

# EAGLE POST 8

EAGLE POST - The newsletter of **Friends of Eagles Nest Wilderness** ([fenw.org](http://fenw.org)), apprising you of important activities in and around Eagles Nest, Holy Cross, and Ptarmigan Wilderness Areas.

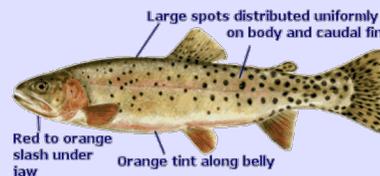
Greetings!

Our **topic this month**: *Saving native cutthroat trout in Eagles Nest Wilderness*



**Introduction:** The Forest Service has begun an exciting new research project in Eagles Nest Wilderness. They will inventory the dwindling native cutthroat trout population (it's found in **less than two percent** of its historic range) in every stream and lake using new, cutting-edge DNA technology, like that used on the famous TV program, CSI. The aim of the project is to discover and document new populations of genetically-pure, native cutthroat trout, with a long term goal of restoring their numbers and range.

**Background:** Originally, the *only* trout in Western rivers was the cutthroat, descended from ancient Pacific species (how they crossed the Continental Divide is anybody's guess). Then, in the 1860s, began the relentless introduction of non-native species (e.g., rainbow, brook, brown...), for anglers' sporting pleasure, marking the beginning of the near-end for the native cutthroat. In fact, cutthroats were reckoned to be extinct in 1937, thankfully incorrectly. Recovery efforts began in the 1950s, and the species moved from *endangered* to *threatened* status, although today non-native trout, overfishing, and habitat loss continue to hamper cutthroat recovery efforts.



Unfortunately, it gets worse. A new challenge - global warming - has emerged. Why? Well, the final refuge for cutthroats is found in the highest mountain lakes and streams, because the non-natives don't like the cold waters there. But with global warming, the invaders are moving upstream and hybridizing with the native cutthroats. Whether you find that acceptable or not, the hybrids are turning out to be *less fit* than their parents, thereby threatening the entire future trout population! (see [NPR article](#))

Monitoring cutthroat populations has traditionally relied on visual observations made directly in the field, which are subject to myriad uncertainties. However, in just the last few years, measurements have

Make a donation



Make a difference!

2016 **Trail projects:**

We spent two long weekends - one at Upper Cataract Lake, and one on Slate Creek - improving trails and campsites. We obliterated a

total of **54** illegal rock-ringed campfire pits at lakes.

**Day Projects** Saturdays: June 4, June 18, July 9

**Pack-in** weekends (Fri-Sun): July 15-17 and August 12-14. [Details](#)

Interested in becoming a **Volunteer Wilderness Ranger?** [Details](#)

We also need volunteers

**outside the Wilderness**

- **Member Relations - HELP** develop and implement communications plans to keep FENW members informed and involved... and maybe have some fun too.
- **Volunteer Recruitment - HELP** devise and deliver plans to greatly expand the field volunteer base through publicity, community



been put on more scientific ground with the development of *environmental DNA*, or eDNA, analysis, which brings the wonders of molecular biology into the wonders of the Wilderness. Analysis of eDNA has been successful in detecting a huge range of plants and animals, both extinct and alive, on land and sea, without having to see them at all in the wild.

It turns out that Eagles Nest Wilderness, especially on Meadow Creek, is a key eDNA study site. Read below how USFS Fish Biologist **Matt Grove** is using eDNA to assess cutthroat populations on every stream and lake in Eagles Nest Wilderness.

## Saving the cutthroat trout with eDNA

By Matt Grove

All animals shed their own DNA into the environment as they lose hair, skin, scales... whatever. This makes it possible for fish DNA to be retrieved from any aquatic environment. Working on a project funded by the Fisheries Program of the Holy Cross Ranger District, I collect these pieces of environmental DNA (eDNA) by pumping ten liters of stream water through a fine filter, then saving the filter with its trapped contents. Back in the office, I freeze the filters, which are later delivered to the lab. The eDNA is then identified using a technique known as **PCR**, which relies on short stretches of DNA sequences that are unique to each species of trout (more about PCR **HERE**). With PCR, we can distinguish which trout species are present in the stream based on the presence of the individual species' markers. This technology can be used to discover "lost" populations of cutthroat trout and to identify expanded ranges of existing populations. Because eDNA degrades as it moves downstream, I collect samples periodically along the stream. So far, I've sampled 13 of 31 target streams in Eagles Nest Wilderness.

Why is Eagles Nest Wilderness a preferred study site? It's because of the extensive historic database of trout presence, especially on East Meadow Creek, which allows us to compare results using the new eDNA technology with decades of field observations. So far, we find pretty good agreement between the historic and the eDNA data, and we have also determined that eDNA travels intact for about one-half mile in the streams (which determines how often I take samples).

