PTAGIS

PIT Tag Information System
Columbia Basin

Newsletter

IN THIS ISSUE

PTAGIS Welcomes A New Staff Member

JENN NIGHBOR (PTAGIS Kennewick Office)

We are pleased to announce that Roger Clark has joined the PTAGIS Kennewick Field Office staff. Roger recently relocated to Kennewick, WA from Minneapolis, MN, where he previously worked at Destron Fearing for 13 years.

While working at Destron Fearing, Roger served as an electronics engineering technician, working hands-on with product development as well as providing QA for livestock and fisheries RFID tag products.

The wealth of RFID knowledge Roger brings to his new position with PTAGIS is a great asset for the Kennewick Field Office. ☺

2011 PIT Tag Workshop Reminder

DAVE MARVIN (PTAGIS Portland Office)

Have you registered for the
PSMFC PIT Tag Workshop?

January 25-27, 2011
Skamania Lodge, Stevenson, WA.

The deadline to register is December 28, 2010.

Space is limited; currently 50 seats are available.
To register click on the link below.

http://www.cvent.com/EVENTS/Info/Summary.aspx?e=1e2c9195-021b-4599-a1fa-caee6c78d1c9

This also links to the Workshop's agenda, lodging information, and more. ☺

PTAGIS Client Software Upgrade

JOHN TENNEY (PTAGIS Portland Office)

PTAGIS Client Software Update

PTAGIS is balancing the development of the next-generation client software and the concurrent support of existing client software systems already in the field. There have been recent new releases of existing PTAGIS software and utilities described below. If you use our software, please read the details to see if you need to upgrade your system. Also listed are updates and plans for the next-generation client software systems.

Before each client software version is released, we perform thorough testing on all supported platforms (operating systems). We have made a decision to limit the number of supported platforms to those that are currently supported by Microsoft for client computer systems:

- Windows XP
- Windows Vista (x64 and x32)
- Windows 7 (x64 and x32).

Our existing client software systems may run just fine on older systems, but we cannot support expired platforms that often require additional versions of our software.

P3
Status: Version 1.4.8 released 12/2010

P3, also known as PITTAG3, is software used to capture mark/recapture field data and submit to PTAGIS. A recent version of P3, 1.4.8, was enhanced with the latest service packs and includes support for new types of tag codes including half-duplex technology. This version will support half-duplex tags read from the following portable readers:

- Destron FS2001F ISO running 5.0 firmware
- Allflex Portable running 1.1.3 firmware

There were also some minor bug fixes in this release related to importing external data:

- Exporting a tag session can produce a runtime "Invalid Null" error. This error can happen when a tag session is created from import data and is associated with a header template that contains a tag date value and the session header and the session header is never edited by the end-user.
- P3 will convert all alpha characters to upper case to avoid importing lower case validation codes.
- P3 will checks for negative weight and length values from imported data.

Unfortunately we had to drop web installation feature for quick patching. To upgrade or install the latest P3, please download and run the full installation of P3 from the PTAGIS web site.

MiniMon
Status: Version 1.5.4 released 9/2010

MiniMon version 1.5.4 includes support for additional tag types and a formatting correction in the status report output from a Destron FS1001M running with 2.1 firmware to indicate the DELAY value option associated with the UNIQUE MODE setting. The default installation path was corrected when installing this version of MiniMon on 64-bit platforms. Please refer to the 'MiniMon Upgrade Instructions' article in this newsletter for specific steps for upgrading an existing version of MiniMon.

NOTE: When installing onto embedded WinXP systems typically operating on micro-PCs, please make sure all file path settings are set to a correct folder by running MiniMon and reviewing both the General and Upload configuration settings. The MiniMon installer technology does not recognize embedded platforms and may not set valid default values for these settings.

We've attempted to fix an intermittent upload issue in this release: the PTAGIS FTP server, on rare occasion, will prematurely disconnect an upload session leaving behind stale temporary files on the client system that may prevent subsequent uploads. We have been unable to reproduce this scenario to verify the correction or cause, but we know it usually happens at sites running on slower Internet connections. In this release, MiniMon will attempt to delete any stale files left over from a previous session before starting the next upload. If the operating system has a lock on the stale temp files and MiniMon cannot delete them, a message will be reported to the log file and end user intervention may be necessary.

Another release of MiniMon will be scheduled for next year to support half-duplex tag technology.

PIFF
Status: Version 1.1.0.4 released 10/2010

PIFF, short for PTAGIS Interrogation File Formatter, is utility software developed in 2008 to support the submission of raw data from remote interrogation sites not using a data collection computer. The latest release contains these enhancements:

- Upgraded to use the latest M4 device libraries and now supports decoding raw data from a Destron FS1001M multiplexer transceiver running version firmware version 2.1. **Note:** PIFF will decode status reports from FS1001 1.7 and 2.x firmware only.

- Upgraded to use the Microsoft .NET 4.0 Framework. The PIFF installer will automatically install this framework if needed on the target system.

- Validation and error reporting have been enhanced during the scanning of raw data files.

- By request, PIFF will display and output data in the original order output from the source system and will not sort the by date.

- A timestamp generated from a transceiver takes precedence over a CR1000 data logger timestamp.

- All records output from a CR1000 data logger are marked as "buffered".

The PIFF client software will eventually be migrated into a PTAGIS web service. This web service will provide similar features from a common web browser so that researchers can submit raw field data into PTAGIS without having to install anything on their local machines. The web service will also provide an optional machine interface allowing automated system-to-system field data submission into PTAGIS. The schedule for developing this new web service is still TBD.

M4

Status: In development with internal beta releases

M4 is the next-generation interrogation software designed to capture real-time observation data from fish marked with a PIT tag. M4 will also support Separation-by-Code (SxC) diversion activities at various facilities. PTAGIS will be presenting M4 at the *2010 PIT Tag Workshop* and here is a preview of the significant progress has been made on this project in 2010:

- Completion of new data submission system corresponding with upgraded database server technology. Relational interrogation data is synchronized between field computers and the PTAGIS server over common HTTP and TCP network protocols.

- The M4 Device library was optimized to support high-performance SxC requirements by reducing tag acquisition and decoding latency from 15.1 to 1.1 milliseconds.

- Additional transceiver models were incorporated into the Device library as well as Ethernet communication support for Allan-Bradley PLC devices.

- Revised system architecture with an "always on" background host service to improve startup time and separate subservices such as monitoring, clustering, SxC, uploading and others to facilitate control operations.

- Completion of 'Failover Clustering' features allowing two M4 instances running on separate, physical computers to communicate and operate as one.

The final phase of development is underway to incorporate the remaining SxC features with a few more development cycles to go. Once these features are implemented and unit-tested, the application will then go through a laboratory performance analysis and tuning phase. When M4 separation-by-code and other monitoring features are fully optimized, we will perform in-situ testing at various facilities to verify the software meets defined performance standards before it is released for production use.

P4

Status: planning phase

The next-generation tagging software, P4, will start development as soon as M4 is released to production. The community will be surveyed to review features and data types within the existing P3 software to help identify additional requirements in the next software system. P4 will take advantage of the new database server platform and common subsystems developed for M4 to shorten the development cycle.

PTAGIS Web Reporting Update

NICOLE TANCRETO (PTAGIS Portland Office)

Following the completion of a community survey for PTAGIS online reporting features; we used the results to inform our evaluation of reporting platforms and tools. We attended online demonstrations and installed trial versions of a dozen different tools. We selected two companies, Microstrategy and Qlikview, to build demonstration applications using a subset of PTAGIS data. We presented the demonstration applications to the web reporting focus group and the PIT Tag Steering Committee, and gathered their feedback. This process culminated in a decision to move forward with Microstrategy as the reporting tool.

Figure 1. Screen shot of a report in the Microstrategy demonstration application.

