Timberland and Agriculture - North America

Infinite possibilities in a finite world

STORIES FROM THE FIELD

e

III Manulife Investment Management



Our farmers and foresters are dedicated professionals who live and work in the communities where we operate. These are their stories from the field, putting into words the work they do day in and day out to steward the land, environment, and communities.

"Good stewardship is good business."

This is a mantra we've long adopted as our own at Manulife Investment Management (Manulife). For us it also proves to be the necessary prescription for sustainable land management practices. Our foresters and farmers have one of the greatest responsibilities on the planet—to take care of the earth and all who inhabit it. This responsibility requires a holistic approach to land management, where science and innovation work alongside traditional ecological knowledge to protect the land and all who rely on it.

What happens upstream happens downstream. What happens during harvest affects the growing season. When stewardship is taught, selfsufficiency can be achieved. When education and programming are prioritized, our industry can grow and diversify. It's these necessary ripple effects that drive our land management practices year in and year out. This regenerative approach to land management is what also drives our deep focus on partnerships

and community outreach. Our team of foresters and farmers manage the lands, as well as the programs and partnerships that help achieve our end goal of bringing innovative land management practices to the over 3.5 million acres we manage across North America.

The ripple effect that happens on the landscape reaches communities in ways that are seen and unseen. Our operations sustain rural communities by providing both jobs and

tangible crop outputs; waterways are managed to provide clean and cool water for both ecological balance and sustenance fishing; private lands are opened for recreational and tourism benefits: tax revenues help to fund local schools.

We may manage a finite resource, but we believe in the infinite possibilities our passion and land management practices can have on communities and the environment.

SPACES, PLACES, & FACES

Growing our industry by cultivating the next generation



Cinnamon Bear and area Manulife foresters manage the Tomanamus forest in a unique way that provides both long-term sustainable management and education focused on cultivating the next generation of land caretakers.

We provide active management of 100,000+ acres of forest on behalf of the Muckleshoot, and what makes our management unique is the community connection and learning opportunities provided by the forest itself. "Our goals here aren't monetary; instead, they are a community health priority. As of December 31, 2021, Manulife manages 5.4 million acres of timberland globally, so we have an opportunity to be the leaders of how to work hand in hand with local tribes." - Cinnamon Bear

"There's power in place," says Cinnamon Bear, a Manulife education forester and traditional medicine herbalist of the northern California Karuk Tribe. Cinnamon Bear shares traditional ecological knowledge (TEK) and forestry education in the Tomanamus forest in Washington State for the Muckleshoot tribal community.

> The Muckleshoot Youth Crew, comprised of kids ages 16 to 21, routinely works alongside tribal experts in the Manulife team to learn TEK and other forest management practices. The program was started in 2014 with the broader goal of reconnecting youth to the land, and also to provide applicable work experience and career-building skills.

> "Honestly, my goal for our youth program would be that, in due time, the Muckleshoot have no need for us. We'd be out of a job, and that's a good thing. Our role in managing operations is temporary—as it should be," said Cinnamon.

Land management happens on a macro level in this area of the Tomanamus forest, where foresters are measuring and observing the elements and anticipating the future. But it also happens on a micro level, which provides intergenerational learning opportunities.

"Relationship to the land is a central core value and priority taught in the forest. Land management incorporates education—with the tribal schools taking field trips on a regular basis, learning traditional ecological management, meeting foresters, and experiencing different career opportunities—with land management and wildlife," Cinnamon said.

"These types of opportunities are opening doors and showing youth pathways to resource management jobs. When I take a child out to cut cedar boughs, that child is practicing sovereignty. Little things become big things. Third graders might cut cedar. Eighth graders might prepare it for cedar oil. Another class might make a salve. The salve is then gifted to elders. One plant can touch many different generations and groups in just one community. That's the lesson of opportunity we always aim to teach."

In partnership with the Port of Seattle, the Muckleshoot Youth Crew, assisted by Manulife foresters and tribal leaders, worked on a floodplain restoration on the Duwamish-Green River that focused on tying communities and ecosystems together. This project tied the upper watershed of the river,

where the Youth Crew was used to working, to lower portions of the watershed that have different types of plants and animals.

"This wasn't a typical forestry project for our Youth Crew, but it was an important lesson in overall ecological health," said Cinnamon. "Projects like this reach our youth at a formative age, teach them new skills and provide them the opportunity to meet a few people who could be resources for their future, as well as provide them with meaningful experiences for their resumes."

Forestry education projects, alongside stable forestry management, ensure the Muckleshoot Tribe's vision is fulfilled for their people, their forest, and their future.

