Re-establishing, Reconnecting, Restoring
Advancing the Science and Practice of Mined-Land Reclamation
Reclamation Facts

Since 1975...
The state of Florida has required the phosphate industry to return every acre it mines back to productive use through a process called reclamation.

Before Mining Begins...
Mosaic seeks approval of comprehensive mining and reclamation plans from local, state and federal regulatory agencies. The plans provide detailed mining and reclamation schedules, and include in-depth plans and analysis describing how Mosaic’s reclamation efforts will properly restore specific sites’ habitats, as well as surface and groundwater flows.

Once Mining Is Completed...
The reclamation process starts. State law requires mining parcels to be recontoured and planted with initial vegetation within two years of completing mining activity.
Mosaic reclaims land three primary ways:

**Sand Fill**
We pump a matrix slurry of water mixed with sand, clay and phosphate ore from the mining site to the plant facility, where it is separated during a process called beneficiation. This sand is vital to reclamation because we return it to the mined area where we initially extracted the ore. Once pumping is complete, we push the piles of soil left behind onto the returned sand and contour the land to match the reclamation plan. Mosaic sometimes covers the returned sand with topsoils we harvest prior to mining. In the case of wetland systems, Mosaic often uses muck collected from pre-mined wetlands. Or, for higher-quality uplands, we may directly transfer soil from another site we’re clearing. These native soils contain diverse seed banks that help establish proper native vegetation. Mosaic grades and contours the mined lands to varying elevations, and plants them with native species to become upland or wetland areas according to the approved reclamation plans. In many cases, we construct stream systems and upland habitats between systems to enhance wildlife corridors and to connect reclaimed wetlands to existing preservation wetland systems.

**Land and Lakes**
Because phosphate ore and clay are removed as a result of the mining process, Mosaic incorporates lakes into reclamation plans to account for a reduction of backfill materials at the mining sites. During the lake reclamation process, we contour the sites by redistributing the soil left behind after mining. We form a lake’s edges with gentle outer slopes to prevent steep drop-offs. Then we plant the shallows of a lake with herbaceous wetland plant species to create a littoral zone, which enhances water quality and encourages fish and wildlife use. Mosaic designs reclaimed lakes with overflow features, allowing water to flow from the lakes during significant rains. This ensures they continue to contribute to surface water flows in the watershed. We specifically engineer these features to provide timed hydration of connected wetland systems. Mosaic typically constructs upland forested areas around a lake’s edge to increase wildlife utilization. Central Florida’s reclaimed lakes are unique habitats that are well-known for their thriving fish populations and boast some of the best freshwater fishing environments in the Southeast.
Clay Settling Areas
The clays we mine in conjunction with the phosphate ore are removed at the mine’s separation facility and stored in reservoirs known as clay settling areas (CSAs). CSAs provide water storage for the mining operation, and also are used by a wide variety of wildlife, including fish, birds and alligators. Once a CSA has reached its clay storage capacity, Mosaic begins the reclamation process by using specialized equipment to remove channels on the surface, facilitating the consolidation and drying of the clay. Once a crust has developed on the surface of the clay, we push in the dam walls and then grade them to create a gentle slope, which typically looks like subtle hills in the landscape.
Today, Mosaic successfully reclaims mined lands into valuable wetlands, agricultural land and wildlife habitats. Examples include:

Streams
Much like what is found on native land, modern reclaimed lands contain intricate stream systems that connect habitats and provide wildlife corridors. While human land uses can result in the modification of a significant portion of Florida’s streams, Mosaic designs reclaimed streams to return the systems to a more natural state. Reclaimed streams also support the health of the systems they connect. Each variety of wetland habitat contains unique plant species that require differing amounts of water at the right times of year for support. Mosaic scientifically designs reclaimed stream systems using the sophisticated Rosgen stream design techniques and/or simulated flood flows to ensure reclaimed stream systems provide both proper hydrological function to the systems they connect as well as valuable wildlife habitat and corridors.

