



Cumberland HCP

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POINTS OF INTEREST:

- White nose syndrome has been found in Sullivan County, TN.
- TWRA Region III and Region IV staff are collaborating on evaluation of biological goals and objectives and conservation measures in the Forest Resources HCP.
- The Water Resources HCP Steering Committee will meet on Wednesday, February 24th.
- The Morgan County/Wartburg Discovery Fest is Saturday, April 17th
- The Crossville Sustainability Fair is Thursday, April 29th.

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Notes from Alex Wyss, HCP Project Director

The Irish author and statesman Edmund Burke wrote "ambition can creep as well as soar." Such seems the case with the Cumberland Habitat Conservation Plan which was conceived as an idea in 2005 to develop a single HCP, only to grow steadily in scope and complexity to become two budding HCPs. In the last newsletter, I talked about the investment of U.S. Fish and Wildlife Funds to increase HCP planning capacity. Since the fall, this investment has paid off!

Great progress has been made, due in large part to the efforts of Tennessee Wildlife Resources Agency staff. The Forest Resources HCP is on track for submittal to the Service by this fall. The majority of the Water Resources HCP will be drafted by the end of this year. The Project Management Team will continue to work hard and efficiently to provide technical support to the HCP applicants. More than ever, we need your continued support and participation in the HCPs. Together we can soar!

Even Common Species Can Use a Helping Hand

The caves, clear flowing streams, and lush hardwood forests of the Cumberlands are home to thousands of plant and animal species—a menagerie of migratory birds, freshwater mussels, legless lizards, elk, and some species that are found nowhere else in the world.

While conservation measures in the Forest Resources HCP (FRHCP) are designed to protect a select group of threatened, endangered, and rare plant and animal species (covered species), many other species will benefit from habitat improvements achieved through the HCP. A secure and reliable food supply, adequate shelter, and clean water

are necessities shared among all of these creatures. This article highlights several FRHCP conservation measures and the benefits they provide to non-covered species.

FRHCP conservation measures include establishment of buffers around rock houses, caves, mine portals, isolated wetlands, and other key features. Activities in the buffers would be limited to forest health management practices like invasive plant removal and fire suppression. Keeping these features largely intact benefits animals like the grey fox (*Urocyon cinereoargenteus*). In addition to hollow trees, wood piles, and

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White Nose Syndrome Found in Tennessee

Two bats in a Sullivan County cave have tested positive for White Nose Syndrome (WNS), a fungus responsible for the deaths of a million bats in the northeast. This is the first record of WNS in Tennessee. The disease causes bats to use up their fat reserves rapidly during hibernation. The bats then fly out of caves during the winter to find food, but since the insects they eat are also dormant, the bats soon die of starvation. There have been no reported human illnesses attributed to WNS and there is currently no evidence to suggest that WNS is harmful to humans or other organisms.

Large bat colony fatalities have been observed in northeastern states. (95% of the bats were killed at one site in New York). "Here in Tennessee we stand to lose the last stronghold of bats like the endangered Indiana and grays," said Cory Holliday of The Nature Conservancy.

"Bats provide a tremendous public service in terms of pest control," said Richard Kirk of TWRA.

Biologists are currently surveying Tennessee caves for WNS and trying to determine the cause of WNS and its effects. Preliminary research indicates that WNS may be transmitted by bats and as an unwanted hitch-hiker on human clothing or gear. Staying out of caves is one of the best measures to slow the transmission of WNS. For more information: www.fws.gov/northeast/white_nose.html.

What Does Your Umbrella Have to do with the HCP?

An introduction to computer modeling and calculating take.

Even though they may seem far apart from your daily routine, computer models touch many aspects of everyday life. Did you look at the weather forecast today before deciding whether or not to take an umbrella to work? If so, you made a decision based on the output of a computer model.