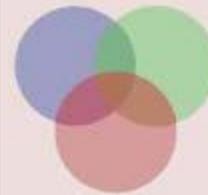
A recently completed status assessment in the White River National Forest



outreach and partnerships.

- **Public Relations** - **HELP** plan and implement ongoing PR programs to raise the public profile of FENW in the community.
- **Advocacy** - **HELP** preserve and protect our backyard wilderness areas by developing and promoting FENW wilderness public policy positions.
- **Grant Writing** - **HELP** apply for grants to raise funds for FENW and Forest Service stewardship programs and special projects.

Details: contact **Bill Reed**  
(billr412@icloud.com).



**Friends, Friends, Friends!** Check out our sister 'FRIENDS'

- Friends of Dillon Ranger District (FDRD)
- Friends of the Lower Blue River (FOLBR)

2016 Newsletters

- October: "**Loved to Death**" by Jackie Fortier
- September: "**Toward a Natural Forest**" by Jim Furnish
- August: "**Save the Colorado River**" by John Fielder
- July: **150th anniversary** by Bayard Taylor
- June: "**Birds of ENW**" by Dr. Susan Bonfield
- May: "**Bikes in Wilderness**" by Tim Drescher
- April: "**After Malheur**" by Currie Craven

## Upcoming events

Join us! for our next  
**MONTHLY MEETING**  
November date TBD, 5:30 PM,  
Silverthorne >> **MAP**

Details at [www.fenw.org/](http://www.fenw.org/)

Visit the FENW **website** for in-depth information at [www.fenw.org/](http://www.fenw.org/)

suggests that cutthroats occupy only 14% of their former range. Most of these cutthroats, however, are hybrids with non-natives; *genetically pure* native cutthroats are found in only *one percent* of their former range. These are the most remote headwater streams and lakes, isolated from lower reaches by impassable barriers to upstream fish movement. This isolation, though protective in the short term, decreases the probability that native cutthroat populations will persist over longer time periods.



Results of our inventory so far are preliminary, but encouraging. We documented cutthroat trout in three new streams of the 13 that we have sampled in Eagles Nest Wilderness. Naturally, we are hopeful that more populations will be identified in the remaining 18 streams to be sampled.

How will these results be used? They will be a big help guiding our management decisions over the next decade, and beyond. We hope to create a new system of classification of watersheds, one that relies on genetic lineage of the native fish that reside in them. This will guide us to watersheds and even to individual streams that have the potential for native cutthroat restoration, not just in Eagles Nest Wilderness, but across the entire Upper Colorado River Headwaters.

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**About Matt Grove :** In 1998, after being awarded a BS in Zoology from Southern Illinois University, Matt joined the National Park Service, where he worked for seven years on a variety of biological monitoring projects. In 2006, he moved to a new position - lead fisheries technician - with the Eagle/Holy Cross USFS Ranger District. Since then, he has been promoted to Fisheries Biologist. His full title is East Zone Fish Biologist, Eagle/Holy Cross and Dillon Ranger Districts, White River National Forest.

Does Matt enjoy fishing for cutthroats in his spare time? "I pretty much only fish at work with electrofishers.... Other than that I only fish in Florida when I am visiting my family. However, I do enjoy floating down a river and sipping on a cold beer," he says.



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## CITY MARKET COMMUNITY REWARDS PROGRAM

Please register your City Market Value Card in 2016. This year, City Market will once again make a contribution to area non-profit organizations. The program allocates funds (rebates) to the organizations based on purchases made using the City Market Value Card. Organization members must go online at [www.citymarket.com](http://www.citymarket.com) to register their Value Card, and link their card to FENW's organization name and/or registration number - **46910**. Individual purchases will be counted towards FENW's rewards allocation without compromising your earned fuel points. Please note that each card holder may only sign up for one tax exempt organization. **THANKS!**

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**WE \*** have identified you as someone who will value our news updates. But if you do not wish to receive further emails from us, just click [unsubscribe](#). \*The FENW Board: Currie **Craven** (Pres), George **Resseguie** (Treas/Secy), Bill **Reed**, Bill **Betz**, Ken **Harper**, Cyndi **Koop**, Mike **Mayrer**, Frank **Gutmann**, Tim **Drescher**.