Wetlands
Prior to mining, reclamation crews often harvest and store the muck layer from wetlands. The anaerobic, or oxygen-deficient, environment of the muck is capable of maintaining viable seeds in the soil for long periods of time. Mosaic later distributes the muck during reclamation of wetland systems on the mine property. Its valuable seed bank of native vegetation begins to sprout wetland vegetation shortly after it is distributed.
Uplands

As Mosaic prepares certain upland habitats for mining, our reclamation crews often harvest the topsoil. Unlike wetland muck, upland topsoil is an aerobic environment, which needs oxygen to survive. That means the seeds within the soil only stay viable for a short period of time. To capture this benefit, we transport the topsoil to other reclamation sites for immediate use. Not only does the receiving site benefit from the organic matter found in the topsoil, but the valuable seed bank in the soil begins to generate diverse native vegetation. When topsoil is not available, Mosaic achieves this diversity by harvesting native seeds from other sites and quickly spreading them across newly reclaimed uplands or through direct planting.

Streams: Mosaic enhances stream habitats like this one by planting wetland sod along the banks to develop wetland floodplain systems that connect to adjacent uplands areas. These transition areas are vital to developing effective wildlife corridors and a proper canopy over the stream.

Wetlands: The placement of muck helps expedite the establishment of proper wetland function.

Uplands: Once properly distributed, seeds contained within harvested topsoil will begin to sprout and produce a diverse and appropriate upland plant population.
Stream Reclamation

Maron Run is a tributary to Bowlegs Creek at Mosaic’s South Fort Meade mine. While the main channel and associated floodplain for this stream were preserved at this mine site, two headwater tributaries to Maron Run were permitted for mining. Mining occurred at this site in 1995.

Mosaic reclaimed the Maron Run headwater tributary with a variety of wetlands communities that effectively regulate the quality and quantity of water entering the Maron Run system. We also reconnected the Maron Run headwater tributary and wetland systems to the watershed. They are now serving the Peace River watershed as fully functional wetland systems.

Stream Reclamation in Action

While a stream’s function may appear straightforward, its role in a watershed is actually quite complex. Streams drain and deliver water to the wetland habitats they connect. The plant species within those wetland systems are highly dependent on how much water they receive and retain. If the streams that connect those systems do not deliver the needed water, those habitats will not thrive. In Mosaic’s reclamation projects, we connect stream systems with wetlands and lake systems, providing wildlife corridors and aquatic habitat.
Stephens Branch is a tributary to the Peace River located within Mosaic’s South Fort Meade mine. Construction of this 1,700-linear-foot stream — part of a 125-acre reclaimed wetland project — began with Rosgen stream modeling techniques and simulated flood flows.

Using these methods — both based on proven science for restoring proper hydrological function and valuable wildlife habitat — Mosaic carefully designed and excavated stream depth and width.

After biodegradable erosion control fabric and silt fencing were in place, we installed woody debris to create aquatic and macro invertebrate habitat.

Mosaic planted more than half a million plants at the 28-acre Stephens Branch wetland to accelerate the establishment of native vegetation and to ensure water quality standards were met upon reconnection.

We used fast-growing seasonal grasses to quickly stabilize newly contoured areas like this one at Stephens Branch. Roseate spoonbills often flock to newly constructed wetlands like this because of the excellent habitat and foraging they provide.

Mosaic sprayed hydroseed grasses along the banks of this reclaimed dragline crossing to establish ground cover prior to the start of summer rains. Many of Mosaic’s reclamation projects close to sensitive areas take place during the dry season, between December and April, to ensure that storms do not wash away material.
As Mosaic prepares to mine wetland systems, our reclamation crews often harvest the muck layer from the surface of the wetland. The harvested muck is then either stored on-site or transported to another reclamation site for immediate use. This muck contains a valuable seed bank and other organic material. After the reclaimed wetland is properly contoured, the muck is redistributed on the surface.

Featuring mature vegetation, appropriate hydrology and vibrant wildlife habitats, the Alderman Creek bayhead in Hillsborough County illustrates the successful reclamation of a fully functioning forested bay wetland system. The system exhibits the characteristics of natural bay wetlands, including a perennial seepage slope.
Herbaceous Wetland

Freshwater Marsh, Wet Prairie

This freshwater marsh near Mosaic’s Four Corners mine has become a sanctuary for various plant and wildlife species. This mitigation project is located on reclaimed land that was a pasture prior to mining. Spanning 500 acres, the vast wetland serves as a haven for migratory birds and as vital nesting grounds for several protected species. The wetland drains to the North Fork of the Manatee River.
Agricultural Lands

Improved, Unimproved and Woodland Pasture, Citrus Groves

Pasture like this reclaimed site (above) at Mosaic’s former Fort Green mine consists of trees, brush and grasses.