Healing of the Canoe with the Cowlitz Tribe



The curriculum is culturally grounded and uses the Canoe Journey as a metaphor and teaching tool to provide Native youth the skills needed to navigate through life's journey. It blends tribal traditions, cultural values, and indigenous knowledge with evidencebased practices and elements of positive youth development.

The Cowlitz Tribe reached out to Manulife Region Manager Stephan Dillon to facilitate a field trip to put the values and lessons of the Canoe Journey into context in the forest—the original classroom. Through three small group forest field trips, students participated in

forest land.

*Donovan DM, Thomas LR, Sigo RLW, et al. Healing of the Canoe: Preliminary Results of a Culturally Grounded Intervention to Prevent Substance Abuse and Promote Tribal Identity for Native Youth in Two Pacific Northwestern Tribe. National Library of Medicine. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4374439/.

Manulife forestry educators also work with youth in Washington at the nexus of overall ecosystem health and community health. "For the indigenous community, land gives us the opportunity to learn social-emotional skills," Cinnamon said. "The forest is the original classroom, with the original teachers."

lessons that centered on forestry and TEK to help build their understanding and appreciation for the traditional and contemporary stewardship of

"We wanted to complement the existing curriculum by tying in forestry education," Cinnamon said. "The forest can teach us boundaries, healthy boundaries—a tenet of personal health. We also used our time together to learn the socialemotional teachings of the plants, ethics of harvesting and entry-level forestry education."

The Healing of the Canoe curriculum, a collaborative

project between the Suquamish Tribe, the Port Gamble S'Klallam Tribe, and the University of Washington Alcohol and Drug Abuse Institute, has trained attendees from 50 tribes and 19 tribal organizations, some as far as Canada and Alaska, with proven results in providing optimism and selfefficacy for Native youth, as shown in a 2015 study of the Healing of the Canoe's impact.*

"The Power of Place made the cultural teachings and forestry education very impactful for all," Cinnamon said. "We're grateful to be part of it."

Growing forestry in Texas



In 2021, the employment rate in the Texas forest sector grew by 3% compared with 2019. We're not sure we can prove it's because of longtime Manulife education foresters Misty Bowie and Ragan Bounds, but we also

can't prove it's not. Together Misty and Ragan have spent a combined 50 years educating students and teachers on forestry and land management in hopes of growing the industry and inspiring the next generation of foresters.

"We try to teach people how to think about forest management and not what to think. For example, just because you see a section of clear-cutting, that does not equal deforestation. Teaching youth and adults about land management practices helps to inform them and also enforces universal truths about our industry," said Misty.

One of those universal truths about our industry is that it's literally always growing. The amount of green jobs in renewable resources is on the rise and in demand, and our planet depends on the next generation of foresters. And, as with most things in Texas, forestry is big business and in big demand.

A 2021 economic report from the Texas A&M Forest Service found that for every job created in the Texas forest sector, another 1.51 jobs* are created in the state. Harvested timber alone accounts for the seventh largest agricultural commodity in Texas, and forestry is in the

*Highlights of Forest Sector Economic Impacts in Texas, 2021. Text A&M Forest Service. https://texasforestinfo.tamu.edu/EconomicImpact/#/highlights.

top 10 manufacturing sectors in the state. A continued thriving forestry sector is dependent on interest from younger generations.

This is where Misty and Ragan have found their calling. Each year they reach several hundred students and teachers at the elementary, high school, and college levels to provide continuing education opportunities with the latest findings in forestry, as well as to share the importance of working forests for the environmental, social, and economic livelihood of Texas and other parts of the country.

With topics such as 'carbon capture' and 'carbon offsets' moving from story lines to headlines, there is an imperative response from the industry to inspire youth to work in forestry. Promoting forestry degree programs at Texas universities is part of the overall strategy, but it's not the only option for future foresters: The boom in green jobs means there are also opportunities for non-degree-seeking candidates.

"We've reached thousands of youths and teachers through our collaboration with the Texas Forestry Association," said Ragan. "I think a goal for future programming would be to take TCI (Teachers Conservation Institute) on the road so we can reach youth in more urban areas."



If Texas—and Misty and Ragan—is any indicator of the future, then we look forward to seeing growth in the industry, as more awareness is offered on opportunities to work in renewable resources and more collaboration is made among private companies, trade associations, and universities.

PART 2: WILDLIFE MANAGEMENT

A living, breathing balancing act

SVIIII

Bullfrog removal study



"Bullfrogs aren't native to this area," said Lindsey Webb, senior wildlife biologist at Manulife. "Since they're generalists, they'll just consume everything. They're a much more voracious predator than some of the native species and will take over ponds. They'll eat native species and their eggs, or whatever native species need to survive."