Models are simplifications of the real world, and any system – mechanical, medical, financial, ecological – can be represented by sets of mathematical equations that describe the function of a system. Computer models are used for two basic purposes: 1) to find the most effective solution to the problem at-hand by assessing alternatives; and 2) to forecast future conditions. Forecasts can be based on current conditions, or we can simulate how changes in current conditions can influence future outcomes. Computer

models are frequently used for these purposes in conservation planning projects like the HCP. Conservation planning requires the ability to assess the current condition of a species (how many individuals/populations, geographic distribution, etc.), identify factors that impact the species, make predictions about the species' viability, evaluate alternative management measures, and design a cost-effective approach to secure the species' future. Models allow us to understand the details of complex processes so that management practices can be designed and implemented towards desired outcomes without having to try each option in the field. Relying on field experimentation can be costly, time-consuming, and in some cases, the risk of a failed experiment with an endangered species is too high.

Separate models are being developed in the Forest Resources and Water Resources HCPs to estimate the effects of landscape change and associated conservation measures on covered species. In addition to **identifying** the conceptual links between landscape change and take of covered species, the modeling efforts have the further challenge of **quantifying** those relationships. The ability to numerically describe the link between landscape change, changes in habitat, benefits of conservation measures, and take covered species allows the HCP team to directly compare the benefits of different conservation measures. The HCP modeling also helps prioritize data gaps so that we can achieve the best balance between data and efficiency by informing the monitoring and adaptive management strategy.

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Helping Hand for Common Species *(cont. from page 1)*

brush, grey foxes often use rock outcrops and cavities under rocks for dens in which to raise their young. Most young grey foxes stay close to home when they leave the den, often selecting a home range within a mile of their birthplace. Thus, long-term minimization of disturbance around rocky features can benefit generations of grey foxes that concentrate in close proximity to suitable den habitat.

Another draft conservation measure is promoting habitat diversity across the landscape. This is achieved through prescribed fire, selective timber harvests, and leaving woody debris (e.g. dead trees) in place to encourage complexity in forested habitat and maintain grasslands and oak savannas. Both of these factors benefit one of the Cumberland's most captivating species—elk (*Cervus canadensis*). In the winter when grasses are sparse, elk feed on the shaggy, peeling bark on mature trees. Elk also frequent early successional areas such as oak savannas.

Forest diversity conservation measures also benefit a broad range of bird species. Retention of woody debris provides habitat for the insects and small mammals

fed upon by birds of prey such as the screech owl (*Megascops asio*), barred owl (*Strix varia*), and Cooper's hawk (*Accipiter cooperii*). Oak savannas in particular provide habitat for a wide number of popular game bird species, including turkeys and quail.

Stream buffers are another significant conservation measure in the FRHCP. Under this measure, no timber harvesting would occur within a specified identified distance on each side of any zero-order stream. By filtering runoff and moving erosion-prone activities farther away from the water, buffers reduce the amount of sediment that enters the stream. Excess sediment clouds the water and decreases oxygen dissolved in the water. Warmer water holds less dissolved oxygen which is vital to the health of aquatic species, including popular game fish like smallmouth bass (*Micropterus dolomieu*). Without adequate oxygen in its bloodstream, a bass will slow its activity, impairing its ability to feed and travel throughout the stream. Cloudy water physically impairs their ability to feed and can smother their prey. By limiting sediment and maintaining sufficient dissolved oxygen, the stream buffer conservation measure promotes healthier and more abundant game fish.

The diversity of species present in the Cumberlands presents a challenge because these species have variable and sometimes divergent habitat needs. For example, where elk prefer open grasslands and savannas, barred owls and Cooper's hawk prefer dense moist forests, and others such as the screech owl enjoy sparse, open forests. TWRA is charged with managing their lands for the mutual benefit of all species as well as providing for human use and enjoyment of the Wildlife Management Areas. Conservation measures in the FRHCP are being designed with these various management goals in mind. Through the HCP adaptive management framework, TWRA will use monitoring data collected throughout the duration of the HCP to evaluate and adjust the conservation measures to ensure that they continue to achieve an appropriate balance between protection of covered species and their multiple-use goals.

Forest Resources HCP Update

DRAFT BIOLOGICAL GOALS

FRHCP biological goals have been drafted based on biological communities. The following are examples of goals being considered by the Core Teams.

Current Forest and Woodland Community goals include establishing forest reserves, limiting management activities to forest health practices (e.g. invasive plant control and fire management), and maintaining complex forest structure. Inland forest goals for Cerulean warblers are under development.