Improvements like this fencing (above) on reclaimed pastureland at Mosaic’s former Fort Green mine demonstrate how these lands are returned to previous use for activities like cattle herding and grazing, which occurred on the land prior to mining. We currently lease more than 30,000 acres of pasture on reclaimed land.
Thousands of acres of reclaimed land are now used for agricultural purposes. In addition to pasture, we use reclaimed land for sod farms, tree farms and row crops. All of those pictured above are located near Mosaic’s former Fort Green mine.
Xeric Rangeland

Palmetto Prairie, Mixed Rangeland, Xeric Oak

Xeric habitats are unique among upland habitats. Their sandy soils and sparse vegetation make them particularly hospitable to burrowing wildlife.
Mosaic’s Horse Creek xeric reclamation project near the former Fort Green mine is home to gopher tortoises, Florida mice, gopher frogs and other wildlife. This area is slated to receive a perpetual conservation easement to provide them a permanent home.

Top: Palmetto prairies like this one near Mosaic’s former Kingsford site in Hillsborough County thrive on reclaimed land. The hydrology on the site is designed to drain well.

Bottom: This mixed rangeland near Mosaic’s former Fort Lonesome mine features a variety of grassy landscapes composed of a mix of herbaceous plants, shrubs and brush.
Sand Pine

Sand pines like this one are xeric communities that consist of sandy, well-drained soils. The sparse understory typically includes grasses, cacti, open sandy patches and scrubby shrubs. Sand pine communities are usually found on ridges and serve as critical habitat for gopher tortoises and indigo snakes.
Water

This herbaceous wetland serves as the headwaters to the Maron Run stream.
Clay Settling Areas (CSAs)

Because of their natural fertility and moisture-holding capacity, reclaimed clay settling areas (CSAs) are put to productive use as cattle pastures and are suitable for row-crop farming. Mosaic maintains ongoing agricultural research on the use of CSAs to grow a number of row crops like zucchini, cabbage and collards. The clay contained beneath the surface of a reclaimed CSA continues to settle for many years, which limits its potential for development involving buildings or structures. In addition to agriculture, reclaimed CSAs also are used for sod farms, like the one pictured on the right near Mosaic’s South Fort Meade mine.
From gopher tortoises and indigo snakes to burrowing owls, special care is given to on-site wildlife before, during and after mining.

Wildlife Translocation Program

Mosaic has taken a leadership role in pioneering wildlife relocation techniques, in creating prime habitats, and in providing continued financial support for wildlife rehabilitation and education. We work to protect the environment’s most sensitive habitats and the many species they contain.

Before any mining begins, the property is surveyed by independent consultants multiple times to locate all protected species that have settled on the land. Our ecologists work closely with agencies like the Florida Fish and Wildlife Conservation Commission and the U.S. Fish and Wildlife Service to ensure that wildlife on our property are monitored appropriately and their habitats managed.
The Florida Scrub-Jay

Mosaic has developed one of the largest scrub-jay populations in Southwest Florida through a series of successful translocations that began in 2003. As of June 2012, the habitat, on an unmined conservation area, was home to 21 family groups consisting of 72 individual birds.

This managed high-quality scrub habitat has also enticed scrub-jays to immigrate on their own for the companionship of other jays. Mosaic’s site is adjacent to land owned by Manatee County — the Duette Preserve — and land owned by the Southwest Florida Water Management District (SWFWMD). Mosaic worked with both Manatee County and SWFWMD to further expand habitat management and scrub-jay population onto their lands.