According to Lindsey, American bullfrogs threaten other species through predation and competition. By removing them from an ecosystem, other native species, such as the Oregon spotted frog, can benefit and repopulate. This was the case in Glenwood Valley when a pond was discovered overrun with bullfrogs, which prompted a joint project among Manulife, Conboy Lake National Wildlife Refuge, and the Mt. Adams Research Stewards to restore the ecosystem by the removal of nonnative bullfrogs that would help bolster the Oregon spotted frog population.

Wildlife management plays an integral role in preserving and

Glenwood, Washington, has historically housed the largest Oregon spotted frog population throughout the entire species range, which is now federally threatened. Yet that population has decreased significantly since 1958, when the American bullfrog was introduced to the population in Glenwood Valley.

> maintaining ecosystem resiliency. The successful removal of nearly 800 juvenile and adult bullfrogs allowed the opportunity for the Oregon spotted frog to thrive, while restoring balance to the area and bringing native species, such as cranes and salamanders, back into the habitat.

Protecting the Wood Duck



"Wood ducks have to have cavities to nest," said Manulife Wildlife Biologist Corey May. A lack of nesting habitats will ultimately lead to a reduction in wood duck populations, a problem endemic to the Mississippi Alluvial Valley, where wood ducks often nest in the many centuries-old mature bottomland hardwoods. The issue is that

many of these bottomland hardwoods have holes in them and are becoming more scarce, in turn causing nesting availability to decrease.

"Soybean prices skyrocketed in the 1970s, clearing a lot of this area in the Mississippi Alluvial Valley. Most of the forest and wetlands were destroyed, harming wildlife like the wood duck population, which was already at a low level. When you push down 80% of wood ducks' available habitat by destroying forests, it really affects them."

But loss of habitat wasn't the only threat to wood ducks: increased hunting in the area also threatened the species, putting the ducks at risk of extinction. According to Corey, a natural solution for the ducks was to create boxes where hens can nest safely from predators and procreate in areas where natural cavities are limited.

Joseph Bell, farmland manager, along with Corey and his team, invited a local high school shop class to create wood duck boxes with the joint mission to preserve the species and ecosystem at large, but to also introduce area students to conservation and wildlife management. The finished boxes were placed on Manulife farmland in the Mississippi Alluvial Valley, an ideal location to see the ducks thrive, and are expected to be used at maximum capacity.

"It's important for these kids to see how their work in the classroom can affect the wildlife communities outside of the classroom, too," said Corey. "It just doesn't get better than that."

The delicate balance

Catastrophic wildfires continue to be a risk every year in Washington State. That risk means that acute attention is paid at every level of the food chain. In 2019 alone, a Washington State aerial survey found that nearly 200,000 acres were damaged by just two beetle species.

Seeing this data, and due to the life cycle of these insects, it was determined that the numbers were likely going to keep increasing. A decision was made: In order to decrease the number of insects causing harm to the forests, the bat population would have to increase.



"Bat boxes are considered to be maternity roosts, as bats use them to raise their young," said Mike Johnson, a Manulife area manager in northeast Washington who assisted with implementing bat boxes in the area's timberlands. "By having these boxes, we're able to increase the bat population."

Knowing that something had to be done, a local high school woodshop class was tapped to create bat boxes that would be placed on Manulife timberlands in the area to house big-eared bats and little brown bats. This would serve as an opportunity for students to expand on their skill set, learn more about wildlife management, and



provide biological diversity to the landscape.

The class enjoyed working on this project, going so far as creating a few bat symbol designs using their computer-aided milling machines. With their assistance, nearly a dozen bat boxes were created and have already been inhabited by the bats to house their pups.



If you build it, they will come



"Vertebrate pests can have long-term effects on newly planted orchards," said Austin Williams, area manager for Manulife Farmland Management Services. "Between wanting to control the pests and wanting to be good stewards by limiting other forms of pest management, we've found that putting owl boxes on some of the ranches we manage has allowed us to control the pest population levels while using a more biological approach. We're also letting the barn owls that are native to this area naturally become a predator for other vertebrate pests like ground squirrels."

A variety of barn owl nest structure designs have been used for barn owl conservation, It's a common, wildlife-friendly practice on many farms, ranches, and wildlands in California to install artificial nest structures (owl boxes) to attract barn owls. This practice is also notable as barn owls help to maintain the biological control of gophers and other rodents.

but few provide the necessary protection from predators, enough room for large broods, a separate chamber for the adults when needed, and allowance for easy monitoring and maintenance. The recommended nest box for the Volos ranch owl box project is a design that has addressed all these factors.

