemia and bacteremias (6 incidents). Other less prevalent, diagnosed diseases included gas bubble disease, CWD, *Loma* parasitism, coagulated yolk, nephrocalcinosis, and gas bubble disease. All necropsies and sample collections are made by hatchery personnel. There were approximately 146 moribund with undetermined cause of death. More extensive sampling is needed to remedy this.

d. Fish health laboratory management During the period, 664 fish health cases were received, worked up and reported by the lab. Each case involved one or more tests including bacteriology (185 cases of 2674 fish), BKD tests (471 cases of 7925 fish), histopathology (28 cases of 437 fish), virology (363 cases of 6309 fish), whirling disease tests (147 cases of 4086 fish), other (23 cases of 343 fish). Work directing the laboratory and personnel continued. This included supervising seven full-time and four part-time personnel.

e. Pollution and fish kill investigation Consultative services have continued when needed to Department, state and federal personnel in pollution and fish kill investigation.

f. Production studies and surveys to enhance fish health An extensive wild fish disease survey is presently being undertaken in Idaho. The purpose is to evaluate the locations of pathogens such as *M. cerebralis* and Rs in wild fish. The project was begun on a small scale in 1988 and was intensified in 1995.

With the completion of the Eagle wet lab in 1995, several fish disease studies are presently being planned or underway.

For several years the Department has been a cooperative in the joint study with the University of Idaho to provide field tests for erythromycin in BID control. Recently another cooperative venture was begun with the Western Regional INAD Project to evaluate other drugs at the field level. Presently formalin, OTC and chloramine-T are covered under the project respectively as controls for external parasites, bacterial diseases and bacterial gill disease.

Some activity in assisting IDFG and other state agencies in monitoring and evaluating water pollution from mining activities has been occurring for several years. This effort has intensified this year in Yankee Fork waters.

Input was provided to the Department for the Salmon Recovery Plan on the potential effects of gas supersaturation, whirling disease and bacterial kidney disease and anadromous fish recovery.

g. Reports Reports include PNFHPC semi-annual reports, DJ sport fish restoration annual report. Presentations were given at the WD Foundation meeting at Baseman, MT; at

the Rocky Plains fish health workshop in Boise; at the Western Fish Disease Workshop in Twin Falls, ID. Publications completed an article in *Aquaculture* on "Bacterial diseases of commercially important fishes" and "The effect of sturgeon density on manifestation of white sturgeon iridovirus disease" in *Journal of Applied Aquaculture*. Publications in press, in manuscript or consideration include: 1) new light on confirming WD; 2) lymphosarcoma in sockeye; 3) copepod hyperparasitism; 4) history of IPNV strains; 5) EM of *Loma*; 6) WD in whitefish.

h. Interagency cooperation Universities of California (Davis), Brigham Young, Idaho, Idaho State, Montana State, Washington, Oregon State, Colorado State; resource agencies: USFWS, USNBS, NMFS, LSRCP, WRIP, USFDA, Utah DNR, Colorado DW, Nevada DW, California FG, Oregon DFW, Washington DFW, Montana DFWP, NWIFC, Nez Perce Tribe, Columbia Basin FWA, BioMed, BPA, USACOE, AFS/FHS, PNFHPC, Rocky Plains FH Committee; other agencies: Idaho Dept of Agriculture, Clear Springs Trout, International Aquaculture Center, Boy Scouts of America, Smithsonian Institute (Registry for Tumors in Lower Vertebrates), etc.

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IDAHO DEPARTMENT OF FISH AND GAME

Funds Expended:

State:	\$14,744
Federal:	\$44,233
Total:	\$58,977

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