Previous studies had seemed to indicate that habitat for three species in particular—the tailed frog, the Pacific giant salamander, and the torrent salamander—all relied on old growth forest to shade and cool these headwater streams, but some researchers are discovering that there may be other factors at work.

To better understand how timber harvest and buffer zones around these streams affected amphibian populations, Willamette Industries asked wildlife research biologist Kevin Russell to survey the Columbia torrent salamander across a random sampling of their forests. This particular species was perfect for the study because more than 95 percent of its territory is on private or state forestland within the Coast Range Mountains of southwestern Washington and northwestern Oregon, and most of it is commercially managed.

From 2000 to 2001, Russell and his research partners Todd Mabee and Michael Cole assessed hundreds of headwater streams throughout the range of these salamanders, and some interesting patterns were discovered, in addition to surprisingly large quantities of salamanders. “After studying the data we had collected, it appeared that there were more factors at work than just the age of the forests around the headwater streams,” said Russell, who is now an assistant professor of wildlife ecology at the University of Wisconsin, Stevens Point.

“The data pointed to the fact that although the riparian zone was a factor in the abundance of the species, it was overshadowed by the other factors within the stream itself—chiefly whether it was a steep or shallow gradient, and the type of geology underlying it.”

While Columbia torrent salamanders were well-distributed throughout the landscape, they were particularly abun-
could focus the protection on areas we
riparian protection on every stream, we
when it isn’t practical to have complete
targeting that protection. In situations
determine where exactly we should be
may be able to use these findings to
beneficially used. “I’m certainly not say-
to target where protection could be most
now, according to Russell, is somewhat
the placement of the protection right
perennial headwater streams. However,
Law is designed to protect 50 percent of
Washington, and the Forests and Fish
rent salamanders on the Olympic penin-
well the results translate to inland areas

Management Implications
The Columbia torrent salamander is cur-
currently under consideration for listing
under the Endangered Species Act in
Washington, and the Forests and Fish
law is designed to protect 50 percent of
perennial headwater streams. However,
the placement of the protection right
now, according to Russell, is somewhat
random. He feels this data could be used
target where protection could be most
beneficially used. “I’m certainly not say-
ing that riparian protection for these
headwater streams is unnecessary, but we
may be able to use these findings to
determine where exactly we should be
targeting that protection. In situations
when it isn’t practical to have complete
riparian protection on every stream, we
could focus the protection on areas we
have determined to already be favorable
to torrent salamanders.”

Conversely, he suggests that low-gradi-
ent, marine sediment streams may not be
productive for torrent salamanders
regardless of the amount of riparian pro-
tection provided, at least in the Coast
Range. In a follow-up study, Russell sur-
veyed an inland area that was home to
the Cascade torrent salamander, using the
same techniques and stratification of sur-
vey sites to evaluate how interior popula-
tions of torrent salamanders responded to
gradient and geology. He again found
these factors to be more influential on
salamander population than previous
studies had shown, although to a lesser
degree due to the non-marine climate.

Bruce Bury, a zoologist with the U.S.
Fish and Wildlife Service, believes that the
location where timber harvest is
occurring makes a huge difference.
“Kevin Russell and others have shown
that timber harvest in the cooler coastal
locales in the Northwest and northern
California has a minimal impact on the
torrent salamander populations,” he says.
He is concerned, however, about how
well the results translate to inland areas
of the Northwest. Further, he and col-
leagues found that tailed frogs and tor-
rent salamanders on the Olympic penin-
sula occur in areas with marine deposits
when there is older forest present.

Cooperative Research and
Adaptive Management
Prior to Kevin Russell’s studies, most of
the previous research into headwater
amphibians had been focused on unman-
aged and/or old growth forest areas. This
made it difficult to ascertain the impor-
tance of the other factors at work when
comparing streams that all have older
vegetation around them, and Russell
believes that their applicability to com-
mercial, second-growth forest headwaters
is limited. He believes that future
research should be focused on further
exploring the effects of commercial land
use near headwater stream amphibians
in various settings.

The foundation of the Forests and Fish
law is science and adaptive management.
It provides for a Cooperative Monitoring
Evaluation Research committee (CMER)
that is charged with selecting studies to
better understand the interactions of for-
est practices and fish and wildlife protec-
tion. Using adaptive management to
monitor on-the-ground effects of forest

Kevin Russell