Early Successional Community goals include creation and maintenance of forest successional stages through managed timber harvests, prescribed fire, and use of native or non-invasive seed mixes.

Goals for Isolated Wetlands focus on identification of isolated wetlands and retention of forest buffers.

Goals for Aquatic and Forested Riparian Communities focus on establishment and maintenance of intact riparian forest buffers and ensuring compliance with Tennessee's existing timber harvest BMPs.

The Forest Resources HCP Region III and Region IV Core Teams have continued to make significant progress on HCP components. Both Core Teams have completed their draft biological goals and objectives and conservation measures. Biological goals and objectives (BG&O) define the expected biological outcome for covered species and habitats. BG&Os in the FRHCP address habitat needs at the community level. Covered species are linked to one or more of these communities. See sidebar for more information. Draft conservation measures identify the specific activities that will be implemented to achieve the objective. The draft BG&O and conservation measures developed independently by each Core Team are similar but also reflect their distinct geography. By April, HCP staff and the Core Teams anticipate completing the final set of linked goals, objectives, and conservation measures that appropriately reflects regional variation.

The Forest Resources HCP computer model is nearing completion. Input data for this model included basic ecological and land cover information from the literature, field data, and detailed predictions of forest management activities provided by TWRA foresters.

The FRHCP model generates information at the scale of a stand of trees. Terrestrial species impacts are modeled through a combination of land cover change (composition and structure) and an index of species sensitivity (based on habitat preference information available for the covered species). Aquatic species impacts are calculated through the linked

effects of landscape change on sedimentation. Each time the model is run, the locations of predicted timber harvests over the next 30 years are compared to the location of covered species habitat, and the change in habitat quality is quantified based on the conservation measures being tested. This change, expressed in acres of terrestrial habitat or miles of stream habitat modified, is then compared to known

information about the sensitivity of each covered species. Habitat changes for individual species are combined for an overall estimate of take. Calibration and validation of the Forest Resources HCP model are complete. Scenarios being run include quantification of take under current TWRA best management practices, the Forest Stewardship Council's Appalachian Standards, and the proposed HCP conservation measures.

Four major components of the HCP remain to be developed: 1) cerulean warbler management goals; 2) monitoring strategy; 3)

adaptive management strategy; and 4) funding strategy. Cerulean warbler habitat needs and management priorities will be discussed at a day-long workshop scheduled for mid-



Lilly Arch

March. TWRA staff will meet shortly thereafter to determine how to integrate cerulean habitat needs into the broader HCP biological goals, objectives, and conservation measures. HCP staff have completed draft

monitoring and adaptive management strategies, which will be discussed by the Core Teams during the coming weeks. The monitoring strategy includes contributions from non-TWRA staff. Preliminary discussions have occurred about long-term funding resources for the FRHCP. Further work on this HCP component is pending further progress of the monitoring plan.

Given the significant progress over the last three months, the Forest Resources HCP is on track to be ready for USFWS review by fall 2010.

WHAT IS A ZERO-ORDER STREAM?

Stream order is a measure of the location of a particular stream reach within a drainage network. The first stretch of water flowing through an identifiable channel is considered to be a zero-order stream, meaning that it has no upstream tributaries. These are also known as "headwaters." Stream order increases

Water Resources HCP Update

Over the last three months, the Water Resources HCP (WRHCP) Core Team has been meeting frequently. Current efforts include identification of covered species, covered activities, development of biological goals and objectives, and initiation of take modeling.

Covered Species

The WRHCP Core Team developed a decision tree for selection of covered species. Key factors in this determination include: if the species has been documented within the planning area; if the species is federally or state listed, highly endemic, or likely to be listed during the lifetime of the HCP; if the species is affected by a covered activity; and if sufficient scientific knowledge exists to quantify take.

With support from Joey Wisby of The Nature Conservancy, the Core Team has compiled a database of rare species occurrence records to use as a basis for selection of covered species in the WRHCP. This database is a compilation of

the Tennessee Natural Heritage Database, scientific collection permit information from TWRA, and other sources. In addition to providing a comprehensive view of species occurrences on the Plateau, this database has a spatial component that allows the Team to evaluate the proximity of those occurrences to the planning area. The Team's next steps regarding covered species include completing the database merger, applying the selection criteria, then facilitating review by the Science Advisory Committee.

