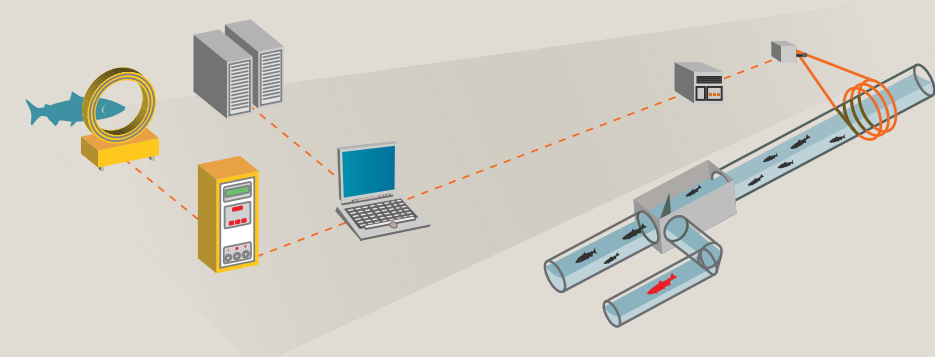


OVERVIEW

THE COLUMBIA BASIN PIT TAG INFORMATION SYSTEM (PTAGIS) IS THE CENTRALIZED DATABASE FOR FISH MARKED WITH PASSIVE INTEGRATED TRANSPONDER (PIT) TAGS IN THE COLUMBIA RIVER BASIN.

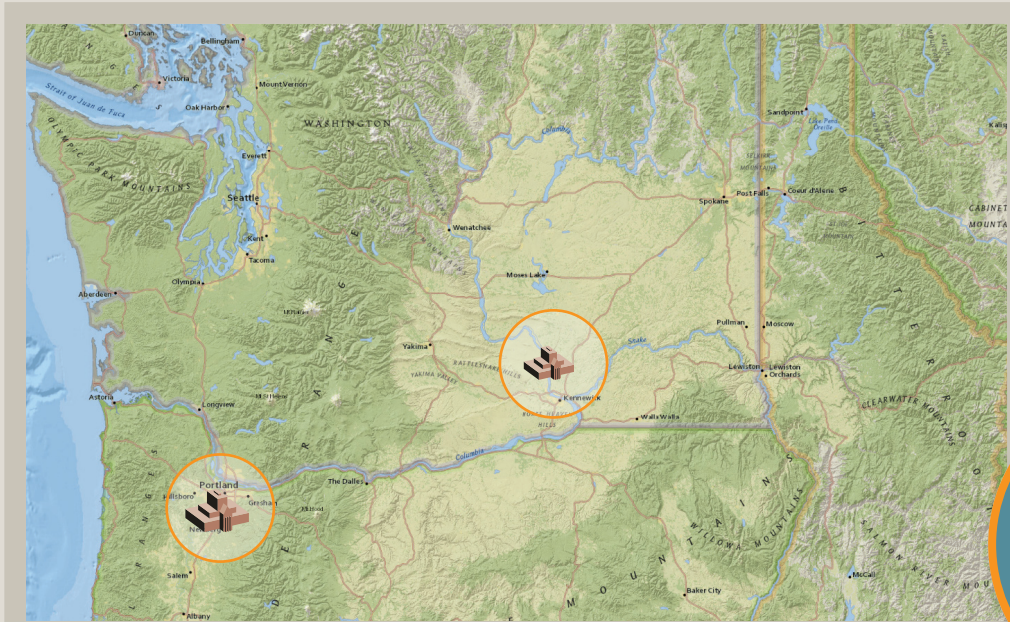


CUSTOM SOFTWARE & HARDWARE

PTAGIS provides custom software to assist data contributors with collecting and submitting high-quality data. PTAGIS also designs, installs and maintains automated detection systems at many of the large hydropower dams on the Columbia and Snake rivers.

SEPARATION BY CODE (SBYC)

Individual PIT-tagged fish can be targeted by researchers for separation from the general population as they pass through juvenile bypasses or adult fishways. Target fish can be diverted to holding tanks for hands-on sampling, or collected for transportation by barge or truck.



PIT TAGS ARE ENCODED WITH A UNIQUE IDENTIFIER AND ALLOW A FISH IMPLANTED WITH ONE TO BE PASSIVELY DETECTED THROUGHOUT ITS LIFETIME.

DATA EVENTS

THE RECORDS IN THE PTAGIS DATA WAREHOUSE DESCRIBE FOUR SEPARATE TYPES OF EVENTS SPECIFIC TO PIT-TAGGED FISH.

INTERROGATION

A PIT-tagged fish may be detected at one or more fixed automated detection sites. The time is recorded as the fish passes by or through antennas.



MORTALITY

Previously PIT-tagged fish may be recovered after death. Recoveries of bare PIT tags, for example from avian colonies, can be inferred as a mortality event.