The Burrowing Owl

Mosaic ecologists have conducted several burrowing owl translocations since 2006, when we successfully completed the first burrowing owl translocation project in the state of Florida. In December 2011, Mosaic ecologists worked with local wildlife experts to relocate four burrowing owls from property near our Four Corners mine. The owls were released into their new habitat following a 30-day stay in a temporary enclosure to help them acclimate to their new environment.
Wildlife at Mosaic Facilities

The venomous cottonmouth snake got its name from the inside lining of its mouth, which appears white when open. These snakes, like this one near Mosaic’s former Fort Green mine, are indigenous to Florida.

Top: Adult American alligators can grow to several hundred pounds and as long as 15 feet. The coloring on this alligator found on reclaimed land near Mosaic’s Hookers Prairie mine suggests it is still relatively young — about three to four years old.

Bottom: Gopher tortoises, like this one living on reclaimed land near Mosaic’s Four Corners mine, are one of the few tortoise species that actually dig and live in burrows. These animals, which can live to nearly 100 years old, feed mostly on vegetation but also have been known to eat fruit and dead animals.
Some trademark features of the black-necked stilt, a shorebird found most often along the edges of shallow water, include a needlelike beak, a white belly and long, thin, red legs.

The trademark pink-tone feathers of the roseate spoonbill, like this one at Mosaic’s Hookers Prairie mine, will actually brighten during mating season. Although roseate spoonbills don’t stay with the same mate for life, they are monogamous for an entire breeding season.
Improved pasture, like this one located on reclaimed land near Mosaic’s former Fort Green mine site, is typically managed through regular seeding and controlled burning, and is used for activities like cattle grazing. Improvements to rangeland — by planting high-protein grasses — allow for increased livestock carrying capacity.
Mosaic’s former Fort Green mine site does not depend on fire management to maintain an open plant community. Instead, the trees, brush and grasses on this reclaimed tract are allowed to develop freely. While requiring less active management, unimproved pastureland has lower carrying capacity for livestock than improved land.
Woodland pasture, like this reclaimed site at Mosaic’s former Fort Green mine, consists of a variety of trees and vegetation.
Thousands of acres of reclaimed land are now used for agricultural purposes. In addition to pasture, reclaimed land is utilized for row crops, sod farms and tree farms. This citrus grove near Bowling Green was planted on reclaimed land at Mosaic’s former Fort Green mine.
Some attributes of cypress wetlands, like this one located on reclaimed land near Mosaic’s former Fort Green mine site, include low-lying wetlands, with a domed canopy and mucky, pocked organic soil.
This is the interior view of a wetland hardwoods project near Mosaic’s South Fort Meade mine. It involved planting a variety of hardwood trees as well as ground cover and mid-story vegetation on reclaimed phosphate mine land.
These pine flatwoods thrive in flat, slow-draining soils. The hydrology of this site near Mosaic's South Fort Meade mine was designed with drainage characteristics to support pine trees and palmettos.
Maron Run is a tributary to Bowlegs Creek at Mosaic’s South Fort Meade mine. This site was reclaimed with a variety of wetland communities that maintain water quantity and quality entering the system, which eventually reaches the Peace River.
Palmetto prairies like this one near Mosaic’s former Big Four mine site in Hillsborough County thrive on reclaimed land. The hydrology of the site is designed to drain well in order to support this habitat, which is used by a variety of birds, rodents and insects for nesting, protective cover and food.
Sand pines, a native Florida tree, grow well in sandy soils like those found on the reclaimed land near Mosaic’s former Big Four mine site.
This wet prairie is located near Maron Run, a reclaimed stream project near Mosaic’s South Fort Meade mine site.
On the back side of this freshwater marsh is an exterior view of a successful mixed wetland hardwoods project at Maron Run. It involved planting a variety of vegetative communities on reclaimed phosphate mine land.
This freshwater marsh near Mosaic’s former Four Corners mine has become a sanctuary for various plant and wildlife species. Spanning 500 acres, the vast wetland serves as a haven for migratory birds and as vital nesting grounds for several protected species.
Featuring mature vegetation, appropriate hydrology and wildlife habitats, the Alderman Creek bayhead in Hillsborough County illustrates the successful reclamation of a fully functioning forested bay wetland system. The system exhibits the characteristics of natural bay wetlands and demonstrates excellent wetland function.
This pickerelweed can be found growing in the sawgrass marsh near Mosaic’s Hookers Prairie mine.