Development of the biological goals and objectives is also in progress. The Core Team is considering a guild approach which would categorize species relative to the way they use their environment for reproduction. As the Core Team evaluates this approach, it may change in the future. Stay tuned in future newsletters for more details.

Covered Activities

Similar to the covered species, a decision tree

for selection of covered activities has also been developed. Key factors for the selection of covered activities include: if the activity occurs within the project area; if the permit applicant has (or could have) legal control over the activity; if the activity causes take of a covered species; and if the activity is occurring or is likely to occur during the duration of the permit.

Take Modeling

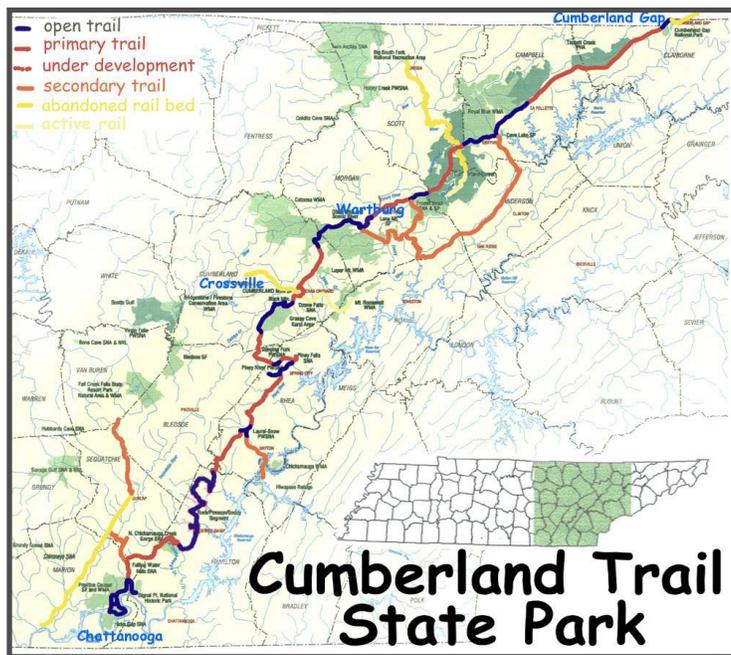
The WRHCP model is at a much earlier stage of development than the FRHCP. Dr. Joe Daraio has established the modeling framework and data collection is in progress. He is using the Watershed Modeling System to integrate the wide variety of data necessary to quantify the links among landscape modification, habitat change, and impacts to covered species. Calibration will begin in the next few weeks.

Steering Committee

The Core Team's work products will be shared with the Steering Committee for their review and guidance. The next Committee meeting is scheduled for Wednesday, February 24th in Crossville. Contact Jennifer Gihring at jgihring@utk.edu; or (865) 974-1955 for more information.

Looking for more information about covered species and covered activities? Definitions and draft lists can be found on the Water Resources and Forest Resources Gateways on the HCP website: www.cumberlandhcp.org.

Public-Private Agreement Expands the Cumberland Trail



On January 12th, Governor Phil Bredesen announced a public-private agreement that will add more than 3,200 acres and 10 linear miles of trail to the Cumberland Trail State Park in Hamilton and Rhea counties. Upon its completion, the Cumberland Trail will extend 300-plus miles from Cumberland Gap National Park (KY) south to Chattanooga. This acquisition was funded through a grant from the Heritage Conservation Trust Fund, federal grants, private funds raised by the Cumberland Trail Conference, and a private landowner who will hold a permanent conservation easement on 2,197 acres.

"This acquisition speaks to the power of leveraging resources and cultivating partnerships to accomplish more than we could do alone," said Bredesen.

Tennessee's hiking trails are a prime tourist attraction. In addition to watershed protection and wildlife conservation benefits, the Cumberland Trail will continue to draw visitors to communities of the Cumberland Plateau.

Volunteers are constructing the trail with project management provided by the non-profit Cumberland Trail Conference. See www.cumberlandtrail.org for more information.