A local high school assisted with creating the owl boxes, a project that resulted with the development of 52 boxes across the 1.800 acres on Volos Ranch. That sort of spread means there is one owl box for every 35 acres across the landscape, which is a natural solution and one that Austin believes is a good model for other properties. By partnering with local high schools, students are able to have a

hands-on learning experience and learn more about the importance of wildlife management and conservation.

"I'd like to see a long-term maintenance plan implemented and, hopefully, build a good enough population of natural predators where we would be able to use less pesticides than a ranch that didn't use a project like this," said Austin.



The hardest working river in the world



The Biron marshes, managed by Manulife, run through the town of Biron, Wisconsin, alongside the Wisconsin River. Public groups made proposals for a public bike path that would run through the city, but it would involve passage through several of Manulife's conservation easements. Since community collaborations are a key priority for Manulife. it was an obvious choice for the company to support facilitation, especially

In terms of energy production per mile per river, the Wisconsin River is the hardest working river in the world. It also has more hydroelectric dams than any other river on the planet. Hardworking? Yes. But the river also has incredible views and hosts a variety of opportunities for those in surrounding communities to take in nature through recreation trails.

when public access and recreation are at the forefront.

The bike path is almost 20 miles long and is the longest continuous path along the Wisconsin River. Manulife has assisted with the upkeep of the bike path since 2006-2007. The bike path also allows for several wildlife viewing opportunities, such as the sharp-tailed grouse, which is a state species in greatest need of conservation.

Conservation easements are occasionally opened in this way, as conservation includes responsible recreation. These lands are still being conserved, and private-public projects that open opportunities for community health are important ways of managing land. The bike path project has been a success, and extensions are already underway to pave the road for future generations to enjoy the riverfront.

Windthrow solutions in British Columbia



"We had two options," said Manulife Forester Daniel Oxland. "We could create a buffer to account for fallen trees or contract a helicopter to help manage by cutting the crown of trees in question."

Windthrow is especially an issue in this part of the world where there are intense winter storms as well as steep terrain that can't be accessed by machinery. Something as simple as wind can have a significant impact on the local environment, so the chosen windfirming technique has to work.

The effects of the technique deployed upstream on the Gordon River would affect the local downstream communities that depend on the river for recreation and food.

"By cutting here, we're preventing excess debris getting into the stream, keeping that riparian buffer cool and shaded during the warm summer months, as well as protecting fish habitat and fish spawning. We're talking about the headwaters of a major salmon stream that also flows into a major stream that local indigenous communities depend on for sustenance fishing. So we're trying to limit the cumulative impact on the larger stream system, including anything that comes with riparian protection: water temperature, debris, sanitation, and all those things. What we do upstream affects downstream."



Windthrow is a common, but not new, challenge for British Columbia (BC) forest managers. This year, when windthrow concerns began mounting for riparian areas along the Gordon River on Vancouver Island, Manulife foresters reviewed their options.

> The BC Manulife team opted for the heli-saw clear-cut edge windfirming technique. The treatment will be measured in the spring to see if it was effective.

"It's all based on new research from the mid-2000s. We're now applying that evidence on a large scale, and we're getting data on just how effective it is as an evidence-based solution for land management. Past treatments have proven to be incredibly effective, so the team is hopeful."

The perfect renewable cycle



"Conservation easements in Idaho go way back on this land base," said Manulife Area Manager David Gabrielsen. "It's been a part of our strategy to help conserve some of the wild nature of the lands that we have."

The Fleming easements were in addition to five other conservation easement purchases with additional landowners in 2020, making a total of 1,992 acres in and around the Kootenai Valley of Boundary County. The acquisition of these easements closed out the Hall Mountain/Kootenai Valley project, a five-year project totaling 23 conservation easements over 6,694 acres.

The conservation easements known as Idaho Fleming West and East closed in January 2021, guaranteeing that the property would remain as working forestlands through the Idaho Department of Lands Forest Legacy Program. So far these easements have contributed to 1,252 acres conserved as working forests.

"The conservation easement makes a really great fit for our stewardship objective, and we're able to put these easements on land and save them for future generations, along with wildlife, water, and carbon benefits—all of the benefits that working forestlands provide," said David. "We have thousands of acres in conservation easements now. The ability to sell the land into a development is what we're giving up over the future."

The working lands of northern Idaho are vital for the regional economy, and the protection of working forests will safeguard a steady supply of products for the region's five mills. The region is one of the few

remaining intact mountain ecosystems in North America, containing a full suite of native wildlife and a wide variety of ecosystems.

"The hope by preserving this land is that we can continue to manage it for forests, wildlife, water, and future generations. It's the perfect renewable cycle."

Problem-solving in Prospect

When illegal camping and trash dumping were taking place near hiking trails in Prospect, Oregon, there was concern that these ongoing issues would lead to forest fires. The trails were receiving heavy foot traffic due to their close proximity to the famed Crater Lake National Park.

The solution was a partial cut harvest of 31 acres adjacent to a local business and a state park trailhead parking area. The parking area typically attracts visitors to an easement trail system that highlights Pearsony Falls and the Rogue River, both popular tourist destinations.

"We wanted to create value for the clients that we manage," said Greg Johnson, forester at Manulife. "This was done to harvest some timber and also to block off some of the (unmanaged) trails to limit access to those illegally camping, which can be a fire hazard. This was a partial harvest cut, not a clearcut, and done in such a way so

that there would be a tree every 20 feet. We wanted to leave an area that looked good, protected the trails, and would be something that the community would be happy with."

Once the harvest was done, Prospect community members were encouraged to walk the



As always, we complied with the state Forest Practices Act. Trees were removed and thinned, and space was opened up. Two large fish streams were buffered with leave trees, as well as additional trees left in visually sensitive areas that encircled the harvest unit. Care was taken to protect the residual leave trees.

unit and communicate any concerns. To date, their feedback has been positive.

"After we were done harvesting, we hauled in about three dump truck loads of wood chips and donated that to the community," said Greg. "The wood chips were spread all over the trail, which helps to prevent erosion from use, and also provides a more positive experience for those recreating in that area."



Pollinator possibilities



"We have a beekeeper that brings bees out to our property for what we call blooming season, said Samantha Lopes, operations support manager at Manulife. "In all our practices, we try to respect the bees as much as possible. We make sure that anything we do occurs when the bees aren't active so that we're minimizing the risk to the hives."

Over the years, Triangle T Ranch has adopted the Seeds for Bees program: a project that encourages using cover crops to Triangle T Ranch, located in Chowchilla, California, is home to 12,000 acres of farmland, split down the middle, with dedicated acres for pistachios and almonds. Bees are one of the many heroes of this operation, playing a vital role in pollinating the 6,000+ acres of almonds and other crops grown across the San Joaquin Valley.

increase the density, diversity, and duration of bee forage in California orchards, farms, and vineyards, all while improving soil health. The seed mixes available through Seeds for Bees are designed to bloom at critical times of the year when natural forage is scarce but managed and native bees are active. Seeds for Bees serves the needs of bees, beekeepers, and growers, increasing sustainability of pollination and agriculture—and that supports the type of land management we believe in.

California grows around 80% of the world's almonds and about 17% of the produce grown in the United States. Most farming has adopted monocrop practices to increase yield and profitability. This practice has the side effect of creating "food deserts" for pollinators, and has also led to diminished soil fertility, less moisture capacity, increased soil compaction, fewer beneficial insects, and increased erosion.



Triangle T is a major participant in the program, dedicating more than 250 acres of their ranch to the Seeds for Bees program in California, which currently has 201 growers and more than 12,500 acres enrolled.

"We're trying to be good stewards of the land and things we're given. Simply put, we wouldn't have as much forage without the Seeds for Bees program." Currently, Triangle T is in the process of acquiring their Bee Friendly Farming Certification on 2,915 acres of almonds. This entails planting 3% of the ground with cover crops and establishing a native hedgerow. Three hundred-fifty acres are dry-farmed row crops; when flood flows are available, the crop can be fallowed and flood flows can be spread on the field. The project is well underway,

and additional sites are being evaluated during redevelopment.

"I know with our company that we're always going to try to do the right thing and improve our inefficiencies, as well as look out for the clients' best interest. That's just what we do," said Samantha.



III Manulife Investment Management

Manulife Investment Management's timberland and agriculture services are engaged in real asset operation and property management and are not authorized to provide, and do not provide, investment advice or investment advisory services. Additionally, the content of this brochure is not intended for nor should be construed as an offer to buy or sell or a solicitation of an offer to buy or sell any security or to participate in an investment strategy.

Manulife, Manulife Investment Management, Stylized M Design, and Manulife Investment Management & Stylized M design are trademarks of The Manufacturers Life Insurance Company and are used by it, and by its affiliates under license. Published August 2022