We prepared a road map for moving forward with development of the new online reporting system in phases. The PIT Tag Steering Committee and the PSMFC executive director and fiscal division were briefed on the expected process and timeline.

Phase 1 consists of building a reporting application running against a recent snapshot of the PTAGIS database. We will import the snapshot into SQL Server and design a dimensional model for the application to run against. We will work with a local consulting firm that has expertise in Microstrategy to build the application using agile development methods. This application will be independent of the production PTAGIS Web Portal system and have no impact on it. The new application will have all the capabilities of the existing Query Builder application plus some additional features. This phase is expected to be completed by January 17 and presented at the PIT Tag Workshop.

Phase 2 consists of refining the dimensional model from Phase 1, adding more features to the application, and providing near real-time access to the full set of production data. We will test and confirm data quality and reporting accuracy, produce documentation and help files, and optimize the speed and stability. After this system is fully realized, optimized, and proven accurate, PTAGIS staff will coordinate with the PTSC to roll out the new reporting system sometime in the summer of 2011.

Phase 3 will consist of migrating PTAGIS O&M monitoring and reporting to the new system.

We would like to thank the focus group for assisting us with this important decision, and hope that we can count on their help in the future as we develop the new PTAGIS reporting tool.

MiniMon Upgrade Instructions

JOHN TENNEY (PTAGIS Portland Office)

The instructions below provide guidance for upgrading an existing version of MiniMon with the latest release (1.5.4 October 2010). PTAGIS is using new installation technology to better support the latest platforms and this new technology may not detect a previous version of MiniMon for automatic removal. In some cases, the existing configuration settings can cause a runtime error when the new MiniMon version is started.

MiniMon was designed to be installed and run on a dedicated system and requires a user account with administrator privileges. If installing and running MiniMon with elevated privileges is not possible, refer to the article in the November 2009 PTAGIS Newsletter that describes how to configure and run MiniMon without administrator privileges.

Please follow these instructions to ensure a successful upgrade of the latest MiniMon software.

1. Log into the user account that the previous version of MiniMon was installed under. The account will require administrator privileges.
2. Open the MiniMon application and click the **Configure** button, select the **Devices** page, and delete all configured devices (you may want to write down the device configurations settings before deleting so they can be replicated in the new installation of MiniMon).
3. Close the MiniMon application.
4. From the **Control Panel**, select **Add Remove Software** or **Program and Features**, select MiniMon in the list, and perform a manual uninstall of the existing version.
5. Once the software is uninstalled, reboot the computer.
6. Once booted, log into the computer and install the latest version of MiniMon.
7. Recreate your device configuration settings and verify the other settings.

If you have any questions or issues with MiniMon, please contact PTAGIS by email at ptagis_support@ptagis.org or by phone at (503) 505-3100.

Destron Fearing Releases CS Flash Installer

ROGER ANDERSON (Destron Fearing)

Destron Fearing has released a new version of the VBFlash program in which the name has changed to CSFlash. The VBFlash version was not compatible with Windows 7 operating system. This version of the program should work under the following operation systems:

> Windows XP (32 and 64 bit)
>
> Windows Server 2008
>
> Windows Vista (32 and 64 bit)
>
> Windows 7 (32 and 64 bit)

This version of the program:

- Does not require installation; just copy the .exe file to the desired location in your computer.
- Will require .NET Framework 4.0 be installed (can be found right next to the program)
- Automatically detects available com ports and is very user friendly.

This version to be used for programming readers:

- FS1001 Juvenile Stationary Transceiver System
- FS1001A Adult Stationary Transceiver System
- FS2001F Portable Transceiver
- FS2001F-ISO Portable Transceiver
- FS1001M Multiplexing Stationary Transceiver System
- FS1001B Bonneville Adult Stationary Transceiver System

You can download the CS Flash Installer as well as other Destron Fearing firmware from Destron Fearing's secure FTP site by following these directions:
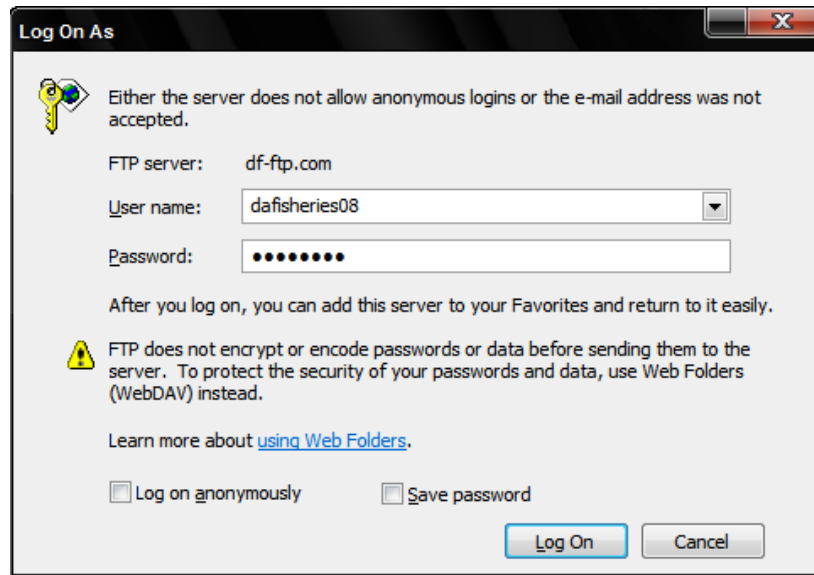
Open a web browser and navigate to:

ftp://df-ftp.com

User Name: dafisheries08

Password: PITTag08

Log On As

Either the server does not allow anonymous logins or the e-mail address was not accepted.

FTP server: df-ftp.com

User name: dafisheries08

Password: ●●●●●●●●

After you log on, you can add this server to your Favorites and return to it easily.

⚠ FTP does not encrypt or encode passwords or data before sending them to the server. To protect the security of your passwords and data, use Web Folders (WebDAV) instead.

Learn more about using Web Folders.

☐ Log on anonymously   ☐ Save password

[Log On]   [Cancel]

1) Navigate to the CS and VB Flash product folder

B2CC   CS and VB Flash   Distributed Multiplexer   FS1001 Stationary Readers   FS1001M Multiplexer   FS2001 Portable Readers   Misc. Material

2) Navigate to the CSFlash folder

CSFlash   VBFlash 2.2.zip

3) This version of program does not require installation; just copy the .exe file to the desired location in your computer.

dotNetFramework   CSFlash.ini   CSFlash 11-3-2010.doc   CSFlash.exe
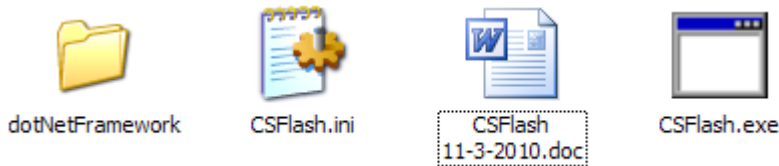
4) This version of program will require .NET Framework 4.0 be installed. (Navigate to the dotNetFramework folder)