Science Advisory Committee News

The HCP project continues to have direct collaboration with the broader scientific community. Core Team members and HCP staff shared posters and talks at the Southeastern Fishes Council, Tennessee Rare Mollusks, and Tennessee Bats Working Group meetings. HCP staff will be presenting at upcoming Tennessee American Fisheries Society, Southern Division American Fisheries Society, and Tennessee Wildlife Society meetings. In addition, a manuscript entitled, "Application of Structured Decision Making and Rapid Prototyping to Plan a

Modeling

(cont. from page 2)

Development of a computer model follows a similar progression regardless of the application: definition of the purpose, selection of appropriate physical and biological parameters, definition of scale, data compilation, calibration, validation, and simulations. The two HCP models are designed to estimate the extent to which conservation measures successfully protect the covered species from the effects of landscape changes; in other words, the models are used to quantify take associated with covered activities and conservation measures.

Things begin to get complicated when determining what parameters to use as input data for the model. Think of a fish...what controls its ability to grow and reproduce? Water temperature? Its ability to find food? Its ability to find a mate? Toxins in the water? The availability of suitable spawning habitat? Yes to all of these, and more. The HCP models focus primarily on parameters that affect water quantity, quality, and sediment load for aquatic species and change in forested land cover for terrestrial species. The HCP models integrate these parameters at scales that are biologically relevant to the covered species and consistent with the scale of the covered activities. For example, model calculations in the Forest Resources model are provided for each TWRA harvest unit

Management Response to Invasive Species: Hemlock Woolly Adelgid on the Cumberland Plateau in Tennessee, USA" was submitted to the Journal of Fish and Wildlife Management. The authors include: Sean Blomquist (Forest Resources HCP modeler), Trisha Johnson (Forest Resources HCP Science Committee Coordinator), David Smith (USGS), Geoff Call (U.S. Fish and Wildlife Service), Brant Miller (TWRA), and Mark Thurman

(TWRA), Jamie McFadden (Univ. of Nebraska), Mary Parkin (USFWS), and Scott Boomer (USFWS). Collaboration at meetings allows HCP and Core Team staff to receive direct feedback regarding application of current scientific knowledge in the HCP. The benefits of collaboration go both ways, as information being developed specifically for the HCP is being used to inform other resource management questions.

HCP Spotlight: Pete Wyatt

Pete Wyatt is a [nongame biologist](#) and manager with the [Tennessee Wildlife Resources Agency](#). Having previously served as a boating safety officer, wildlife officer and wildlife biologist, Pete has been with the Agency's nongame program for the past 17 years. Prior to joining TWRA, Pete received a Bachelors's degree from UT in Forestry, Wildlife and Fisheries, a Master's degree from ETSU (studying lungless salamanders) and served four years in the Air Force.

Everyone has a place that is close to their heart. For Pete, that is [Unaka Mountain](#). He owns a cabin in nearby Ephraim Place, complete with solar power and a water harvesting system to reuse roof runoff. He was a former member of the Unicoi County History Museum Board and was directly



Pete and his (self-certified) world record ringneck snake

involved in the Rocky Fork acquisition (~10,000 acres in Unicoi and Greene Counties). He was even married on top of Unaka at Rattlesnake Ridge!

Pete's interest in historic and land

preservation extends beyond Unaka through his participation with the East Tennessee Historic Preservation Committee (affiliated with the [East Tennessee History Museum](#)) where he works to preserve special places, buildings, and local culture.

Pete embodies TWRA's multi-use philosophy. Although he works with nongame species during the work day, he also enjoys squirrel hunting. Pete is also a master at "Heritage" cooking, which includes open-fire and cast iron, using his 18th Century brazier and numerous Dutch ovens. If you can catch it, Pete can cook it!

With Pete's help, the TWRA Region IV Core Team has made huge strides during the past few months. The HCP staff extends a big "thank you" to Pete for bringing his expertise and energy

(the "stand", typically 20-25 acres).

The mathematical relationships in computer models must be calibrated and validated to ensure that they correctly represent the system. During calibration, the mathematical equations and process connections are modified based on a comparison of a model outputs to measured data. Through comparison of many model runs to measured data, model developers adjust equations used in the model until the output sufficiently fits the measured data. Calibration calculations are conducted with a subset of the data. In the Forest Resources HCP model, approximately 75% of the available data was used during model calibration. Modelers

"check their work" through the validation process during which they compare the model's forecasts predictions against the measured data for the validation time period.