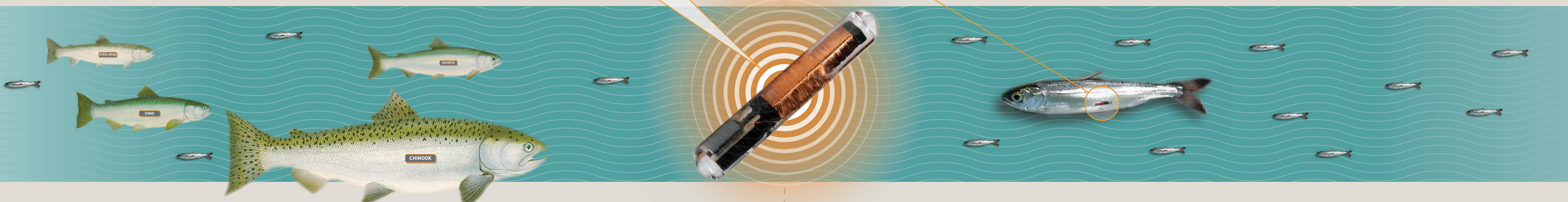
MARK /RELEASE

Each unique PIT tag is associated with a specific mark event. Species, size, condition, and other associated metadata are recorded for each fish, along with location and time of release.



RECAPTURE

Previously PIT-tagged fish may be recaptured and physically sampled subsequent to initial marking event.



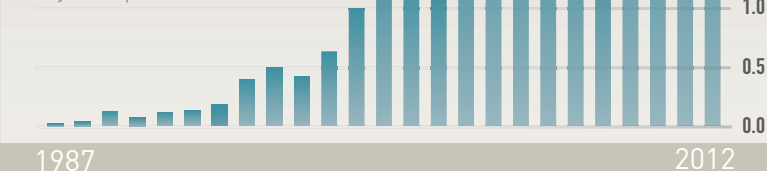
25 YEARS
34 MILLION TAGGED
1.1 MILLION RECAPTURED
1.2 MILLION RECOVERIES
700 LOCATIONS

TAGGING LOCATIONS

Mark/release, recapture, and recovery records are tied to locations in the Columbia Basin. These locations can be a stream segment, a fixed point, or a site within a hydropower facility. PIT tag data has been reported from nearly 700 different locations across the Basin.

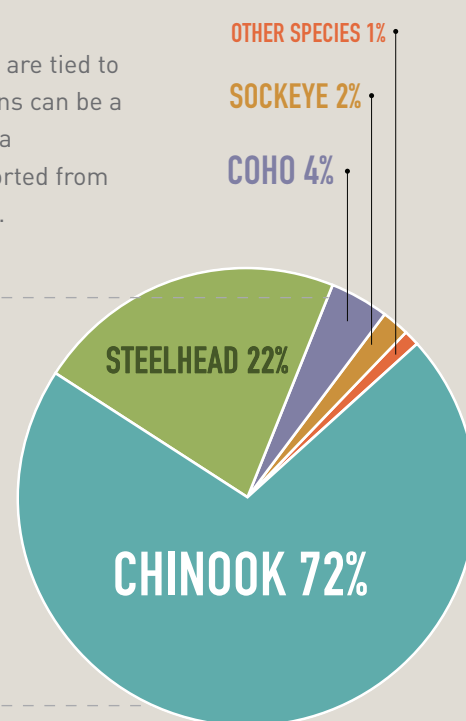
TAGGED FISH

The number of fish marked with PIT tags annually has grown from approximately 30,000 in 1987 to 2.9 million in 2012, with a total of nearly 34 million fish tagged during that 25 year span.



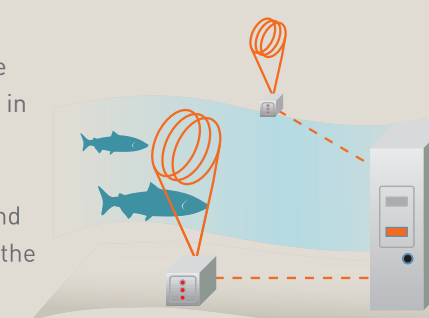
SPECIES TAGGED

In recent years, PIT tags have been used to mark and track an increasing number and diversity of other species throughout the Columbia Basin, including northern pikeminnow, shad, juvenile and adult Pacific lamprey, brook trout, and both resident and anadromous stocks of cutthroat trout.



DAMS

Many of the dams on the Columbia and Snake rivers have interrogation equipment installed in the juvenile bypass systems and adult fish ladders. PTAGIS installs and maintains these systems with multiple redundant antennas and high availability computer systems to handle the large volume of fish passing through.

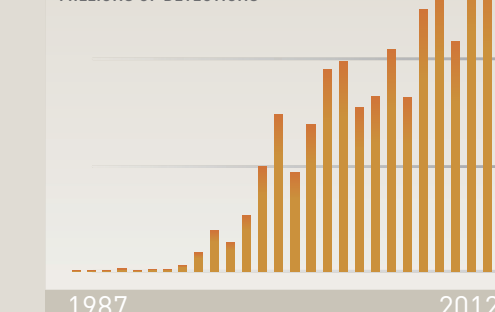


TRIBUTARIES

Low power interrogation systems were developed to provide automated detections in remote locations. These sites, operated by a variety of fisheries agencies, typically have fewer antennas which are installed directly in stream beds.



MILLIONS OF DETECTIONS



DETECTIONS

From 1987-2012, almost 14 million unique PIT-tagged fish have been detected at one of 250 sites, generating 150 million detection records.

MARKING & RELEASE

AROUND 40 DIFFERENT ORGANIZATIONS HAVE MARKED FISH WITH PIT TAGS AND RELEASED THEM INTO THE COLUMBIA BASIN.

INTERROGATION

AUTOMATED INTERROGATION SYSTEMS PASSIVELY DETECT PIT TAGGED FISH AS THEY PASS BY OR THROUGH SPECIAL ANTENNAS.