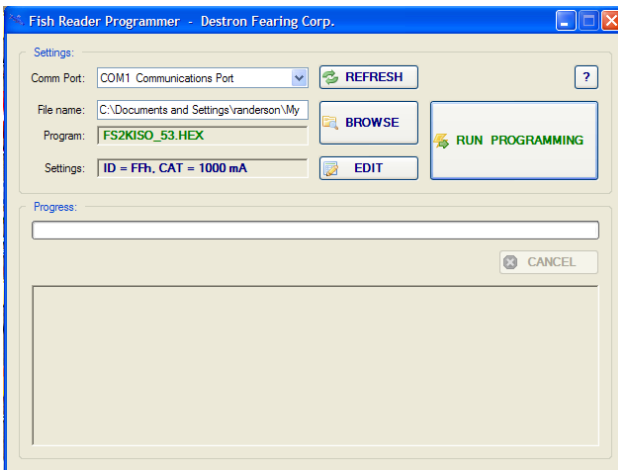dotNetFramework   CSFlash.ini   CSFlash 11-3-2010.doc   CSFlash.exe
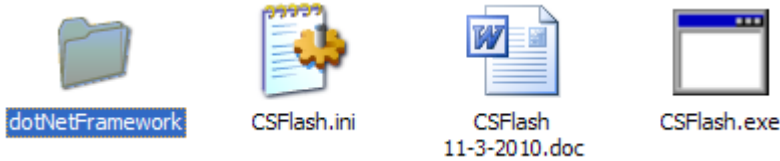
5) Select and install .NET Framework 4.0

dotNetFx40_Full_x86_x64.exe
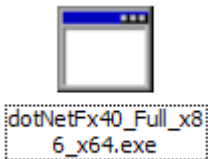
6) After installation to computer is complete, select the CSFlash.exe program downloaded on your computer and open the program.

7) The program is very user friendly:

- Select the computer's available com port on the drop down menu.
- Select the reader's hex program to flash using the **"BROWSE"** button.
- Change the settings as needed with the **"EDIT"** button.
- Proceed to **"RUN PROGRAMMING"** to start the flash process.
- More detailed instructions available in the CSFlash word document.

CSFlash 11-3-2010.doc

Klickitat River Subbasin Improvement Project Overview

EARL F. PRENTICE (Fisheries Biologist, Harbor Consulting Engineers)

The Klickitat River is one of the longest undammed rivers in the northwest and flows into the Columbia River at river mile (RM) 180.4 near Lyle, WA. Ten miles of the river is designated as "Wild and Scenic" beginning at the confluence with Wheeler Creek, near the town of Pitt, to the confluence with the Columbia River. The river supports runs of spring, summer, and fall Chinook salmon, coho salmon, winter and summer steelhead, and Pacific lamprey. In addition, cutthroat trout (*Oncorhynchus clarki lewisi*), rainbow trout (*O. mykiss*), bull trout (*Salvelinus confluentus*), and brook trout (*S. fontinalis*) are present within the river system.

Historically there have been two natural impediments to the upstream migration of anadromous fish into the upper Klickitat Subbasin, especially during low flow periods. Both impediments consisted of multiple natural cascades and waterfalls. The first obstruction to fish migration is located at RM 2.2 and is referred to as Lyle Falls or Klickitat Falls No. 5. The second obstruction is located at RM 64 and is referred to as Castile Falls (Fig. 1).
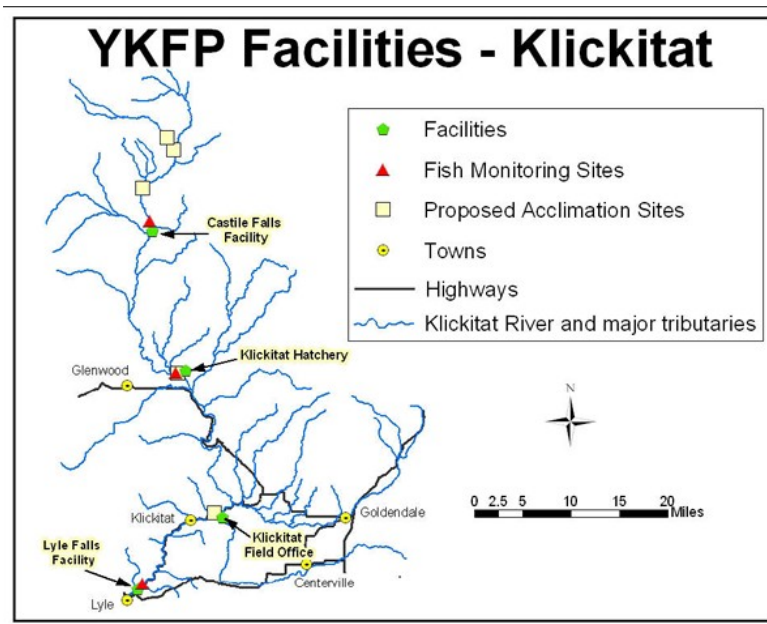

Figure 1. Location of Lyle Falls, Castile Falls, Klickitat Hatchery and the Wahkiacus Hatchery Acclimation Facility (located near the Yakama Nation's field office) on the Klickitat River.

In addition to the natural impediments, fish runs were impacted by the construction of dams on the main-stem of the Columbia River. To augment declining runs, fish hatcheries were constructed including the design and construction of the Klickitat Hatchery (1949 – 1954). The hatchery is located at RM 42 of the Klickitat River, 7 miles east of Glenwood, Washington (Fig. 1). Originally the hatchery was operated by Washington Department of Fisheries (WDF), now the Washington State Department of Fish and Wildlife (WDFW).

Funding for hatchery operations comes from NOAA-Fisheries under authority of the 1938 Mitchell Act. The hatchery, in addition to Lyle and Castile Falls fishways, has been operated since 2006 by the Yakama Nation (YN) in accordance with the co-managed (YN & WDFW) Yakima/Klickitat Fisheries Project (YKFP) plan. The YKFP plan addresses renovation of existing facilities, new facilities, production protocols, monitoring and evaluation, and habitat improvements needed to improve both anadromous and resident fish populations. This includes major renovation to the Klickitat Hatchery (RM 42) and the anticipated construction of the Wahkiacus Hatchery and Acclimation Facility (WHAF) complex to be located near the Yakama Nation's Klickitat Subbasin Field Office located near RM 17 of the Klickitat River (Fig.1).

An in depth description of the Yakama Nation's fishery plan for the Klickitat Subbasin can be obtained at **http://www.ykfp.org/klickitat/Hatch_AP.htm**. The link provides photos and a description of the changes that are or will be made to fish passage and fish culture facilities including Lyle and Castile Falls, the Klickitat Hatchery, and Wahkiacus Hatchery Acclimation Facility. Joint sponsors of the Klickitat Subbasin Fisheries Program include Bonneville Power Administration (BPA), the Yakama Nation, and the Washington Department of Fish and Wildlife. The specific projects to be described are the first major construction project to be implemented under the landmark Columbia Basin Fish Accords. These include Lyle Falls, Castile Fall, Klickitat Hatchery, and the Wahkiacus Hatchery and Acclimation Ponds. Incorporated into all of the new or renovated facilities will be passive integrated transponder (PIT) tag technology.

Harbor Consulting Engineers of Seattle, WA is the prime design and engineering firm for the four construction projects.   Design and engineering is now complete for the Lyle Falls and Castile Falls project but still underway for the Klickitat Hatchery renovation project and the new Wahkiacus facility. Earl Prentice, biologist for Harbor Consulting Engineers, Bill Sharp, YN tribal biologist, and Don Warf and his team from Pacific States Marine Fisheries Commission (PSMFC) have been guiding the design of the PIT-tag interrogation systems to be installed at the construction projects. In April 2010, William Charles West Inc. of Kennewick, WA was awarded the Lyle Falls and Castile Falls improvement contract.   The work is being funded by the BPA, under the guidance of the YKFP.

Lyle Falls

To overcome the impediment to fish passage at Lyle Falls, WDF began building a concrete fishway at Lyle Falls in 1949. In 1955 a more formal facility was constructed with additional changes made to the facility in the 1960's. However, in spite of these efforts, fish passage at Lyle Falls has met with only limited success, especially during low flow conditions at the fishway entrance and exit. This lack of water in the fishway results in fish being reluctant to enter and exit the fishway.

The new fishway now under construction at Lyle Falls includes: relocation and modification of the ladder exit and entrance; a new fishway water intake structure; a new fish passage channel; a 45 foot tall fish lift elevator that will enable fish to be routed to a fish handling, sorting, sampling, tagging, transport facility; a water reservoir; and offices. In addition, the fishway will be made lamprey friendly using rounded corners, etc. and incorporating a separate lamprey ladder located at the fishway entrance.

The ladder is a design that NOAA Fisheries has successfully used at Bonneville Dam and elsewhere for enhancing lamprey passage.   Provisions for interrogating HDX PIT-tagged lamprey will be incorporated into the lamprey ladder. In the fishway, three consecutive vertical slots will be outfitted with shielded FDX antennas. The shielded antennas will measure about 2 ft wide by 9 ft tall. The forthcoming 20-20 transceiver from Destron Fearing is planned to be used on the project. Unlike the fish ladders on the Columbia River, both the Lyle Falls and Castile Falls fishways overtop during high water periods. In addition, the water level within the fishway at both facilities can vary significantly as the water level is not controlled by a dam; thus it can vary in height daily or seasonally by a number of feet. In the largest water events the site passes 50,000 CFS and is flooded by 20 ft of water.   This means that the transceivers must be located out of harm's way about 175 ft from the antennas. In addition, the transceiver must be able to self tune in a manner similar to the FS1001 MUX transceiver presently used for stream applications. The new 20-20 transceiver has more power and a better electromagnetic noise filter system than FS1001 series transceivers presently used at most fish ladders. These features, in part, enable the transceiver to operate with a longer cable from the antenna to the transceiver. The new transceivers also have an auto-tune feature which will enable the transceiver to remain in tune regardless of water height in the fishway or changes in environmental conditions.

Additional PIT-tag interrogation will take place at the entrance, within, and at the exit of the adult fish sorting and handling facility. There will be six interrogation locations associated with this facility. Each location will have two antennas located in a shield box. The antennas will be wrapped around a 14-inch diameter PVC pipe. Within the fish handling facility there will be several portable transceivers used to verify the presence or absence of PIT tags on fish entering the facility and during tagging operations. Some of the fish diverted to the facility will be transported directly to the Klickitat Hatchery as brood stock while others will be released back to the river. All fish handled will be anesthetized using electro-anesthesiology rather than using chemicals or gas since fish released could be captured for human consumption.

The lamprey flume will be constructed and installed by NOAA Fisheries under a BPA contract. The PIT-tag interrogation systems at both Lyle Falls and Castile Falls are being installed and maintained by PSMFC under contract with BPA. All PIT-tag data collected at Lyle Falls will be transmitted to PTAGIS via a land line.

Castile Falls

Castile Falls actually consists of eleven natural falls with a vertical drop of 108 feet over 0.67 miles. The first attempt to improve fish passage occurred during the 1950-1960 time period. The passage improvements included the construction of a fishway around the major falls and modification to some small falls. This first attempt failed due to design flaws and improper maintenance. In 1999 NOAA Fisheries approved design changes for the passage facility with special appropriations coming from the Mitchell Act as the result of the 1996 floods that damaged a number of fish passage facilities in the Pacific Northwest. However, renovation of the Castile Falls fishway did not occur until the 2003-2005 time period.   Facility improvements at that time included converting the passage facility from a pool-weir style fishway to a vertical slot fishway to allow passage over a wider range of river flow conditions and to reduce maintenance needs.

Additionally, in 2005 work was completed on two fishway tunnels within the Castile Falls complex. These changes brought the facility into basic compliance with NOAA Fisheries' fish passage standards. In addition, the improvements opened access for salmon and steelhead to over 50 miles of habitat in the upper Klickitat which had been blocked for 40 years.

Additional work to the fishway is required to enable video enumeration of fish passage, PIT-tag interrogation, and non-manned monitoring of the facility to ensure proper facility operation and security. Present work at Castile Falls includes the construction of a building that will house a diesel generator system to be used to provide power to various types of electronic equipment. A separate structure will contain fuel storage. The electronic equipment to be operated includes: video cameras in and above the fishway, a multifaceted security system, on demand lighting in the building and outside, power and electronic system monitoring equipment, two independent satellite communications systems, video fish enumeration system, and a PIT-tag interrogation system. Since the facility needs to operate year-around and is located many miles off the electrical grid, diesel power was selected as the power source. Other means of power generation were investigated and found not to be cost effective to meet overall power requirements for a four month long unattended facility.

Within the building there will be a fish counting window through which fish passing will be videotaped. This information will be transmitted via satellite to YN offices for analyses. Two vertical slot passage ways in the fishway just prior to the counting window will be equipped with shielded PIT-tag antennas. One additional antenna will be incorporated in a vertical slot just upstream of the counting window. All three antennas will measure about 2 ft wide by 9 ft high. As with the Lyle Falls PIT-tag system the intent is to use forthcoming Destron Fearing 20-20 transceivers. The transceivers will be located in the same room as the video fish enumeration equipment. All PIT-tag data will be transmitted to PTAGIS via the satellite communication system.

Klickitat Hatchery and Wahkiacus Hatchery Acclimation Facility

The Klickitat Anadromous Fishery Master Plan (KMP) identifies upgrades to the Klickitat Hatchery and the need for new fish rearing and acclimation facilities at Wahkiacus to be located at RM 17 on the Klickitat River. The changes are required to meet Hatchery Scientific Review Group's (HSRG) reform criteria that are outlined in the KMP (see additional information at **http://www.ykfp.org/klickitat/Hatch_AP.htm**). Each of these facilities is critical to the Yakama Nation as discussed in the Yakima/Klickitat Fisheries Project (YKFP) plan. Presently the Klickitat Hatchery rears and releases spring and fall Chinook and Coho salmon. In addition, steelhead smolts are released annually directly into the Klickitat River at several locations downstream of the Klickitat Hatchery.

The new plans call for the rearing and release of coho and fall Chinook salmon at the Wahkiacus Hatchery Acclimation Facility, located 26 RM below the Klickitat Hatchery. The rearing of these fish at the WHAF facility in conjunction with incubation and rearing at Skamania Hatchery will enable the fish to be released low in the basin. This program reduces the interaction on wild species rearing in the river near the Klickitat Hatchery such as spring chinook and summer steelhead. In addition, the transferring of coho and fall Chinook production stocks to the WHAF frees up critical water and space at the Klickitat Hatchery thus ensuring that optimal rearing densities and protocols outlined in the YKFP and HSRG guidelines are met for the two endemic stocks in the Klickitat River Klickitat spring chinook and Klickitat summer steelhead.

Upgrades to the Klickitat Hatchery, in part, include: the construction of a bridge across the Klickitat River to provide a second ingress and egress point for hatchery staff; a new water supply line; turbine hydro power generator; facility waste heat recovery for building heating; adult fish ladder; adult brood stock holding ponds; adult spawning facilities; and juvenile volitional release rearing ponds. In addition, the existing fish rearing building will be updated and expanded, including the capability to chill water for incubation. The WHAF will be a new facility which will include egg and fry incubation, offices, an adult ladder, adult broodstock holding ponds, spawning facilities, and acclimation ponds which will also be designed to enable volitional releases to occur.

PIT-tag interrogation equipment will be installed at both the Klickitat Hatchery and WHAF. Interrogation will take place in the hatchery return adult fish ladders and at the exit of the volitional release rearing ponds. Which transceiver will be used at the facilities has yet to be determined since the facilities are just now being designed by Harbor Consulting Engineers on behalf of the YN. As presently planned, a minimum of two antennas would be installed in the fishway leading to adult holding ponds. At each volitional release pond it is anticipated that there will be two pipe outlets with each outlet having a minimum of two shielded antennas. As with the Lyle and Castile Falls facilities, PSMFC will play a key role in final system design, system maintenance, and ensuring data is reliably transferred to PTAGIS.

Warmest wishes for a wonderful
Holiday Season!

PTAGIS
STAFF