The calibration and validation processes require judgments of "acceptable accuracy." Although there are statistical methods for quantifying accuracy, it is ultimately up to the user of the model to decide what level of accuracy they are comfortable accepting, balanced against the resources necessary to further refine the model. Once the user has determined a model is sufficiently accurate for their purpose, then it can be used to run different scenarios and forecast future conditions.

2010 Crossville Sustainability Fair

The City of Crossville's Second Annual Sustainability Fair is scheduled for Thursday, April 29, 2010 at the Cumberland County Community Complex. Fifth grade students from all the county schools will tour the Fair from 9 am to noon. The Fair will then remain open for anyone in the community to attend.

The goals of the Fair are to increase youth awareness of sustainable living and to reach out to adult community members to provide consumer and civic information about sustainability.

More than 550 5th grade students visited the many exhibits during the 2009 fair. Mayor J. H. Graham is recruiting partners to demonstrate sustainability practices at the 2010 Fair. To reserve a display booth or for general information, contact Louise Gorenflo, Sustainability Fair Coordinator: lgorenflo@gmail.com or (931) 484-2633.

Photo credits:

Page 3: <http://www.nps.gov/obed/historyculture/places.htm>

Page 4: Cumberland Trail Conference, <http://www.cumberlandtrail.org/ctmap.html>

Page 5: Pete Wyatt, TWRA

Obed Streambank Restoration

In 2009, the Obed Watershed Community Association completed two major streambank restoration projects, one on the Obed within Crossville and the other on One Mile Creek, a secondary tributary to Daddy's Creek. Additional projects are planned in 2010, including a major project at Crossville's Centennial Park. Contact Dennis Gregg at dennisgregg@gmail.com or (931) 484-9033 for more information or to volunteer.

Upcoming Events

February 22-26: Second Annual Tennessee Invasive Weed Awareness Week

Fifty-eight organizations and businesses have joined together to support this event. A full list of events is available on the Tennessee Exotic Pest Plant Council website: www.tneppc.org.

February 27: Cumberland Trail Work Day (Nemo to Alley Ford)

For details about this volunteer opportunity, contact the Tennessee Citizens for Wilderness Planning: www.tcwp.org or sandra@sandrakgoss.com.

March 16-17: East Tennessee Environmental Conference

The 2010 East Tennessee Environmental Conference (9th annual!) has an impressive lineup of speakers addressing timely information about the environmental health, human-environmental health connections, and economic issues. The conference will also include hands-on workshops. See www.tnenvironment.com for more information.

April 17: Morgan County/Wartburg Discovery Fest

The annual Discovery Fest, sponsored by Morgan County, Wartburg, and the Emory River Watershed Association, will be held the third Saturday in April. Last year's events included a climbing wall, children's games, informational booths, vendors, live music, hikes, ATV rides, rock climbing and kayaking demonstrations. Contact the Chamber at (423) 346-5740 or dfkeyes@highland.net for information.

April 21: Alabama Invasive Plant Council

The annual meeting of the Alabama Invasive Plant Council is scheduled for April 21st at Auburn University. More details are available here: www.se-epcc.org/alabama.

May 11-13: Southeast Exotic Pest Plant Council Meeting

The theme of this spring's joint meeting of the Southeast Exotic Pest Plant Council and Southeast Society for Ecological Restoration International is "Disturbance and Change: Invasive Plants and Paths to Recovery." See www.se-epcc.org/2010/ for details.

Did you know...

...birdwatchers contributed \$36 billion to the United States economy in 2006?

...more than 31% of Tennessee residents are active birdwatchers?

...that it takes around 39,000 gallons of water to make an automobile?

The Cumberland HCP Project includes state and local governments, state agencies, organizations, landowners, and other private citizens working together to address issues of growth and conservation of the forests and waters of the Cumberlands of Tennessee.

Check us out on the web: www.cumberlandhcp.org

We'd like to hear from you! For more information about the HCP or to submit items for future newsletters, contact Jennifer Gihring at jgihring@utk.edu or (865) 974-1955.

