A GIANT LIST OF FACTS ABOUT PANDO

Pando is a single aspen tree that spans 106-acres of the Fishlake Basin in the Fishlake National Forest in Utah ▪ Pando is the world's largest tree by area and weight *combined* ▪ Pando's weighs 13.2 Million pounds, making it three times larger than the largest single tree ▪ Pando features and estimated 47,000 stems (botanical term "ramet") ▪ Each stem is a genetically identical part of the larger single tree ▪ Rapid field estimates by Paul Rogers suggests, Pando's roots could span 12,000 miles if laid end-to-end ▪ Just like a tree in your yard, Pando works as a single tree balancing energy production, defense and regeneration ▪ Burton Barnes and Jerry Kemperman were the first to document Pando in 1976. Pando is so big, they only saw it because they flew over it ▪ Each Spring and Fall, you can see Pando's outline from above since the leaves unfurl and change color at the same time, making Pando stand out from surrounding trees ▪ A helpful way to imagine Pando: hold your hand out palm up, make a fist, now slowly raise your fingers upward; the root system is your palm, the fingers are the stems rising from the ground ▪ Fish Lake spans 5 square miles making it Utah's *largest natural mountain freshwater* lake ▪ Fish Lake is primarily fed by natural springs ▪ Fishlake Basin was dominated by glaciers until around 13,000 years ago ▪ Archaeological research shows Fishlake Basin has been used for recreation for at least 1,500 years and hunting for some 10,000 years ▪ Fishlake Basin is the homeland of the Paiute people ▪ Pando lives along the edge of a fault line pulling the earth apart while the magma heated land between, sinks. Geologists call this a *graben* ▪ In 1993 Michael Grant named the tree "Pando", which is Latin for "*I Spread*" ▪ In 2008, Karen Mock, Jennifer DeWoody, Valerie Hipkins and Carol Rowe verified Pando's size by genetic testing ▪ Each branch of Pando can reach 80 ft tall, 3ft around and spread 30ft at the top ▪ Pando is male and creates pollen ▪ Pando is constantly re-generating itself by sending up new branches from its massive root, a process botanists call *suckering* ▪ Pando is a quaking aspen, scientific name Populus *tremuloides* ▪ The name "*tremuloides*" refers to the way the aspen "tremble" when the wind blows ▪ Locals call aspen "quakies" ▪ Pando eats enough sunlight to power 70,000 homes each year ▪ The "eyes" of Pando are created where branches fall off ▪ Aspen like Pando can grow 3 feet per year making it one of the fastest growing tree species in North America ▪ Pando contains chlorophyll in its bark allowing it to create energy *without leaves* in Winter ▪ Pando shares it's home with black bear, fox, pelicans, coyote, mountain lions, antelope and deer ▪ Each stem of Pando can live about 150 years ▪ Most scientists believe the Pando seed set down between 9,000 to 13,000 years ago ▪ There is no way to tell Pando's actual age as no "original" part remains to test ▪ Elk and deer love to eat the baby stems and bark which undermines Pando's ability to keep itself in balance ▪ Fencing is used to help keep out deer and elk ▪ 53-acres is fenced-in today, more work is planned ▪ Friends of Pando was founded in 2019 and is the only organization soley dedicated to Pando working to esnure it may be enjoyed by future generations. ▪ Learn more at www.friendsofpando.org

HELP FRIENDS OF PANDO PROTECT PANDO

Pando is a wonder without compare who care and natural wonder is worthy of our constant attention. If you share our wonder for Pando, here are some things you can do to help us ensure Pando can be enjoyed for generations to come.

Make a recourring donation to support Friends of Pando. Make a tax-deductible donation to support our education, research and stewardship programs which create local jobs in science, art and land management.

Volunteer your talents. Whether you have a few minutes to create a social media post (#pando) or, you want to get your hands dirty helping work in the tree, we have volunteer opportunities year round.

Host a Talk. The history of protecting special trees doesn't start in the marble halls of academia or government, but with people sharing the story about a tree that inspired them. Invite Friends of Pando to give a talk in your community or, order our information kit and host your own.

Become a community partner. Friends of Pando has a track record of developing innovative partnerships programs that get results. Reach out to us about opportunities to help support education, research and stewardship programs.

To learn more about Pando
and ways you can help, visit
FRIENDSOFPANDO.ORG

A friend of Pando is a friend of mine...

Friends of Pando is a nonprofit organization founded and based in Richfield, Utah. Our mission is *to educate the public, support research and preservation efforts and inspire stewardship of Pando, the worlds largest tree.* Each year we employ students, scientists, artists and volunteers from around the world that work to understand, monitor, document and preserve the tree. As the only organization dedicated to Pando and the land it calls home, Friends of Pando recognizes the challenges ahead will involve generations of collaboration. We welcome all who feel led to understand and protect Pando and declare, *a friend of Pando, is a friend of mine*.

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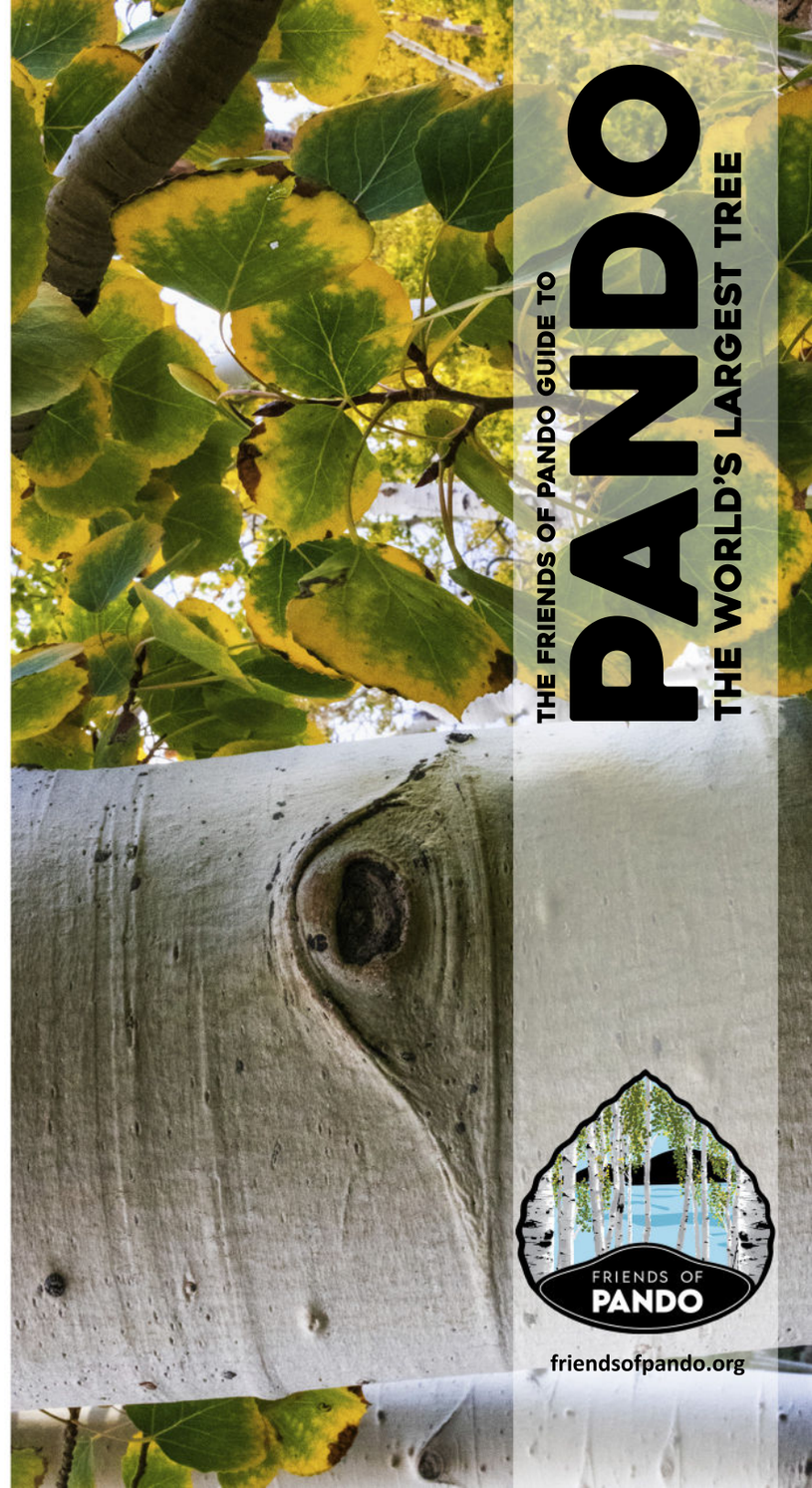

THE FRIENDS OF PANDO GUIDE TO

PANDO

THE WORLD'S LARGEST TREE

friendsofpando.org

PANDO: THE WORLD'S LARGEST TREE

High in the mountains of the Fishlake National Forest stands Pando, the world's largest tree, a aspen clone made up of and estimated 47,000 "stems" (botanical term "ramet"). Covering 106 acres and weighing 13.2 Million pounds, Pando is the largest tree by weight and, by land mass *both*, meaning it has no rival in the tree world. Although each stem appears to us as an individual tree "trunk", they are in fact, genetically identical parts of a *single tree* interconnected by a massive root system that coordinates energy production, defense and regeneration across its expanse. Almost 3/4 of a mile at its widest point, Pando's outline is visible each Spring and Fall from above - which lead to its discovery in

A satellite view of Fishlake Basin with Pando's boundaries highlighted in green.

1976 when Burton Barnes and Jerry Kemperman first reported seeing the tree. In the 1980's, Fishlake National Forest began work to protect the tree. In 1993, Michael C. Grant named the tree "Pando" which is Latin for "*I Spread*". In 2008, Pando's size was confirmed by genetic tests conducted by Jennifer DeWoody, Karen Mock, Valerie Hipkins and Carol Rowe stirring global wonder and a new era of research.

AN ANCIENT PIONEER, A MASTERWORK IN LONGEVITY

How Pando came to dominate the land it calls home, offers remarkable lessons in resilience and longevity. Born from a seed the size of a piece of oatmeal that took root between 9,000 and 13,000 years ago, Aspen like Pando (Populus *tremuloides*) are "*pioneer trees*"; the first trees to take root in disturbed lands like the glacier carved Fishlake Basin was after the last ice age. The first stem of Pando would not have seemed like much to a passer-by, would not have indicated what it was to become. Tree's like Pando regenerate via a hormone cycle. The hormone *auxin*, send stems upward. When auxin diminishes due to stress, this allows for the accumulation of the hormone--*cytokinins*. When cytokinins collect, they stimulate creation of a *genetically identical* stem which grows from the root; a process botanists call *suckering*. A dynamic system, each new stem adds energy gathering potential. A network of life, each new branch of the root system adds a place where Pando can "spread out". While single stems only live around 150 years, Pando has continued changing shape and form in this way for at least about 9,000 years.

UNIQUELY ADAPTED TO THE HIGH WILDS OF UTAH

As all aspen do, Pando features adaptations that allow it to thrive in the high wilds of Utah. As a sun loving tree, Pando reaches high and fast, dropping its less productive branches which leave branch scars we call "eyes". Known as a "stable" aspen clone, Pando's massive root system forms a lattice-work that prevents other trees from settling in. Although today we do not know the extent and underground dynamics of its root, rapid field estimates by researcher Paul Rogers suggests the root could span 12,000 miles if laid end-to-end. Living where dry mountain winds


A branch scar forms "eyes" | Leaves preserve moisture | Watery bodies thwart fire

can reach 60 Mph, Pando features additional adaptations that allow it to thrive. The leaves connect at angles that help deflect drying winds, while a waxy leaf coat helps the tree preserve moisture. In a land where fires can rage for weeks, Pando's body stores large quantities of water allowing it to thwart low-to-medium intensity ground fires. Living where winters are harsh, Pando has another strategy; the bark contains chlorophyll, allowing it to produce energy in winter without leaves.

A RECENT DISCOVERY, CHALLENGES IN STEWARDSHIP


Deer outside Pando's fence | Conch Fungus infection | Target Canker infection

Pando is a recent discovery whose nature and operation was only verified in 2008. A subject of intense study and curiosity, you may have heard Pando is in decline or, perhaps, that Pando is dying. We know *Pando is not dying*, because the hormone cycle that drives regeneration has not stopped, but that does not mean, all is well. Today, about 53 acres of Pando is *fenced-in* to control deer and elk who can eat new growth faster than Pando can respond. While some find fences ugly or short sighted, they are required in these lands for one very important reason; Pando is surrounded by 700 square miles of prime deer habitat managed by private, state and federal agencies whose policy concerns are not shaped by Pando. In addition, Pando also faces diseases common to aspen which require study and care. Just as a broken bone is put in a cast, so too does Pando need us to provide time and space for healing. The challenges ahead are many and will involve collaboration across many fields; geology, agriculture, biology, botany and genetics to name a few. It will also involve inspired stewardship of artists, policy makers, land managers and you, who have come to wonder.

CONNECTING DISCOVERY & IMAGINATION

As the world's largest organism, Pando is a natural wonder that stands as a testament to the magnificence of nature's imagination. Although Pando belongs to itself, its wellbeing is now tied to how humans respond; a situation worthy of introspection. Just as Pando has re-imagined itself over millennia, we might do well to consider how


Surface detail of Pando's massive root system connecting over 40,000 branches

we imagine ourselves as part of nature and, the role we can play in Pando's future. As each stem of Pando can live two human lifetimes, the work ahead will involve generations of collaboration and new ways of thinking about what a trees *are* and what trees *can be*.

A DESTINATION FOR ALL SEASONS OF LIFE

Located along remote Utah Highway 25, Pando is a destination for all seasons of life. In Spring, Pando sends out an explosion of bright green leaves and in Fall, those leaves turn bright gold, a process that takes weeks to unfold because Pando is *so big*. Those who visit in Summer and Winter will be rewarded with a meditation on the possibilities of life in this rugged land. In Summer, winds stir Pando's leaves creating a magnificent song that stands in stark contrast to the silent, bare-vista canyons to the south and east. In a land known for its natural formations, Pando laid bare in Winter, traces a menagerie of forms against bright blue mountain skies. If you only have a few minutes to meet Pando, use a pull-off and take a moment to run your hands over the body of a lifeform that has re-invented itself countless times and has learned to eat sunlight and retard fire. If you have more time and want to move to a different rhythm of life, take a short walk on the marked trail and rest against one of Pando's giant trunks. Wait for the wind, when it comes, feel the body sway. As it sways, consider - you are immersed in the world's largest tree, a lifeform in constant motion, able to re-invent itself again and again here, on the boundary between discovery and, imagination.