## WHAT IS PCR?

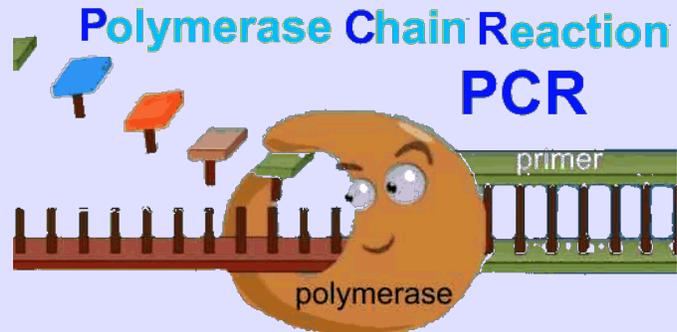
How do you find a needle (cutthroat trout DNA) in a haystack (a whole lot of other DNA)? You use PCR.

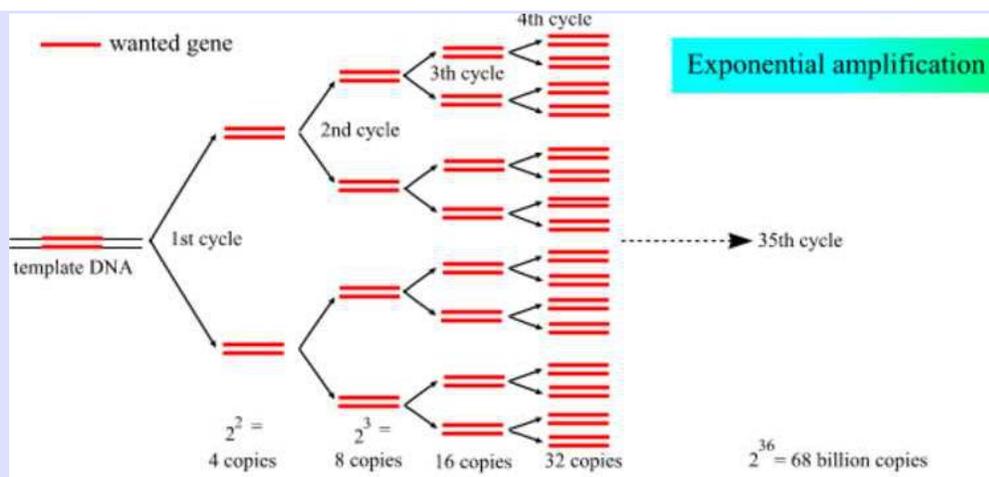
PCR is a technique that causes the needle in the haystack to make a billion copies of itself, making it a whole lot easier to identify.

Suppose you want to determine if cutthroat or rainbow trout (or both, or neither) are present in a lake. You collect eDNA from the lake, and then look for unique DNA markers that tip off the presence of each species. In reality, it's done in two steps - preliminary work and then the PCR itself.

In preliminary work, you begin with the entire fish genome. From this, you need to identify, isolate, and *sequence* DNA from a region that differs slightly between cutthroat and rainbow trout (not a trivial chore). Then you make *primers* - short stretches of DNA that match the start of the sequence. Each species needs *two* primers (one for each strand of DNA), separated by a short stretch (different length for each species) of DNA. Now you are ready.

PCR: the eDNA is heated to break apart the two strands into *single stranded* DNA. Then it is cooled, and the primers (present in great excess) bind to their complementary regions, making short stretches of double-stranded DNA. Then an enzyme - *DNA polymerase* - recognizes the short stretch of double-stranded DNA and adds the rest of the second strand. Then the soup is heated again, and the double strands come apart. After cooling, the primers bind, and the polymerase copies. Each cycle of heating and cooling doubles the number of copies, and after 30 cycles of heating and cooling, there are about a billion copies ( $2^{30}$ ). It is then an easy matter - using electrophoresis - to separate the cutthroat from the rainbow copies. It's clear why PCR stands for **P**olymerase **C**hain **R**eaction.





PCR of eDNA is not without its limitations, such as false positive results. Also, hybrids are a problem. For example, if positive results are obtained for both cutthroat and rainbow trout in a lake, PCR cannot distinguish between the presence of a cutthroat-rainbow hybrid and the presence of both genetically-pure species (although the latter is likely to lead to hybridization).

Last year cutthroat trout eDNA markers (primers) were created for cutthroat trout using genetic material from fish collected by Colorado Parks & Wildlife (CPW) and by the U.S. Forest Service over the last decade. To test the markers and determine if they are effective in the field a control stream site was needed. Because the USFS has been working in East Meadow Creek for a number of years and knows exactly where the cutthroat population in the stream begins, it serves as a perfect control stream. Using this existing detailed demographic information, we were able to determine approximately how far eDNA travels in the stream before it is degraded. Detectability turns out to be approximately one half mile downstream from where known cutthroat populations reside, so that is the distance between the eDNA samples that I take.

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THE BEAUTIFUL NATIVE CUTTHROAT TROUT:

