
LEWIS AND CLARK
TRAIL

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The Journals of the Lewis and Clark Expedition 1803-1806: Weather, Water & Climate

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The Journals of

The Lewis and Clark

Expedition 1803-1806

Weather, Water & Climate

Edited by Vernon Preston

NOAA's National Weather Service
Salt Lake City, Utah
2004

To my honored parents, David and Ruth Mary

Who believed that history must be experienced, not just read
Who took our family to tour the West and it's History
Who taught us to respect the Land and it's Peoples
Who encouraged my Meteorological Pursuits

This is our present Situation,! truly disagreeable. About 12 oClock the wind Shifted about to the NW and blew with great violence for the remainder of the day at maney times it blew for 15 or 20 minits with Such violence that I expected every moment to See trees taken up by the roots. Many were blown down. Those Squals were Suckceeded by rain, !O how Tremendious is the day. This dredfull wind and rain Continued with intervales of fair weather all the latter part of the night. O! How disagreeable is our Situation dureing this dreadfull weather.

Captain William Clark
Mouth of the Columbia River
November 28, 1805

About 12 oClock we arived in Site of St. Louis. Drew out the canoes then the party all considerable much rejoiced that we have the Expedition Completed and now we look for boarding in Town and wait for our Settlement and then we entend to return to our native homes to See our parents once more as we have been So long from them.—

Sergeant John Ordway
Return of Expedition to St. Louis
September 23, 1806

Preface

This immence river so far as we have yet ascended, waters one of the fairest portions of the globe, nor do I believe that there is in the universe a similar extent of country, equally fertile, well watered, and intersected by such a number of navigable streams.

Meriwether Lewis
March 31, 1805
Letter to his mother Lucy Marks while at Fort Mandan, North Dakota

In the annals of American scientific exploration and discovery, one journey which stands the enduring test of time and leads us on to new discoveries is that of Meriwether Lewis and William Clark. The two Captains with more than three dozen participants explored across the heart of the vastly uncharted North American Continent from St. Louis, up the Missouri River, across the Continental Divide and down the tributaries of the Columbia River to the mighty Pacific Ocean. Inspired by President Thomas Jefferson with years of planning and failed attempts, the successful Lewis and Clark "Corps of Discovery" journey established a foundation of commerce, science and knowledge in what would become the expanding domain of the United States of America. (Appleman, 1975; Ambrose, 1996, 68-79; Hayes 2001; Ronda 2001, viii, 1-16; Wheeler, 1904) Historian Roy Appleman (1975, 3) notes "In its scope and achievements, the expedition towers among the major explorations of the North American Continent and the world." This Expedition between 1803 and 1806 vastly increased the knowledge of flora, fauna, geography, geology, native peoples, commerce trade possibilities and routes, and as this special edition of the journals will describe, the systematic climatological, hydrological and meteorological events during their journey.

This Countrey may with propriety I think be termed the Deserts of America, as I do not Conceive any part can ever be Settled, as it is deficent in water, Timber & too Steep to be tilled.

William Clark
May 26, 1805
in Central Montana

Acknowledgments

This project was inspired by many members of my family both immediate and extended. This idea came to fruition because of my love for camping along the Lewis and Clark trail, extended readings of the journals and various books, a Ken Burns and Dayton Duncan movie and a Billboard. Traveling through Missoula, Montana a commemorative billboard sponsored by the State of Montana reminded drivers about the upcoming Lewis and Clark Bicentennial, and the idea of developing a special National Weather Service (NWS) safety Internet Homepage for the millions of travelers expected over the four years of the Bicentennial 2003-2006 was born. At the end of September 2002, NWS, Western Region Meteorological Services Division Deputy Director, Carl Gorksi, and NWS Glasgow, Montana Warning Coordination Meteorologist, Tanja Fransen prompted me to pursue this project. To them, I am truly indebted.

I am particularly grateful to Mr. Dean Hazen, Science and Operations Officer at the Pocatello, Idaho National Weather Service for providing valuable suggestions, comments, criticisms and constructive design concepts. His knowledge of meteorological prose and style have helped this project blossom.

To my fellow staff members at the weather forecast office in Pocatello, for their encouragement and support during the long hours of research and typing. To the Western Region Headquarters personnel who strongly believed in the importance of this project and assisted in final publication.

Lest we forget, to those who have gone before us. Many thanks and appreciation to those dedicated authors and historians who spent many years researching the Lewis and Clark Expedition. In particular, Nicholas Biddle, Elliott Coues, Reuben Thwaites, Milo Quaife, Ernest Osgood, Donald Jackson, and Gary Moulton for their timeless work in editing the main baseline of Lewis and Clark journals and letters. To Ken Burns, Dayton Duncan, and Stephen Ambrose for re-invigorating the public interest in Lewis and Clark in their excellent film rendition. And those authors who helped my understanding, Appleman, Bakeless, Burroughs, Cutright, DeVoto, Frisinger, Large, Ronda, and countless others.

Finally, many affections towards my family for their support. And just as Lewis noted of Private McNeal who " *exultingly stood with a foot on each side of this little rivulet and thanked his god that he had lived to bestride the mighty & heretofore deemed endless Missouri*" on August 12, 1805, I thank mine for His inspiration and guidance on completion of this project.

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Chapter 1

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Saw a black cloud rise in the west which we looked for emediate rain we made all the haste possable but had not got half way before the Shower met us and our hind extletree broke in too we were obledged to leave the load Standing and ran in great confusion to Camp the hail being So large and the wind So high and violent in the plains, and we being naked we were much bruuzed by the large hail. Some nearly killed one knocked down three times, and others without hats or any thing about their heads bleading and complained verry much...The plains are so wet that we could doe nothing this evening.

Sergeant John Ordway
June 29, 1805
along the Portage Route around the Great Falls of the Missouri, Montana

In the afternoon, there arose a storm of hard wind & rain; accompanied with amazing large hail at the upper camp. We caught several of the hail Stones which was measured & weighed by us, there were 7 inches in Surcumference and weighed 3 ounces— Captain Lewis made a small bowl of punch out of one of them. As luck would have it, we were all...Safe...the party that was at the upper camp, were under a good shelter, but we feel concerned about the men on the road with the baggage from the lower Camp—

Private Joseph Whitehouse
June 29, 1805
White Bear Island, Upper Portage Camp southwest Great Falls, Montana

Beginnings

Exploration of inland portions of the North American Continent had been a goal of many governments worldwide and lucrative trade with Indian nations led many counties to develop remote trading posts. Thomas Jefferson was intrigued by the idea of an expedition up the Missouri some twenty years prior to the Lewis and Clark Expedition. He tried to interest General George Rogers Clark in making the expedition in 1783, but lack of funding prevented an attempt. While serving in Paris, Jefferson tried to engage John Ledyard to cross Russia, enter North America by way of Alaska and explore eastward to St. Louis. This too fell through as Ledyard was stopped by Russian officials while trekking through Siberia. Jefferson's concern over who would control interests in the Pacific Northwest was further aroused when he learned of overland journeys by British explorer Alexander Mackenzie. Mackenzie made two westward trips from northern Alberta's Lake Athabasca. During his first journey in 1789, Mackenzie led a small party northwest to the Arctic Ocean down a broad river (later named for Mackenzie). On his second journey in 1793, Mackenzie made a trek to the Pacific Ocean down the Peace River and later Fraser River. Arriving at the coast, he threw down the gauntlet to other counties by painting the rocks near the shore with the following inscription; "Alexander Mackenzie, from Canada, by land, the twenty-second of July, one thousand seven hundred and ninety-three." (Mackenzie, 1801; Bakeless, 1947; Salisbury, 1950; DeVoto, 1953; Gilbert, 1973; Allen, 1975; Appleman, 1975; Wood and Thiessen, 1985; Ambrose, 1996; Ronda, 2000; Hayes, 2001; Ronda, 2001; Saindon, 2003) As a twist of irony, the Lewis and Clark Expedition took liberties of similar nature during their journey and one of these markings still remains at Pompey's Pillar near Billings, Montana; the only remaining physical evidence of their journey on the landscape.

Undaunted by other setbacks, Jefferson tried once again to enlist an explorer to tour the Missouri River system. In 1793, backed by the American Philosophical Society, Jefferson tried to hire Andre Michaux, a French botanist, to make the journey. The plan failed when it was learned Michaux was a French spy attempting to stir up trouble between the Americans and Spaniards. (Salisbury, 1950; Steffen, 1977)

Thomas Jefferson found himself in a better position to promote an expedition when he became President of the United States and on January 18, 1803, he submitted a confidential message to Congress. (The message has been reproduced in Appendix B of this edition) Near the end of the message was a small paragraph requesting "an appropriation of $2,500 for the purpose of extending the external commerce of the United States." (Richardson, 1897; Bruun and Crosby, 1999) On February 28, 1803, Jefferson received word from Congress that they had approved the journey. Meriwether Lewis, President Jefferson's personal secretary, was selected to lead the Expedition and spent the Spring of 1803 preparing for the journey in Philadelphia. Lewis requested a co-leader for the journey and chose his former Army Captain, William Clark. While in Philadelphia, Lewis also completed training in astronomy, natural history and sciences, health and medicine, and ethnology. In addition to his studies, time was spent purchasing and obtaining a vast array of materials needed to complete the journey successfully. (Biddle 1814; Jackson, 1978; Botkin, 1995; Burroughs, 1997; Burns, 1997; Chuinard, 1998; Paton, 2001; Peck, 2002; Cutright, 2003; Patient, 2003) Included in his packing list were three thermometers.

(Lewis' Expedition requirements list has been reproduced in Appendix C of this edition)

Meteorological Instruments of the Expedition

There is uncertainty as to the type of thermometers used on the Lewis and Clark Expedition. Although not discovered until the late 1600's, the basic principal behind thermometers was known as far back as the third century B.C. Galileo is credited with the first invented thermometer sometime around 1593. By 1641, Ferdinand II, Grand Duke of Tuscany developed a sealed thermometer. Other advancements were made by Robert Boyle, who recognized the need for a standard scale. Various trials were made using water, air, liquor, spirits, alcohol, linseed oil and finally mercury as the measuring element within a thermometer. As science advanced during the 1700's, Robert Hooke increased the accuracy and established a fixed measurement for the freezing point of water. Dutch mathematician Christian Huygens is credited in suggesting two fixed points, the second being that of boiling water. Sir Isaac Newton choose a scale using fixed points of melting snow and of the human body. In 1714, Gabriel Fahrenheit developed the first mercury thermometer with a reliable scale. He established the first point of his scale by dipping the thermometer into a solution of ice, water and salammoniac, and/or sea-salt and designated it zero. A second point was assigned at 32^0 F when the instrument was placed in a mixture of water and ice only. The third point of 96^0 F was based on the temperature reached when the thermometer was placed in the mouth, or the arm-pit of a healthy man. Swedish astronomer, Anders Celsius provided another alternative in 1742. He used two fixed points; that of boiling water, which he assigned zero on his scale, and the temperature of melting ice -- one-hundred, with equal marks between. Although it was Jean Pierre Christin of Lyons who inverted the scale as it is known today. In fact, by 1779 there were as many as nineteen scales in use. (Middleton, 1969; Frisinger, 1983; Middleton, 2003)

What scale was chosen for the Lewis and Clark Expedition? On their first entry (January 1, 1804) in what would become known today as the Weather Diary [*"Book of Thermometrical Observations or the Meteorological Register were other names used*"], they performed experiments to determine errors in their thermometers by dipping them in a mixture of water and snow and marked the freezing point and then made a similar mark when inserting them into boiling water. Lewis and Clark noted that they made these observations using "*Ferenheit's Thermometer*" and this would imply they were using the Fahrenheit Scale. It is not certain when they conducted these particular experiments, but during January 17 through January 31, 1803 nearly every hour they made mention of current ambient air readings. Nowhere else during the journey did they write such entries. Clark at various times used words like "Ferenthiers" and "Ferents" thermometer and Lewis used "Ferrenheit" which help confirm what scale they were using. (Clark, June 22, 1804) (Lewis, September 3, 1803) Another mark they placed on the thermometers was an arbitrary summer temperature commonly known as "Summer heat" which was usually 75 or 76 degrees F^0. (Moulton 1986, 2:316)

It is believed that the three thermometers noted on the requirements list were made in Philadelphia. (see Appendix C) (Moulton 1986, 2:69) Clark makes mention of a particular company that made a thermometer in his January 3, 1804 entry. "John Donegan (or Denegan) and Joseph Donegany (Donegani) were making thermometers in Philadelphia in 1785. Although thermometers are among Lewis' list of requirements for the trip, there is no direct evidence that any were purchased." (Moulton 1986, 2:146) Other stories abound as to their origin. Historian Donald Jackson (1978, 75) notes that "an undocumented family tradition, first related by Dye and renewed by Meany, declares that St. Louis physician Antoine Saugrain made thermometers for Lewis and Clark by scraping the mercury off the back of his wife's mirror. Saugrain had social contacts with the explorers before and after the Expedition, but it is not likely that he made thermometers for them. Lewis kept temperature records on his way down the Ohio in the fall of 1803. Clark continued the practice at the Wood River (Dubois) Camp in the early months of 1804, and there is no evidence that the thermometers obtained in Philadelphia were not used. The last one was broken on September 3, 1805 when it was accidentally struck against a tree. The instruments must have been similar to that described by Jefferson in a request on June 5, 1804 to Isaac Briggs for two thermometers: " 'The kind preferred is that on a lackered plate slid into a mahogany case with a glass sliding cover, these being best exposed on exposure to the weather.' "

To further confirm this, the Weather Diary entry on September 6, 1805 notes "*Thermometer broke by the Box strikeing against a tree.*" No other meteorological instruments are known to have been carried by the Expedition. Except for temperature recordings, all other meteorological observations were taken using the natural senses or with other instruments used for navigation and measurement. To determine wind direction, they would stand facing the wind with a compass to determine a direction. For rise and fall of the river water, various marks were made on the bank and measured later with marked sticks, poles or chains which used the English scale of inches and feet. (Large, 1986)

Final Instructions

Jefferson sent final instructions to Lewis in June 1803 which gave specific directions on the scientific and commercial goals for the Expedition. (These instructions have been reproduced in Appendix D of this edition) As fortune would have it, Lewis returned to Washington, D.C. on July 4, 1803 to learn that Napoleon had decided to sell the Louisiana territory to the United States. This changed the Expeditions initial intent and now expanded their commission to conduct diplomatic meetings with the various Indian Nations and study the geography of the newly acquired land mass. Lewis went to Pittsburgh, Pennsylvania via Harpers Ferry, Virginia to load the many materials needed for the Expedition as well as obtain a keelboat and perogues (large flat canoes). On August 31, 1803, he left Pittsburgh and moved slowly down the Ohio river due to low water brought on by drought. Lewis noted the extremely low water of the Ohio as well as the perpetual morning fogs in his journal writings . In addition,

he conducted mini-experiments by taking temperature readings of the ambient air and the surface water of the river and made interesting conclusions as to the cause of the fog: "*Fog appears to owe it's orrigin to the difference of temperature between the air and water the latter at this seson being much warmer than the former; the water being heated by the summer's sun does not undergo so rapid a change from the absence of the sun as the air dose consiquently when the air becomes most cool which is about sunrise the fogg is thickest and appears to rise from the face of the water like the steem from boiling water*." (Lewis, Sept 1, 1803)

Lewis arrived at the Falls of the Ohio near Clarksville, Indiana / Louisville, Kentucky on October 14, 1804. Here he met William Clark and more recruits. As acclaimed author and historian, Stephen Ambrose (1996, 117) noted, "When they shook hands, the Lewis and Clark Expedition began." They set out from Louisville on October 26 arriving at the confluence of the Ohio and Mississippi Rivers on November 14 and moved up the Mississippi to near St. Louis by December 11, 1803. Heading up the Mississippi was made difficult by low water and strong current and more burdensome with strong northwest winds from late Fall cold fronts which pushed against the boats. (Quaife, 1916; Osgood, 1964)

Camp Dubois - Winter of 1803-1804

On December 12, 1803, Clark established Camp Dubois (Wood) at the mouth of the small Wood River on the east side of the Mississippi directly across from the confluence of the soon to be explored Missouri River. The winter scene at Camp Dubois was fraught with boredom, endless drilling and preparation of the boats for the journey. Clark kept a log during this time, known as the Camp Dubois field notes. However, it was not in the original manuscripts and was printed for the first time in the Moulton edition of the journals (1986). The weather that winter seems typical of the latitude. Their first recorded snows were on the day they established Camp Dubois. By December 22, ice was beginning to form in the rivers and they settled in for the long winter. They had a white Christmas.

The new year started off with an inch of new snow. Entries began on January 1, 1804 in what today is known as the Weather Diary. This particular diary noted sunrise and 4 PM weather observations of temperature, wind direction, the state of weather, river rise and fall, and general remarks. (The Weather Diary has been reproduced in Appendix A of this edition.) The pattern of entries is very similar to President Jefferson's style of weather diary writings. It also follows the pattern Jefferson directed his friend James Madison to keep while conducting an experiment to debunk arguments by naturalist Comte de Buffon in the 1780's and 90's. Buffon wrote scathing articles stating that the North American Continent's "supposed" inferior weather patterns would lead to degenerated fauna. (Druckenbrod, 2003) In addition to the Weather Diary remarks, Clark routinely placed comments about weather or river conditions in his daily narrative journal entries. Ever vigilant to conduct quality scientific observations, Lewis and Clark seemed to take care in the placement of the thermometers to obtain the truest temperature

readings possible. As many notes show, they found locations under trees out of direct sunlight. One such example contained in Lewis' notes was on July 22, 1805, *"I placed my thermometer in a good shade as was my custom about 4 PM."*

The winter season brought bouts of arctic outbreaks and almost every day between January 17 and January 31, Clark's narrative journals noted hourly temperature observations. No word is given to why this was done, but it could be that they were conducting experiments to determine any errors on the scale which had been inscribed next to the thermometer. Late winter brought bouts of rain and snow, but fair weather set in by the middle of March and the ice was off the rivers by the first day of spring. The horizon was occasionally obscured by smoke. A special treat greeted the camp on April 1, as red northern lights (Aurora Borealis) danced across the sky around 10 P.M. They watched with anticipation the river's daily rise and fall as the flood season progressed. Their first thunderstorm came on the leading edge of a cold front which passed by on April 5. Plants and trees were budding by the end of March, but Clark took special note on April 18, as he stated "*Vegetation appears to be Suppriseingly rapid for a fiew days past*."

Starting up the Missouri - May 1804

After several days of falling river conditions and warming May days, the "Corps for Northwestern Discovery" left Camp Dubois. They pushed across the Mississippi, entered the mouth of the Missouri River and moved up river on a cloudy, showery May 14, 1804. At St. Charles they stopped for a few days to readjust the loads in the keelboat and perogues and met Lewis who was finishing diplomatic business in and around St. Louis. The Expedition finally set off from St. Charles on May 21. Going slowly up river against the current, the party moved at 5 to 15 miles a day. Driftwood, snags, strong currents and falling river banks from spring floods kept the Corps on a slow pace. Occasionally they would hoist a sail and use the wind to their advantage, but most of the time they poled, rowed or towed by rope, the boat and perogues. Typical of the sultry Missouri climate, morning fogs were replaced by hot afternoon breezes. The occasional thunderstorm caused concern for the boats. Not much is known of the actual temperature readings during this part of journey as no record has been discovered. However, remarks from the daily narrative journal entries show it was hot and humid during the late spring and early summer on the Missouri. Some members had heat stroke and many got sunburned. They passed present-day Kansas City, Missouri on June 26. The highest temperature (96^0 F) the Expedition would record for the entire journey occurred on June 30 as they neared present-day Leavenworth, Kansas.

On July 4, they stopped by a small stream and named it after the special day. Clark made special mention of the area; "*One of the most butifull Plains, I ever Saw, open & butifully diversified with hills & vallies all presenting themselves to the river covered with grass and a few scatttering trees. Nature appears to have exerted herself to butify the Senery by the variety of flours Delicately and highly flavered raised above the Grass, which Strickes & profumes the*

Sensation, and amuses the wind throws it into Conjectering the cause of So Magnificent a Senerey in a Country thus Situated far removed from the Sivilised world to be enjoyed by nothing bu the Buffalo Elk Deer & Bear in which it abounds & Savage Indians." A few days later Clark and Sergeant Ordway noted the effects of the extreme heat on Expedition members "*Worthy of remark that the water of this river or Some other Cause, I think that the most Probable throws out a greater prepson. of Swet than I could Suppose Could pass thro: the humane body Those men that do no work at all will wet a Shirt in a Few minits & those who work, the Swet will run off in Streams*."(Clark & Ordway, July 6, 1804)

On July 12, in what would become an Expedition ritual, Clark climbed a nearby hill to take celestial observations and inscribed his name, day and month near an Indian pictograph of animals and a boat. Summer thunderstorms brought relief from the excessive humidity, but also brought perilous moments as the boats were nearly capsized or run ashore by the strong winds and waves.

Passing north of present-day Omaha, Nebraska, the Corps found a swath of large diameter trees twisted and mowed down. Clark's observation notes "*passed much fallen timber apparently the ravages of a Dreadfull haricane*." These trees were probably part of a recent tornado path. Further up the river they began to note how much of the prairie had been burned. As they would learn, starting a prairie fire was a way of notifying Indian Nations that travelers were nearby or that their presence at a council was requested. Later, they would find bluffs with seams of coal on fire producing a sulphurous odor. August continued sultry with afternoon and evening showers and thunderstorms. Clark began to note changes in the air as they moved north; "*the air is pure and helthy So far as we can Judge—*." As they entered the great plains and left the protection of the dense forests of Missouri, the strong daily breezes on the prairie acted as a blessing and a curse to the Expedition. Many days the prevailing southeast winds assisted their upstream progress against the rapid current, but sudden changes as frontal boundaries pushed through in late summer delayed their departure many times until late in the afternoon. The loose sands near the river often acted as a "summer blizzard" by reducing visibilities, irritating their eyes and filling everything full of gritty menace. The party became concerned one August day as they rounded a bend and saw the river full of white feathers which continued for three miles. Tension mounted as they were fearful of meeting hostile Indians. A few miles later they came upon a flock of pelicans who were shedding their feathers in preparation for new growth, something the Corps had never seen before. Throughout the summer months bugs plagued the party, most notably the mosquito. In fact, for nearly the entire journey, mosquitos became a scourge and generated a plethora of comments.

By September 8, the Expedition had pushed into South Dakota and were headed toward the "Great Detour of the Missouri." The first cool rains of the early fall season met the Corps just down river from the Big Bend of the Missouri or as they called it the Grand Detour. A few days later the Weather Diary mysteriously ends it's silence as daily observations resumed on September 19 with no explanation as to their absence. These were the first entries since leaving

Camp Dubois on May 14. They noted the change of seasons by remarking that the leaves of the cottonwood were fading and the brant and plover were starting to migrate southward. Clark further expounded on a remarkable change in the humidity. On September 23, the Weather Diary entry noted; "*aire remarkably dry-plumbs & grapes fully ripe— in 36 hours two Spoonfuls of water aveporated in a sauser*." Lewis would later experiment with evaporation rates in Montana the following Spring (Lewis, May 30, 1805). (Large,1986)

During what seemed like an early Fall, the party began to note the changes in the flora and fauna and experienced their first frost of the season on October 5. Brisk north winds swept cold dense gray clouds (black flying clouds as Lewis called them) indicating the first clue of a harsh winter to come. They pushed into North Dakota in mid-October and received freezing rain and their first snow of the season just north of the present-day Capitol of North Dakota (Bismarck) on October 21. Having decided to winter near the Hidatsa/Mandan Villages, they established Fort Mandan west of present-day Washburn, North Dakota on November 2, 1804.

Fort Mandan - Winter of 1804-1805

Continuing to note special circumstances, the narrative journals and Weather Diary entries show the winter of 1804-1805 at Fort Mandan was somewhat colder and wetter than modern observations (Burnette, 2002). Tragedy struck the Mandan Villages on October 29, as wind-whipped fire swept across the prairie into the Indian village and killed a man and women and severely burned others. The Corps barely escaped and noted the fire passed the camp "*with great rapidity and looked Tremendious*." Other unique occurrences during the winter of 1804-1805 included a spectacular appearance of the Aurora Borealis (November 6) and the onset of ice in the river (November 13). Repeated heavy frost were noted many times and one event impressed Sergeant Ordway on November 16; "*the Trees were covered with frost which was verry course white & thick even on the Bows of the trees all this day. Such a frost I never Saw in the States*." Several instances of frostbite and snow blindness were recorded along with heavy snow storms such as November 29 when thirteen inches fell. Corps members experienced additional hazards as winds stirred up blizzard conditions and produced significant snow drifts. Another white Christmas was noted and was celebrated by cannon fire in the morning and feasting during the afternoon. Extreme cold, which none of them had ever experienced, caused them to change the guard as often as once every ½ hour during the coldest times. December 17 marked the coldest temperature recorded during the journey as the mercury fell to 45^0 F below zero. They also experienced many visual oddities during the winter including parhelion (sun dogs, December 8 & 11); a halo around the moon (January 12, 1805); several mirages; and even an eclipse of the moon on January 14. As the first year of the Expedition came to a close, Private Whitehouse gave his summation of events at Fort Mandan, "*nothing particular occured Since christmas but we live in peace and tranquillity in our fort. The weather continued pleasant & the Air Serene— .*"

The new year (1805) began with a mild 34^0 F, but by early evening a light sprinkle of rain gave way to overnight snow. The Corps learned about various Indian customs during their stay with the Mandans. One of particular note was how they kept their horses during the winter. During the daytime, they let them roam about, but the horse would return to the large mound lodges and spend the night inside with the families. Sometimes during hunting parties, the Indians were forced to stay out all night in the sub-freezing temperatures. Sergeant Gass noted one particular incident when an Indian survived by cutting branches from trees and lying on them to keep his body off the snow and covered himself with a buffalo robe. Clark was so impressed with their heartiness he commented "*...a man Came in who had also Stayed our without fire, and verry thinly Clothed, this mans was not the least injured— Customs & the habits of those people has ancered [inured them] to bare more Cold than I thought it possible for man to indure— .*"

Realizing they needed to prepare for the spring thaw the party attempted to remove the boats from the river ice during January and again in February. Many ingenious methods were employed to cut through or thaw the ice. They finally succeeded just a couple of weeks before the river started to break up in early March. The snow began to melt and spring was just around the corner. On March 3, they saw a large flock of ducks and their first insect on the twenty-seventh. With the snow nearly gone, they witnessed the Indian Nations preparing for the return of the Buffalo by setting the prairie on fire. They learned this would stimulate early grass growth and lure the herds toward their village. (Moulton 1987, 3:309) By late March, the party was preparing to depart as they watched geese and swans return from their winter migrations. They experienced several ice jams near the end of the month as large chunks broke loose well above their location but became stuck in a river bend. To their amazement, the Indians began jumping from one cake of ice to another in an attempt to catch buffalo as they floated down.

Their first thunderstorm of the season occurred on April 1. Lewis provided some additional observations on this particular day, "*A fine refreshing shower of rain fell about 2 PM this was the first shower of rain that we had witnessed since the fifteenth of September 1804 tho' it several times has fallen in very small quantities, and was noticed in this diary of the weather. The cloud came from the west, and was attended by hard thunder and Lightning. I have observed that all thunderclouds in the Western part of the continent, proceed from the westerly quarter, as they do in the Atlantic States. The air is remarkably dry and pure in this open country, very little rain or snow ether winter or summer. The atmosphere is more transparent than I ever observed it in any country through which I have passed*."

Moving Toward the Rockies - Spring & Summer 1805

On April 7, 1805 the permanent party of thirty-three left the Mandan Villages for the unexplored land to the west. A smaller party took the keelboat packed with journals containing

the Expeditions discoveries and specimens collected during the previous years travel up the Missouri back to St. Louis. Specimens including various plants, animals and minerals were shipped to President Jefferson. Some of these items are still on display at Monticello, Virginia and in Harvard's Peale Library. As they headed up the Missouri, Lewis had time to note the significance of the date, "*Our vessels consisted of six small canoes, and two large perogues. This little fleet altho' not quite so rispectable as those of Columbus or Capt. Cook were still viewed by us with as much pleasure as those deservedly famed adventures ever beheld theirs; and I dare say with quite as much anxiety for their safety and preservation. We were now about to penetrate a country at least two thousand miles in width, on which the foot of civillized man had never trodden*."

Incessant winds racing across the prairie plagued the Expedition during their ascent of the Missouri into present-day Montana. Many times in April and May they had to stop by 9 A.M. and did not return to the river until 3 P.M. The strong winds caused several near mishaps as canoes would tip and nearly sink with their valuable cargo and more importantly, a few Corps members barely escaped drowning. Ordway also noted how bad the winds were, "*The Sand blew off the sand bars & beaches so that we could hardly see, it was like a thick fogg*." The sandstorms drew complaints of sore eyes from the men and as Lewis noted, "*So penitrating is this sand that we cannot keep any article free from it; in short we are compelled to eat, drink, and breath it very freely*." The dust rose to great heights in immense columns and visible for several miles.

Just two days into the assent, their old nemeses were back and as Ordway succinctly put it on April 9, "*The Musquetoes begin to Suck our blood this afternoon*." As spring progressed, their flora and fauna notations in this newly explored land increased dramatically. By the end of April they began to note the plants had scarcely changed in their growth patterns and may be at even earlier stages than those at the Mandan villages. Although not perceptible to the Corps, they were experiencing the affects of the higher elevation plains as they neared the Rocky Mountains as well as the higher latitude which has a shorter growing season.

The Expedition reached the confluence of the Missouri and Yellowstone Rivers near the end of April and pushed toward central Montana. Spring brought normal changes including many morning frosts, water freezing on their oars, and occasional bouts with fog and snow. A couple of late spring snowstorms shocked the party as they remarked how virulent the plants must be to tolerate such drastic weather changes. Clark expounded, "*The Snow which fell to day was about 1 In deep, verry extroadernaley Climate, to behold the tree Green & flowers Spred on the plain, & Snow an inch deep*." (Clark, May 2, 1805) As they passed from the flat barren plains toward central Montana, navigation became more difficult as the river grew more narrow with greater current and eddies from spring snowmelt flow. Dead and rotting buffalo lined the banks which they surmised had drowned when the ice gave way as they crossed frozen stretches of the upper Missouri.

Clark was the first to see the beginnings of "*those Shineing Mountains*" (The Little Rocky Mountains) on May 19, while walking on top of a ridge near the river. Lewis followed suite on May 26 with exuberation, "*while I viewed these mountains I felt a secret pleasure in finding myself so near the head of the heretofore conceived boundless Missouri*." The Corps then entered a scenic stretch of the river with spires and canyon walls which reminded the party of the marble buildings in the nations Capitol. This area today is known as the Missouri Breaks National Monument. Lewis was so overtaken with the beauty he offered this emotional rendering of the area; "*As we passed on it seemed as if those seens of visionary inchantment would never have an end...So perfect indeed are those walls that I should have thought that nature had attempted here to rival the human art of masonary had I not recollected that she had first began her work*." (Lewis, May 31, 1805) The Expedition members had lived in the lush green of the east coast, so the treeless barren plains were of great concern as they were trying to provide images that would enhance the economic value of the Louisiana Purchase so hoped for by President Jefferson. So much to their astonishment was the appearance of Montana, that Clark and Ordway bemoaned, "*this Countrey may with propriety I think be termed the Deserts of America, as I do not Conceive any part can ever be Settled, as it is deficent in water, Timber & too Steep to be tilled*." (Clark and Ordway, May 26, 1805)

As summer approached, the Expedition came to a dilemma at the confluence of today's Marias and Missouri Rivers. The Captains could not tell which was the true Missouri due to spring flooding from the snowmelt off the distant mountains. After exploring both systems for many miles, the Captains correctly choose the south fork. They were in search of what the Hidatsa Indians had called the "Great Falls of the Missouri." Lewis had speculated it would only take a days portage before continuing. As the party proceeded they began to comment nearly every day about the "*Snowclad*" mountains to the west. Snow in June caused more than a little anxiety since they were accustomed to the Appalachian Mountains which shed their snow by early Spring. Lewis set out on the south fork with a small scouting party to locate the falls. Hearing a roar on June 13, Lewis noted its grandeur as "*to gaze on this sublimely grand specticle...at the cascade...on my right formes the grandest sight I ever beheld*." There were five falls of the Missouri and the Expedition would spend nearly a month to portaging around them.

From June 13 to July 13, various members brought goods to the upper portage of the White Bear Islands at the southwest end of today's Great Falls, Montana. Many notable and significant weather events came to light during their month stay including numerous afternoon showers and thunderstorms — at least two of which were severe thunderstorms with large hail. One storm pummeled the men, knocking one down three times and bruised and bloodied most — another storm which had hail the size of pigeon eggs and as the Weather Diary noted: "*hail fell of an innomus size driven with violence almost incredible, when they struck the ground they would bound to the hight of ten to 12 feet and pass 20 or thirty before they touched again*." A flash flood nearly took the lives of Clark, Charbonneau, his wife Sacagawea and their little son Jean Baptiste. Strange apparitions known as flying clouds were described several times.

Strong winds were used by the resourceful portagers as they hoisted the sails to assist them moving the canoes overland to the upper portage. Strange noises which sounded like military cannon fire were heard by most of the Corps, but they could understand what caused it. Clark discovered a large natural spring which produced enough water to be a river in it's self. He used another spring laced with sulphur to bring medical assistance to Sacagawea who was near death. The buffalo trodden plains developed dried sharp points after summer rains which cut into their feet. In addition to weather concerns, grizzly bear, prickly pear and mosquitoes provided for lively discussions. They anxiously noted the looming snow covered mountains to the west nearly every day.

Summer heat came late that year, as the wet June and early July temperatures struggled into the 70s. In fact, they did not record their first 80 degree temperature until July 16. The perpetual and persistent southwest winds continued through this entire time. Lewis and Clark finally had their fill and began to speculate on their origins, "*The winds has blown for Several days from the SW I think it possible that those almost perpetial SW winds, proceed from the agency of the Snowey mountains and the wide leavel and untimbered plains which Streach themselves along their borders for an emence distance, that the air comeing in Contact with Snow is Suddenly chilled and condensed, thus becoming heavyer than the air beneath in the plains, it glides down the Sides of those mountains and decends to the plains, where by the constant action of the Sun on the face of the untimbered country there is a partial vacuom formed for it's reception. I have observed that the winds from this quarter is always the Coaldest and most violent and most violent which we experience, yet I am far from giveing full credit to this hypothesis on this Subject; if I find however on the opposit Side of these mountains that the winds take a contrary direction I Shall then have full faith*." (Lewis July 2, Clark July 3, 1805)

The Expedition was again moving up the Missouri and into the heart of the Rocky Mountains on July 13. They passed and named the "*Gates of the Rocky Mountains*" on July 19 and came to the Three Forks of the Missouri on July 25. To their astonishment, they found additional mountain ranges which reminded them of "*amphitheaters*," many of which were still covered with snow. After much scouting, the party correctly chose the southwest fork and since all three forks were of near equal size, named each of them for prominent members of the Jefferson Administration — the Gallatin after the Secretary of the Treasury; the Madison after the Secretary of State; and the southwest fork "*in honor of that illustrious personage President Jefferson*." The late summer heat now began to affect the Expedition with temperatures rising into the 90s. They found some relief as they were constantly in the cool waters of the Jefferson trying to pull the canoes up the smaller and increasingly rapid waterway. Near Dillon, Montana Lewis finally recognized that, "*The mountains do not appear very high in any direction tho' the tops of some of them are partially covered with snow. This convinces me that we have ascended to a great hight since we have entered the rocky Mountains, yet the ascent has been so gradual along the vallies that it was scarcely perceptable by land*." (Lewis, August, 10, 1805)

Over the Mountains - Late Summer and Fall 1805

Needing horses to cross the Rocky Mountains, Lewis set out with a small search party and reached the Continental Divide at Lemhi Pass west of the present-day Clark Reservoir in southwest Montana on August 12. Lemhi pass is currently measured at 7,373 feet and Lewis' group may have reached a couple of hundred feet higher depending on their exact route. This is the highest elevation the Corps would reach during the Expedition. Since the time of Columbus, a mythical trade route known as the "Northwest Passage" had been sought by hopeful explorers. The country who found and controlled this route, would probably control the destiny of the Continent. (Duncan, 1987) Lewis surely anticipated that he would find a gentle slope and river on the other side of this divide which would lead them toward the Pacific Ocean. Having the exultation of coming to the end of the Missouri River, Lewis instead must have felt centuries of hope come to a crushing defeat when he saw extensive snow-capped ranges in every direction. Lewis expounded, *"two miles below McNeal had exultingly stood with a foot on each side of this little rivulet and thanked his god that he had lived to bestride the mighty & heretofore deemed endless Missouri. After refreshing ourselves we proceeded on to the top of the dividing ridge from which I discovered immence ranges of high mountains still to the West of us with their tops partially covered with snow. Here I first tasted the water of the great Columbia river."* (Lewis, August 12, 1805).

They descended into the Lemhi Valley and found the Shoshone Indian Nation. Convincing Chief Cameahwait and a small party to return over the divide, they held council with Clark and the main party at Camp Fortunate in what is today Clark Reservoir. They experienced their first frost of the season while in the dry high mountain air (August 19). On August twenty-first they noted the dry cooler temperatures caused their writing ink and water in small vessels to freeze and the need for two blankets or more to remain comfortable all night. Looking for a fast way to the ocean, Clark explored down Lewis' River (today known as the Salmon) to see if it could be navigated. He soon found, as the Shoshone Chiefs had described, a river that had no shore, just tall rock cliffs and walls (still known today as the River of no Return). After acquiring the needed horses, the Expedition then set out by land over the Lost Trail Pass back toward Montana. A horse carrying the last thermometer stumbled and broke the case and instrument while climbing rocky snow and ice covered terrain on September 3.

Fall came early to the Rocky Mountain region as they proceeded north down the Bitterroot Valley and toward an old Indian trail known today as the Lolo. Anxieties began to rise once again as they saw snow-capped rugged mountains over their left shoulder every day. On September 9, they arrived at Travelers Rest, near present-day Lolo, Montana and on the eleventh the Corps proceeded into the heart of the Bitterroot Mountains. They awoke one morning to nearly 10 inches of snow and many others to frost during the perilous eleven day passage. They suffered from shortness of breath, great fatigue, and discomfort from extended

time at the high elevation altitude (6000 to 7000 feet) and from lack of food. The higher mountains stunned them with their perpetual snow cover that did not melt and rugged appearance. Sergeant Gass alarmed by the heights wrote "*proceed over the most terrible mountains I ever beheld*." They lost the trail at one point and had to climb nearly straight up a canyon side before returning to the correct course. The trail was littered with downed trees and several areas suffered from the ravages of fire. Nearly starved to death, they staggered onto the Weippe Prairie and met the Nez Perce Indian Nation. They proceeded to near present-day Orofino, ID and established Canoe Camp to build vessels for travel down the Clearwater, Snake and Columbia Rivers. The warm early fall temperatures in the deep valley of the Clearwater combined with a change in diet and water made many of the Expedition members ill.

To the Pacific - Fall 1805

On October 7 the Corps of Discovery was once again underway down the Clearwater River with the current to their back and the river at seasonal low depths. On October 10 they passed the confluence of the Snake and Clearwater Rivers and proceeded swiftly through various rapids toward the Columbia. By October 17 they were proceeding down the Columbia and knew they were close to reaching their destination as Clark noted a conical mountain to the southwest annotated on their maps as Mount Hood. They found the river crowded with salmon both alive and dead. Cool frosty mornings and pleasant daytime temperatures greeted the weary travelers as they moved through the Great Falls of the Columbia, the long and short narrows and the Cascades of the Columbia. Their weather fortune changed on October 27 as strong winds brought the first of what would be numerous winter storms into the Pacific Coast. Some suggest this was one of the stormiest winters in the Pacific Northwest. (Lange, 1979; Large, 1986; Burnette,2002)

Knowing that they were nearing the Pacific Coast they expectantly looked for the ebb and flow of the ocean tide at each major falls they came to on the Columbia . They thought they had found it on October 26, but were dismayed that it was water being backed up by yet another fall. On November 2 they passed beyond the Cascades of the Columbia and saw Beacon Rock, noted by Lieutenant William Broughton of George Vancouver's visit some thirteen years before. (Ambrose, 1996) They also noted the long sought after tide and reported it raising 9 inches. The once constricted Columbia now widened as they rowed by the site of present day Vancouver, Washington and Portland, Oregon through thick and frequent fog. On the evening of November 4 the rains came. As the Expedition would soon find out, the Pacific Coastal area provided a harsh, wet and windy climate. From this date until their return to the Columbia River Gorge the following Spring they would experience only twelve days without rain and only six with sunshine for half or more of the day. (Gass, April 8, 1806)

As they moved into the estuary of the Columbia and nearing the mouth, Clark made a premature revelation in his diary on November 7, "*We are in view of the opening of the Ocian,*

which Creates great joy....Ocian in View! O! The joy. Great joy in camp we are in View of the Ocian, this great Pacific Octean which we been So long anxious to See. and the roreing or noise made by the waves brakeing on the rockey Showers (as I Suppose) may be heard distinctly." Sergeant Gass now noted the tidal fluctuations of over 4 feet and soon would reach 8 feet at the mouth of the Columbia River. After being pinned down in a cove for several days of stormy weather Clark lamented "*It would be distressing to a feeling person to See our Situation, at this time all wet and colde with our bedding &c. also wet, in a Cove Scercely large enough to Contain us, our Baggage in a Small holler about ½ mile from us, and Canoes at the mercey of the waves & drift wood.*" (Clark, November 12, 1805) He also noted, "*!O how Tremendious is the day. This dredfull wind and rain Continued with intervales of fair weather all the latter part of the night. O! How disagreeable is our Situation dureing this dreadfull weather. most tremendous and terrible winds*." (Clark, November 28, 1805) Members of the party now began to show concern as their animal skin clothes rotted in the wet conditions and the lack of drinking water in the salty estuary. In fact, the rain persisted for eleven straight days, never ceasing for more than 2 hours with several thunderstorms and hail. As the party rowed towards the mouth of the Columbia River, many became seasick as the high waves and strong winds buffeted their canoes. (Appleman, 1975)

Finally, after a year and a half of journeying the weather let up and the Corps of Discovery proceeded on to the mouth of the Columbia and their final destination, the Pacific Ocean. Sergeant Gass noted on November 16, 1805, "*We are now at the end of our voyage, which has been completely accomplished according to the intention of the expedition, the object of which was to discover a passage by the way of the Missouri and Columbia rivers to the Pacific Ocean; notwithstanding the difficulties, privations and dangers, which we had to encounter, endure and surmount."* Private Whitehouse noted, "*We are now in plain view of the Pacific Ocean. The waves rolling, & the surf roaring very loud. We are now of opinion that we cannot go any further with our Canoes, & think that we are at an end of our Voyage to the Pacific Ocean*." Milage calculated by William Clark using dead reckoning placed the distance from St. Louis to the mouth of the Columbia River at 4,162 miles. He was within 40 miles of the actual distance. (Ambrose 1998, 175; Duncan and Burns, 1999) Clark led a small party up the Washington State coast and remembering the indelible mark inscribed by Mackenzie in 1793, Clark inscribed on a tree, "*William Clark December 3rd 1805. By Land from the U. States in 1804 & 1805— ."* Most of the party followed suit during the coming weeks.

Fort Clatsop - Winter 1805-1806

Needing to establish winter quarters, each member cast a vote for their preferred winter location on the evening of November 24. They settled on exploring the south side in hopes that a ship might come by and allow them to obtain provisions and send some members and journals back via the sea. After traveling up river, the party crossed and searched for a suitable location for winter quarters. The Expedition established Fort Clatsop on December 7, 1805 and

remained here until they left on March 23, 1806. This site is near present-day Astoria, Oregon.

They settled in for a long stay and set up a furnace near present-day Seaside, Oregon to cook ocean water to obtain salt. They experienced numerous storms including one which Clark commented, "*a most dreadfull night the rain continues, with Tremendious gusts of wind. The winds violent from the SE. With some risque proceeded on thro high waves in the river, a tempestious disagreeable day. Trees falling in every direction, whorl winds, with gusts of rain Hail & Thunder, this kind of weather lasted all day, Certainly one of the worst days that ever was!*" (Clark, December 16, 1805). Christmas came and went as "*a warm, rainy, wet, showery, disagreeable day*." The last year of their journey started as the first. Sergeant Gass remarked, "*The year commenced with a wet day; but the weather still continues warm; and the ticks, flies and other insects are in abundance, which appears to us very extraordinary at this season of the year, in a latitude so far north*."

They regretted the loss of the thermometers as the mild Pacific Northwest air kept them quite comfortable and was comparable to the same latitude along the Atlantic Coast. (Weather Diary, January 3, 1806) They did not experience their first snows until near the end of January 1806 (January 25) and the cold weather only remained for a few of weeks. But the rains, Oh! the incessant rains of the winter of 1805-1806. They lamented nearly every day about the dreary, cloudy, rainy weather. Thunderstorms, sleet, hail and winds buffeted the fort numerous times. Author Robert Lange noted ,"In all the journals of the Expedition, nowhere do we find any one word to be as repetitious as the word *rain*." (Lange, 1979) The term "disagreeable weather" soon became their motto. The continual cloudy conditions kept them from taking observations. Lewis exclaimed, "*I am mortifyed at not having it in my power to make more celestial observations since we have been at Fort Clatsop, but such has been the state of the weather that I have found it utterly impracticable—*." (Lewis, February 25, 1806)

Homeward Bound - Deep Mountain Snow Delays Return - Spring 1806

Having enough food and salt for the journey to the Nez Perce Nation, they set out from Fort Clatsop on March 23, 1806 and started up the swollen Columbia River. Having labored against the strong current for seven days, they camped near present-day Portland, Oregon, between March 30 and April 6. Clark and a small party ventured up the Multnomah River (Willamette) on April 2-3. They had missed this tributary in the thick fog on the way down. Touring the river on April 2-3 he marked on his maps that this might still be a possible link to the mythical northwest passage. The weather in the tidal reaches of the Columbia was just as troublesome as they had experienced the previous fall. Thick fog, drenching downpours, mist and gray overcast clouds kept them from taking celestial observations. Plants and flowers were coming to life in the temperate, moist Pacific air. As they proceeded into the Columbia Gorge, gale winds, channeled by the high timber laden hills caused several delays as they were fearful of capsizing their canoes. Many members discussed the rising flood waters, some twelve feet

higher than the previous Fall, as the spring thaw commenced in the Cascade Mountains. As the Expedition moved past The Dalles, Oregon Lewis commented, "*The plain is covered with a rich virdure of grass and herbs from four to nine inches high and exhibits a beautifull seen particularly pleasing after having been so long imprisoned in mountains and those almost impenetrably thick forrests of the seacoast.*" (Lewis, April 17, 1806)

The cold damp rainy coastal weather gave way to lee side spring warmth and a break for the weary travelers and they traveled by land from near Wishram, Washington to the confluence of the Walla Walla and Columbia Rivers noting, "*there are now no dews in these plains, and from the appearance of the earth there appears to have been no rain for several weeks*" (Lewis and Clark, April 24, 1806) From here, they took an Indian shortcut through the steep rolling hills of southeast Washington passing through present-day Waitsburg, Dayton, and Pomeroy to the Snake River near Lewiston, Idaho/Clarkston, Washington. Learning from the Nez Perce leaders that it would be late June before snow in the Bitterroots would melt enough to allow passage, the Expedition set up camp near present-day Kamiah, Idaho (today known as Long Camp or Camp Chopunnish) between May 14 and June 10. During their stay they learned the customs of the Nez Perce, increased their food stocks, and wrote more journal entries. The weather was typical for this time in spring with warm temperatures in the Clearwater valley and cool air in the higher plains. Journal entries describe their anxiety over whether they would make it through the mountains in time to return to the United States this season. Of particular note, they pondered the rain in the valley while snow would blanket the Weippe Prairie just a few hundred feet above. They observed the river daily and noted its variations hourly during the spring snowmelt, in hopes that when it fell and remained down for several days, that would mark the time to start into the Bitterroots. By the end of May the river had reached flood levels "*as high as any marks of it's having been for several years past*." (Weather Diary, May 31, 1806) As they experienced the previous year, the growing season in the higher elevations had delayed plants, flowers and most important for the horses, the grass, from reaching their spring maturity.

On June 10, after the Clearwater fell for five straight days, the Expedition left the confines of the warm canyon and proceeded up the hill to the Weippe Prairie and toward the Lolo Trail. The Corps attitude was still apprehensive as they viewed the white snow-covered mountains to the east. Lewis near despair on June 14 wrote, "*every body seems anxious to be in motion, convinced that we have not now any time to delay if the calculation is to reach the United States this season; this I am detirmined to accomplish if within the compass of human power*." Proceeding up the trail with their pack horses, mounds of snow increased steadily in depth. Compact and firm, the snow supported the weight of the Corps. Up they went, first on 4 feet of snow, then 8 feet, then twelve feet and finally by June 17 they were on snows to the depth of fifteen to eighteen feet. The trail, which the Indians marked by scratching trees in higher snow seasons was not visible due to the high snowpack. The winter being extremely wet and a potential El Nino pattern, the excessive snows of this particular year forced the Expedition to retreat for the first time. (Ambrose 1978; Quinn et. al. 1987; Quinn and Neal 1995) They

returned down the mountain and spent the next week and a half asking the Nez Perce to provide a guide and apprehensively waiting for the snow to diminish.

They started a second attempt at the Lolo Trail on the June 25 with the assistance of two Nez Perce guides who entertained them the night before by lighting the undersides of fir trees on fire, a custom which they believed brought fair weather for the journey over the mountains. Lewis and Clark noted this spectacle, "*they have a great number of dry limbs near their bodies which when Set on fire creates a very sudden and emmence blaize from bottom to top of those tall trees. They are a beautifull object in this situation at night. this exhibition reminded me of a display of fireworks.*" As they proceeded with their newly acquired guides, the Expedition reported that the snow where they had stopped had reduced to 10 feet 10 inches deep but generally was about 7 feet deep. Just as the Nez Perce guides had predicted by their tree ceremony, fair weather prevailed as they moved over the high terrain. On the Montana side, they stopped and refreshed themselves at a hot spring (Lolo Hot Springs) which they noted was as hot as any in Virginia. They arrived back at Travelers Rest on June 30 and rested a couple of days.

Expedition Separates - Summer 1806

The Expedition now split into two parties. Lewis took a volunteer contingent to the White Bear Islands Camp near the Great Falls of the Missouri via a trail the Indians had described as their path to the summer hunting grounds. Lewis left most of his group here under the direction of Sergeant Gass to prepare for a portage back below the Great Falls of the Missouri. Lewis, meanwhile, led a small exploratory party back to the Marias River to determine it's northern most extent. Clark along with the remaining members headed southeast through the Big Hole Valley and to Camp Fortunate to pick up cached supplies and specimens. From there they took horses and the canoes and floated down the Beaverhead and Jefferson Rivers to the Three Forks. Here, Clark split his party again. Sergeant Ordway led a small party with the canoes and specimens down the Missouri to meet with Gass and portage the falls. Clark led his small contingent over present-day Bozeman Pass, recommended by Sacagawea who guided them to the Yellowstone River which they then descended by canoes. All Expedition parties planned to meet again at the confluence of the Missouri and Yellowstone around August 5.

Weather remained cool and wet for the high country of Montana, sometimes with frosty mornings and many times with rain and afternoon thunderstorms. Clark and Ordway noted frost on July 10 at Camp Fortunate. The incessant prairie winds returned while the mosquitoes redoubled their war on the Corps and became a daily theme in the journals with Lewis noting, "*My dog even howls with the torture he experiences from them.*" (Lewis, July 15, 1806) Both Lewis and Clark continue to note the dry conditions across the prairie. On July 22, Lewis' party reached a point on the Marias where they realize that it would not carry them above 50^0 Latitude

and decided to spend the day taking celestial observations. However, due to the persistent clouds, they remained until the twenty-sixth. This would prove tragic as a skirmish with a party of Blackfeet Piegan Indians broke out the next morning. Reuben Field and Lewis each kill an Indian, attempting to steal the parties rifles and horses. On the night of the twenty-seventh, as they raced back to the Marias River, they experienced "*heavy thunderclouds lowering all around us and lightning on every quarter but that from which the moon gave us light*." (Lewis, August 27, 1806). The next day Ordway noted hailstones from an afternoon thunderstorm larger than a "muskat ball." Meanwhile, on the Yellowstone River, Clark's party was building canoes and began their descent. On the twenty-second of July Clark noted a peculiar cloud formation as a thunderstorm approached "*The Cloud appd. to hang to the SW, wind blew hard from different points from 5 to 8 PM which time it thundered and Lightened*." (Clark, July 22, 1806) Could this be a description of a wall cloud? Although they noted excessive heat a couple of times, it was the repeated rains and afternoon thunderstorms that filled their journals.

Down the Missouri - Homeward Bound - Early Fall 1806

The weather continued unsettled for much of August with many thunderstorms and daily rains noted on their parchment. They also commented on the continued coolness of the air. All members of the Expedition finally reunited southeast of Williston, North Dakota on August 12 and proceeded expeditiously towards the Mandan Villages where they parted company with Charbonneau, Sacagawea, little Pomp and John Colter. Anxious to return home, they left the Mandan Villages on August 17 and proceeded at a rapid pace carried along by the current and their paddles. Indifferent to being rebuffed by the usual southerly winds, the Corps made tremendous progress sometimes covering 50, 60 and even 70 miles a day. By September 1 the Corps was straddling the border of Nebraska and South Dakota and the showers, thunderstorms, and winds persisted. On September 7, north of present day Omaha, Clark again expounds on the excessive evaporation from his ink stand. He also makes a startling revelation, "*The Missouri at this place does not appear to Contain (as much) more water than it did 1000 Miles above this place, the evaporation must be emence; in the last 1000 miles this river receives the water 20 rivers and maney Creeks Several of the Rivers large and the Size of this river or the quantity of water does not appear to increas any—.*" (Clark, September 8, 1806) By the ninth he mentioned that the nights were warm enough that they party is comfortable sleeping under a thin blanket. They were now returning to the humid climate of Missouri with it's thick vegetation, trees, lakes and marshlands.

By the time the Expedition reached Kansas City, they were complaining about the sultry heat and the weather being "*disagreeably worm.*" Constant staring at the water and glare of the sun as they rowed brought complaints of near blindness. (Although this may be attributed to bacterial infections [Chuinard, 1998]) As they rowed into St. Charles, Missouri on September 21, the rains began again and a final thunderstorm greeted them at daybreak on the twenty-second as they prepared for the final leg of their journey. Just as it had bid them

farewell in May of 1804, the rains greeted their return to the confluence of the Missouri and Mississippi and St. Louis on September 23, 1806. Ordway exultantly remarks on this momentous occasion, "*a wet disagreeable morning. Soon arived at the Mouth of the Missouri entered the Mississippi River and landed at River deboise where we wintered in 1804. About 12 oClock we arived in Site of St. Louis. Drew out the canoes then the party all considerable much rejoiced that we have the Expedition Completed and now we look for boarding in Town and wait for our Settlement and then we entend to return to our native homes to See our parents once more as we have been So long from them.*" Letters were hastily written by Lewis to President Jefferson and by Clark to his brother in Kentucky describing their safe return and findings. (These letters have been reproduced in Appendices E and F of this edition) The last entry in the Lewis and Clark Expedition journals occurred on September 26 as Clark, still vigilant on reporting the weather inscribed "*a fine morning we commenced wrightin &c.*"

finis (Ordway, September 23, 1806)

Thus ended the Lewis and Clark Corps of Discovery Expedition. Their findings were numerous. Along the way they described in scientific detail for the first time one-hundred and twenty-two new animal species and one-hundred and seventy-eight new plants, flowers and trees. Clark recorded the journey through cartographic illustrations and in 1814 produced the most advanced map of North America to that time. Although they failed to find the elusive "Northwest Passage," they found the shortest route across the continent if you follow the Missouri River system. As fur traders, trailblazers and immigrants later discovered, it was not the quickest way across the Continent. Their extensive daily writings on weather conditions though, are one of the most detailed for its time. Having been nearly two-hundred years since they were recorded, the weather records have been awaiting an opportunity to burst forth and draw a new breath of research and debate. This publication hopes to establish this course and induce renewed enlightenment.

In the writings of Thomas Jefferson:

> *"The work we are now doing is, I trust, done for posterity, in such a way that they need not repeat it ....We shall delineate with correctness the great arteries of this great county; those who come after us will extend the ramifications as they become acquinted with them, and fill up the canvas we begin."* (Duncan and Burns 1997, 224; Ronda, 2000, 50)

May we take up the scientific reigns and continue to fill up the canvas that was begun so long ago and learn from the national treasure of writings known as the Journals of the Lewis and

Clark Expedition. Of all the things that we can learn or discover about the Lewis and Clark Expedition, it is this "At the core of discovery is the recognition that all human kind are but travelers making rough journeys, sustained now and again by the kindness of strangers." (Ronda, 1984; Ronda, 2001, 37)

Vernon Preston
January 18, 2003
Pocatello, Idaho – in the heart of the Shoshone Nation
Who assisted the Corps of Discovery into History

Additional Lewis and Clark Expedition Readings

For more detailed narratives on the Lewis and Clark Expedition the reader is directed to the works of Ambrose, 1996; Appleman, 1975; Bakeless, 1947 & 1998; Brooks, 1935; and Devoto, 1953. Further discussions on the journey can be found in works by Ambrose, 1998; Beckham, 2003; Beckham and Reynolds, 2002; Burns, 1997; Clarke, 1970; Duncan, 1987; Duncan and Burns, 1999; Fifer and Soderberg, 1998, 2001 & 2002; Gilman, 2003; Graetz, 2001; Gragg, 2003; Hunsuker, 2001; Jackson, 2002: Lavender, 1958 & 1998; Meadows and Prewitt, 2003; Peterson, 1998; Ronda, 1984, 2000 & 2001; Salisbury, 1950; Space, 2001; Saindon, 2003; Schmidt, 1999; Thomas, 2000; Thorp, 1998; and Wheeler, 1904.

Chapter 2

The Journals of the Lewis and Clark Expedition

As we passed on it seemed as if those seens of visionary inchantment would never have an end...So perfect indeed are those walls that I should have thought that nature had attempted here to rival the human art of masonary had I not recollected that she had first began her work.

Meriwether Lewis
May 31, 1805
Missouri Breaks, Montana

The journals of the Lewis and Clark Expedition are many and varied and Donald Jackson (1978, vii) noted that Lewis and Clark were "the writingest explorers of their time. They wrote constantly and abundantly, afloat and ashore, legibly and illegibly, and always with an urgent sense of purpose." The principal writers of the journals were Meriwether Lewis and William Clark. They recorded data into daily narrative diaries made from rough "Field Notes" which were translated at the end of the day by Clark. They maintained several other documents and booklets containing, astronomy, botany, ethnology, geography, military orders, mineralogy, thermometrical and weather observations, and zoology. Clark produced numerous sketches and maps. Both wrote numerous letters before, during and after the Expedition. Much has been written discussing the methods used and history behind the journals. (Biddle, 1814; Coues, 1893, 1:cvii-cxxxii; Thwaites, 1904, 1,: xvii-xciii; Bakeless, 1964; Cutright, 1976; Jackson, 1978; Moulton, 1986, 2:8-48, 530-567; Bergon, 1989; Beckham, 2003; Saindon, 2003) The reader is encouraged to view these source documents for further revelation on the journals.

President Thomas Jefferson did not order the keeping of separate journals by anyone other than the captains. His final instructions to Lewis did suggest that "several copies of these as well as of your other notes should be made at leisure times, & put into the care of the most trust-worthy of your attendants, to guard, by multiplying them, against the accidental losses to which they will be exposed" Jefferson's Instructions to Lewis. (Jackson, 1978, 1:62; Moulton, 1996, 10:xi) In addition to the Captains, other known journals were written by three sergeants and a private. Some of these journals have come to light only during the last fifty to one-hundred years. There may be an additional one to three journals that have not been found.

Lewis gives credence to this in his last communication to Jefferson from Fort Mandan in April 1805, as Lewis wrote: "*We have encouraged our men to keep journals, and seven of them do so, to whom in this respect we give every assistance in our power*." Lewis to Jefferson, April 7, 1805. (Jackson, 1978, 2:232)

The Journals of Lewis and Clark have been reproduced only a few times in the past two hundred years. The first issuance was under the guidance of Clark, who after the untimely death of Lewis, took control of the known journals. Nicholas Biddle (1814) produced the first edition, a two volume set, using a general narrative paraphrase without much scientific content. Biddle turned the manuscript over to Paul Allen, for final revision, who's name appears on the title page. Biddle may have followed a literary custom of the time, which mandated that a gentleman did not publish under his own name. (Moulton 1986, 2:37; Ambrose, 1996,.469-470) Elliott Coues (1893) produced the next edition of the journals, introducing numerous scientific discoveries that had been left silent for nearly a century. It is believed that it was Coues who rekindled the nation's interest in Lewis and Clark; (Moulton, 1986, 2:39) however, Coues only produced a small subset of the full journal writings. The first full edition of known journal writings was published for the centennial by Ruben Gold Thwaites (1904) after extensive research and discovery of new documents that greatly enhanced his edition. Thwaites' eight-volume edition included copies of Clark's cartography in a special Atlas and for the first time in history, the bulk of the Lewis and Clark journal writings was available to the public.

Other valuable but small renderings were made by Milo Quaife (1916) and Earnest Osgood (1964) and concise, abridged editions like John Bakeless (1947) and Bernard DeVoto's (1953) editions were published as new materials became available after 1904. Discovery of missing journals and letters written by the captains and other Expedition members led to the newest, most complete edition yet. Started in 1986 and completed in 2001 by University of Nebraska professor Dr. Gary Moulton (1986-2001), this compilation contains thirteen volumes with an atlas and journals by Lewis and Clark, Sergeants Floyd, Gass, Ordway, and Private Whitehouse. Donald Jackson (1978) produced a two volume set of letters that were written before, during and after the Expedition which complements the Moulton edition tying together events outside of the Journals. For further history about the journals the reader is referred to the following source documents: (Coues, 1893, 1:cvii-cxxxii; Cutright, 1976; Jackson, 1978; Moulton, 1986, 2:8-48, 530-567; Thwaites, 1904, 1:xvii-xciii)

Chapter 3

Lewis and Clark Expedition Writings on Climate, Water & Weather

Came a Dredfulle hard Storme from the South which Lasted for about one ouer and half which Cosed us to Jump out and hold hir the wind fare Sailed,

Sergeant Charles Floyd
July 14, 1804
north of St, Joseph, Missouri

At day break it began to rain and continued until seven when it abated, and we set forward; but in a short time a gust of wind and rain came on so violent, that all hands had to leap into the water to save the boat. Fortunately this storm did not last long, and we went on to a convenient place and landed.

Sergeant Patrick Gass
July 14, 1804
north of St. Joseph, Missouri

Several scientific books have been written describing the flora and fauna of the Expedition: Allen, 1975; Cutright, 1976; Bergon, 1989; Burroughs, 1995; Botkin, 1996; Blume, 1999; Moulton, 1999, 12; Cutright, 2001; Wells and Anzinger, 2001; Cutright, 2003; Patient, 2003.

Publications also describe the advance in the fields of geology, geography and cartography: Allen, 1975; Moulton 1986, 1; Allen, 1991; Plamondon II, 1991; Goetzmann and Williams, 1992; Ifland, 1998; Schmidt, 1998; Blume, 1999; Cordes, 1999; Hunt, 1999; Schmidt, 1999; Franslow, 2000; Hayes, 2000; Plamondon II, 2000; Preston, 2000; Plamondon II, 2001; Space, 2001; Bedini, 2002; Cohen, 2002; Eastman 2002; Hoganson and Murphy 2003; Plamondon II, 2004.

Medical needs have also recently been documented by: Chuinard 1998; Paton 2001; Peck 2002.

The Expeditions systematic daily observations of climate, water and weather elements have largely been ignored, undocumented and not studied. Their daily observations were taken at the dawn of modern meteorology when only a handful of scientists were noting the changing weather patterns. Regular daily observations, (although noted back to the Greeks as early as the fifth century B.C.) were not recorded until the late 1600's as instruments such as the thermometer, barometer and hygrometer were developed. (Frisinger, 1983)

Weather diaries based on meteorological instruments were very uncommon in the United States in the late 18th century. Thomas Jefferson and James Madison in Virginia, John Winthrop in Massachusetts, Dr. John Lining and a few others in South Carolina were noted for taking and documenting daily observations (Druckenbrod 2003, 62). In recent writings, scientists have used this small record of historical diaries to reconstruct climate patterns: Ludlam, 1966; Middleton, 1969; Ingram et.al., 1978; Frisinger, 1983; Bedini, 1986; Bradley and Jones, 1993; Baron, 1995; Catchpole, 1995; Pfiste,r 1995; Quinn and Neal, 1995; Glaser et.al., 1999; Druckenbrod et.al.,2003. No scientific national approach to daily observations were in place during the Lewis and Clark Expedition. Now we have an opportunity to study three years of weather, water and climate data from Pittsburgh, Pennsylvania to the Pacific Ocean and back to St. Louis, Missouri. Over sixty years would pass before systematic scientific observations would be conducted on a daily basis in this region. Therefore, we have a true historical snapshot to compare today's weather, water and climate records to those recorded by the Lewis and Clark Corps of Discovery Expedition.

Few selected writings are found which describe limited aspects of the weather, water, or climate of the Lewis and Clark Expedition including: snow conditions along the Lolo Trail (Ambrose, 1978; the inclement weather at the mouth of the Columbia River (Large, 1979); general weather observations (Large, 1986); scientific instruments used on the Expedition (Plamondon II, 1991); a master thesis on the weather conditions at Fort Mandan, ND and Fort Clatsop, OR (Burnette, 2002); a discussion on temperature variations along the trail (Solomon and Daniel, 2004); and 1805-06 winter conditions at Fort Clatsop (Miller, 2004) . No documentation of the Lewis and Clark Expedition has collected all weather, water, and climate related records into one volume for use by the meteorological or hydrologic scientific communities.

Chapter 4

Editorial Procedures for Daily Narrative Journals

a Cloudy fogey morning, a little rain. Ocian in View! O! The joy. Great joy in camp we are in View of the Ocian, this great Pacific Octean which we been So long anxious to See. and the roreing or noise made by the waves brakeing on the rockey Showers (as I Suppose) may be heard distinctly.

William Clark
November 7, 1805
in the Columbia River Estuary a few miles from the Pacific Ocean.

This edition of the Journals of Lewis and Clark is designed to provide users a scientific approach to the meteorological, hydrological and climatological information documented during the three-year time frame of known journal entries. The main source for this material is the thirteen-volume edition published between 1986 and 2001 by Dr. Gary Moulton through the University of Nebraska Press. Source references were also used from the first paraphrased edition by Biddle (1814); the second edition by Coues (1893) and the first full edition of known journals by Thwaites (1904). In addition to original journal entries, Jackson (1978) contains the largest collection of known letters and other documents related to the Expedition.

The editorial procedures were designed to focus on the weather, water, and climate entries in the daily narratives of the two Captains, the three Sergeants and one Private with an overall goal of incorporating all related entries into this edition. Redundant entries regarding strong river current have been omitted. Rather, selected notations are made to provide the reader a feel of the river course changes. Lewis and Clark provided entries about streams, creeks and rivers as they moved by them, and gave many of them names for the first time or noted names used by the Indian Nations. They also scientifically described the river characteristics at main confluences and many of these have been included in this edition. Since Moulton and Thwaites provide actual journey entries describing these in detail and distance from St. Louis or the Pacific Ocean, this edition does not try to recreate these. (Thwaites, 1904, VI:3-79; Moulton, 1987, 3:333-385; Moulton, 1993, 8:376-411) The reader is directed to these two authors when conducting extensive research on streams, creeks and rivers.

Lewis and Clark Weather, Water & Climate Journals

Most general references to climate and its affect on the geography as given by Jefferson's Instructions to Lewis (See Appendix D) "*by the access & recess of frost, by the winds, prevailing at different seasons, the dates at which particular plants put forth or lose their flowers, or leaf, times of appearance of particular birds, reptiles or insects*" were added to this edition. However, any general references made in Lewis' extensive botanical and zoological entries were not added in this edition as other authors have made mention in their flora and/or fauna publications. (Cutright, 1976; Burroughs, 1995; Botkin, 1996; Wells and Anzinger, 2001; Patient, 2003;)

When dual or parallel entries made by Meriwether Lewis and William Clark occur, Lewis was chosen as the first entry since he was given charge of organizing the Expedition under the direction of President Thomas Jefferson. Clark's entry is placed second. Each had a special technique for writing. Lewis, the more educated and verbose; Clark, more frontiersman style, with numerous spelling and punctuation challenges. Clark kept field notes and transferred them the same day or at times edited on later dates. When it came to the most diligent and faithful journal keeper, the honor went to Sergeant John Ordway. Not once during the entire 863 day journey did he fail to make an entry. Clark was a close second with missing entries during a hunting trip between February 3-12, 1805 which was summarized when he returned. So for all practical purposes, his journal is complete. (Cutright, 1976) Lewis' journal entries begin in a field book started on the day he left Pittsburgh, Pennsylvania - August 31, 1803. His first reference to water was on the extreme low flow of the Ohio River, which he later referenced to drought conditions. He also noted the water being "*sufficiently temperate*." His first meteorological entry was a discussion about a "*thick fogg on the face of the water that no object was visible 40 paces*." Clark's first known travel entries were in some of his field notes taken near the confluence of the Ohio and Mississippi Rivers and his first shared journal entries were made on November 28, 1803 as Lewis left Clark in charge of the boats. Clark's first meteorological reference was "*This morning being verry Smokey prevents my being as acurate as I Could wish—*." The same day he noted "*The horozon became darkened that I could not see across the River, which appeared to windened, the Current much Swifter than usial*."

In order to preserve the record, at Fort Mandan and again at Fort Clatsop, duplicate journals were made by Lewis and Clark. Where duplicate entries are present, this edition uses a combination name "Lewis and Clark" without differentiation. On occasion, Clark would write two versions of his daily entries. An on-the-spot draft version in his field notes, and a much cleaner version for the final journal entry. When editing data into this edition, a mixture between the two daily entries was used. This will allow the reviewer to see all the thoughts that were written for a particular day. Lewis' journal entries are much more sporadic and many scholars have researched and discussed why Lewis' journal entries have large gaps in them. Some believe it was fits of depression, while others believe the journals may have been lost, destroyed, or misplaced. (Appleman, 1975; Cutright, 1976; Moulton 1986, 2; Ambrose 1996) The only known reason for a particular gap, being his last, was due to an accidental gunshot wound on August 11, 1806. Rejoining with Clark and the rest of the party the next day, Lewis decided he would relinquish his journal entries to Clark and wrote his last words in the journals,

"*I shall desist untill I recover and leave to my frind Capt. C. the continuation of our journal...This cherry...is now ripe...I have never seen it in blume.*" Clark's last reference to the topic of this edition, which is used as closing sentiments for many an author was, "*a fine morning we commenced wrightin &c,*" entered on September 26, 1806, three days after their arrival back in St. Louis.

After the two Captains, the entries of three Sergeants and one private have been placed in alphabetical order for this edition. Sergeant Charles Floyd's entries are the shortest as he, being the only member of the Expedition to die, passed away near present-day Sioux City, Iowa on August 20, 1804. His entries provided a more conscientious look at daily happenings. As Moulton (1995, 9:xviii) notes, "Floyd apparently had an eye for such details, which makes us regret all the more that he did not live to complete a record of the whole journey." He kept entries until two days before his death. Sergeant Patrick Gass and John Ordway wrote their journals from the day they left Camp Dubois, on May 14, 1803 through September 23, 1806, their arrival back in St. Louis.

Gass' (1807) journal is not from his original writings, as their whereabouts are not know. His journal was the first full account of the Expedition published and was edited David McKeehan who smoothed his rough frontier prose. Many editors have reprinted Gass' journal over the years. In this edition Moulton (1996, 10) was the primary source. Being a carpenter, he paid particular attention to details other journalist did not. His entries provide times of particular rain events that others do not.

Ordway's entries are in his own hand and provided a substantial amount of data related for this edition on days when other journalists did not annotate data. Being an educated gentleman, his text is quite refined. Besides Clark's journal entries and the Weather Diary, Ordway provides the most useful weather, water and climate information during the journey. In this edition Moulton (1995, 9) was the primary source.

The final journalist used for this edition is Private Joseph Whitehouse. As with Gass, Whitehouse had an original version which was very rough and provides some distinct language about certain incidents. It dates from May 14, 1804 to November 6, 1805. A paraphrased journal discovered in a bookstore in Philadelphia, Pennsylvania in 1966, provides entries from May 14, 1804 to March 23, 1806. There is speculation that he may have kept a journal through the end of the journey, but it has not been found. Just as with Clark and his rough and final journal versions, when two entries are found on a particular day, the data is blended in this edition to give the reviewer the context of what was written by Whitehouse. In this edition Moulton (1997, 11) was the primary source. As with all of the Sergeants and Private entries, the reader will note similar or duplicate observations at times. Various scholars have documented that the journalists would copy from one another at times, or fill out data for another member when they were away. Each duplicate entry is added in this edition except as highlighted.

Care was taken to keep as much of the original spelling and context as possible. Occasionally punctuation or certain spelling corrections have been made for ease of reading. Many times the journalist did not place an end of sentence punctuation mark. Extra spacing has been used between sentences to help the reader differentiate a new line of thought. If the word was difficult to ascertain, [brackets] with a suggested word have been added. Since this edition uses Moulton as it's primary source, his exhaustive research shows when certain words were changed or added by journalists or earlier editors. This edition does not make that differentiation. Footnotes have been added at the end of each month's/segment's entries when additional detail was necessary. To assist the reader, text has been added between daily entries to describe the location of the Expedition party with respect to well known geographic and political boundaries.

Occasionally the journalists to used abbreviations in their narrative entries. Some that have been included in this volume are:

d.	degree
do.	ditto
h.	hour
L. Larb, Ld. or Ldb S.	larboard (left) side
Latd.	latitude
Longtd.	longitude
m. mts.	minutes
mes. mls. ms.	miles
pt.	point
s.	second
St. Star. Starbd. S.Stb. or Stbd.	starboard (right) side

Chapter 5

Editorial Procedures for the Lewis and Clark Weather Diary (Moulton, 1986)

also known as Book of Thermometrical Observations (Thwaites, 1904)

or

The Meteorological Register (Coues, 1893)

a most dreadfull night the rain continues, with Tremendious gusts of wind. The winds violent from the SE. With some risque proceeded on thro high waves in the river, a tempestious disagreeable day. Trees falling in every direction, whorl winds, with gusts of rain Hail & Thunder, this kind of weather lasted all day, Certainly one of the worst days that ever was!

William Clark
December 16, 1805,
out hunting near Fort Clatsop, Oregon

Lewis kept a "Weather Diary," otherwise known as "Thermometrical Observations" which began on January 1, 1804 and continued through May 1804. Weather entries in this diary were in both Lewis and Clark's hand. Clark repeated these entries in his Codex C journal. It is probable that Lewis copied the entries from Clark's journal as Lewis was in St. Louis for an extensive amount of time while the party was at Camp Dubois. After May 14 there is a gap of sunrise and 4 PM observations in both Captains' books until September 19. During this time, general remarks on natural history were placed in Lewis' Weather Diary rather than meteorology or hydrology. Between September 19, 1804 and April 3, 1805 the two-a-day observations and remarks resumed with few interruptions. After April 3rd, Lewis began placing weather data with his daily narrative journal entries while Clark continued to make weather tables in his various journals. Clark kept the record going when gaps in Lewis diary entries are found. When the two parties split at Travelers Rest on their return trip, both Captains kept separate daily logs for July and portions of August. The weather notes indicate a substantial scientific record of atmospheric and hydrologic conditions which included two entries for temperature readings, the general state of weather, the wind direction, and a single record of river rise and fall. In the

remarks section, climatological references are made regarding flora and fauna, as well as daily weather and hydrologic occurrences. Various miscellaneous events were recorded occasionally such as an Indian Chief coming to visit. Although several methods were employed in writing down the weather data, it is certain that this portion of the journals were a collaborative effort of both Captains. (Moulton, 1986, 2:20, 30, 537)

The data in this edition follows much of what Dr. Coues (1893), Mr. Thwaites (1904), and Dr. Moulton(1986-1993) reproduced from the original journal entries with a few variations. At the top of each table notations were made to distinguish whether the data is a combination of various Lewis and Clark journals or entries that were made separately. Occasional capitalization of certain letters such as certain column titles, T for Thunder, C for Cloudy, and L for Lightning were omitted. The titles used at the top of each column varied during the journey. This edition generally follows what was entered but organizes them consistently from table to table to assist the reader. Blank entries are noted in the originals by a dash "–" mark. For various observations, the occasional period "." next to numbers or letters has been omitted. Due to space limitations in the tables, the River Rise and Fall, River Feet and Inches were combined into two columns and with a ' used for feet and " used for inches. Also, to assist reading the columns, the River Rise and Fall in are placed in capitals. Lewis or Clark used either the word "ditto' or "do" to show a duplicate or identical journal entries and the convention is continued.

Remarks which appear in the Weather Diary but have no relevance to the weather, waterways or climate are not included in this edition but are replaced by four (4) periods in a row "....". Additional journal entries from various manuscripts for a particular day, have been delineated by parentheses "( )" in the remarks sections to identify the source. The original spelling of the words used by the authors of the journals have been preserved to maintain their contextual significance.

Temperature observations in the table listed with "a0" "a" or "b0" "b" is in relation to the Fahrenheit temperature scale. For example, the December 17, 1804 journal entry of 43b0 translates to 43^0 below zero Fahrenheit (by chance it is also the number on the Celsius temperature scale). As noted in postscript discussions in Dr. Moulton's (1986) edition, the accuracy of the thermometer readings may vary from 8 to 11 degrees.

The accuracy of the data is relevant to Dr. Coues (1893), Mr. Thwaites (1904), and Dr. Moulton(1986-1993) editions of the journals and they make extensive notes on the variations from the different journal entries. Many of these footnotes have been added to this compilation; however it is recommended that researchers review the original journals or the three cited editions for additional postscript explanations, temperature corrections, and other entries.

The tables represent a snapshot of what occurred during the Expedition and to fully comprehend the ramifications of weather, water and climate on the Corps of Discovery, the

reviewer is encouraged to read Lewis and Clark daily narrative journal entries.

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Appendix A

The Weather Diary - Observation Tables

also known as the
Book of Thermometrical Observations or
The Meteorological Register

Meriwether Lewis & William Clark
from the Journeys of the Corps of Discovery
1804-1806

The following weather observation tables comprise one half of the Lewis and Clark - Corps of Discovery "Weather Diary" journal entries. The second half were narrative remarks related to daily weather, climate, water changes, general characteristics of flora and fauna, and miscellaneous comments about events of the day. This appendix is limited to the monthly weather observation tables. The narrative remarks from the Diary are located in the main sections of this edition.

The Weather Diary was a separate book from the various other journal writings and was originally kept by Lewis. Clark made copies or at many times entered original data in his various journals. This data was shared with Lewis and placed into his Weather Diary. Dr. Gary Moulton's "*The Journals of the Lewis & Clark Expedition*, (1986, 2: 171) discussion is provided below to better describe the process in his postscript related to the Weather Diary:

> "Here begin the captain's systematic weather observations, kept independently of regular journal entries. ....Included here are tables and observations from Lewis's Weather Diary and Clark's Codex C {see Introduction and Appendix C, this volume). The two sets of tables and remarks are combined to provide complete information without repetition. In this edition I have followed the Weather Diary as far as it goes and compared Codex C or other miscellaneous weather notes with it. It is uncertain which was the original source and which the copy, but internal evidence points to the Weather Diary as being the principal document. Insignificant changes between sources, such as word choice and sentence structure, are ignored; substantive differences are

noted. The 'remarks' include some events unrelated to weather, such as natural phenomena or daily events; they are retained with the weather data. Sometimes the remarks form a column of the table, sometimes they are placed separately. This edition follows the later practice."

The data in this edition follows much of what Dr. Coues (1893), Mr. Thwaites (1904), and Dr. Moulton(1986-1993) reproduced from the original journal entries with a few variations. At the top of each table notations were made to distinguish whether the data is a combination of various Lewis and Clark journals or entries that were made separately. Occasional capitalization of certain letters such as certain column titles, T for Thunder, C for Cloudy, and L for Lightning were omitted. The titles used at the top of each column varied during the journey. This edition generally follows what was entered but organizes them consistently from table to table to assist the reader. Blank entries are noted in the originals by a dash "–" mark. For various observations, the occasional period "." next to numbers or letters has been omitted. Due to space limitations in the tables, the River Rise and Fall, River Feet and Inches were combined into two columns and with a ' used for feet and " used for inches. Also, to assist reading the columns, the River Rise and Fall in are placed in capitals. Lewis or Clark used either the word "ditto' or "do" to show a duplicate or identical journal entries and the convention is continued.

Temperature observations in the table listed with "a0" "a" or "b0" "b" is in relation to the Fahrenheit temperature scale. For example, the December 17, 1804 journal entry of 43b0 translates to 43^0 below zero Fahrenheit (by chance it is also the number on the Celsius temperature scale). As noted in postscript discussions in Dr. Moulton's (1986) edition, the accuracy of the thermometer readings may vary from 8 to 11 degrees.

The accuracy of the data is relevant to Dr. Coues (1893), Mr. Thwaites (1904), and Dr. Moulton(1986-1993) editions of the journals and they make extensive notes on the variations from the different journal entries. Many of these footnotes have been added to this compilation; however it is recommended that researchers review the original journals or the three cited editions for additional postscript explanations, temperature corrections, and other entries.

The tables represent a snapshot of what occurred during the Expedition and to fully comprehend the ramifications of weather, water and climate on the Corps of Discovery, the reviewer is encouraged to read Lewis and Clark daily narrative journal entries.

Lewis and Clark Weather Diary
Lewis' General Comments about Diary Entry Procedures

Lewis and Clark Combined Entries [1]

January 1804

[Lewis and Clark] **[Weather, January 1804]**

Thermometrical observation shewing also the rise and fall of the Mississippi ("Missouri" - Clark Codex C), appearances of weather winds &c at the mouth of the river Dubois commencing 1st Jany 1804. in Longitude 89^0 57' 45" W. Latitude 38^0 55' 19.6" N. Thermometer on the N. Side of a large tree in the woods.

Explanations.

In the miscellanious column or column of remarks are noted, the appearance quantity and thickness of the floating or stationary ice, the appearance and quantity of drift-wood, [the rapidity of the courent of the river below the mouth of the missouri, the falling of the banks —] the appearance of birds, reptiles and insects, in the spring disappearance in the fall, leafing flowering and seeding of plants, fall of leaf, access and recess of frost, depth of snows, their duration or disappearance.[Longitude and Latd.]

Notations of the weather

f **means Fair**
c **—Cloudy**
r **—Rain**
s **—Snow**
h **—Hail**
t **—Thunder**
l **—Lightning**
a **—after— as f. a. r. means that it is *fair after rain* which has interveened since the last observation— c. a. s. *Cloudy after snow* intervening c.a.r.s. — cloudy after rain & snow—**

Notations of the river

R means *risen* in the last 24 hours ending at sunrise
F —*fallen* in the same period

Notations of Thermometer

a 0 means *above naught* (zero)
b 0 means *below naught* (zero)

Remarks on the Thermometer

—By two experiments made with Ferenheit's Thermometer which I used in these observations, I asscertained it's error to be $11^{0\ 2}$ too low or additive + –- I tested it with water and snow mixed for the friezing point, and boiling water for — the point marked boiling water.—

Note **when there is not room in the column for the necessary remarks it is transferred by the refference of Numbers to an adjoining part of this book.—**

1 Reference: Coues, Volume III, page 1264; Moulton, Volume 2, pages 168-169; Thwaites, Volume 6, Part II, pages 165-166.

2 Clark's Journal Codex I lists this temperature as "8^{0}."

January 1804

Lewis and Clark Combined Entries [1]

Day of the Month	Temp. at Sunrise	Weather at Sunrise	Wind at Sunrise	Temp. at 4 PM	Weather at 4 PM	Wind at 4 PM	Rise [2] or Fall	Feet ' [2] Inches "
1	-	Cloudy	-	-	Cloudy	-	-	-
2	-	c a s	-	-	c	-	-	-
3	-	-	-	2 1/2a0	f	N W W	-	-
4	11a0	f	W	-	-	W	-	-
5	-	f	W	-	f	W	-	-
6	-	f	W N W	30a0	f	W N W	-	-
7	-	h	SW	-	c & r [3]	SW	-	-
8	-	f	SW	-	f	NW	-	-
9	-	f	W N W	1b0	c	W N W	-	-
10	-	f	-	-	f	-	-	6"
11	-	-	-	-	-	-	-	-
12	-	-	-	-	-	-	-	-
13	-	c & s	SW	0	r & s	SW	-	-
14	-	f a s	-	-	f	-	-	-
15	-	-	-	-	-	-	-	-
16	-	-	-	-	-	-	-	-
17	8b0	f	NW	1 1/2b0	f	NW	F	6"
18	1b0	c	N W W	1a0	s & f	N N W	F	-
19	13a0	c	NW	11a0	c	NW	F	-
20	5b0	f	NW	8a0	c	NW	F	-
21	7a0	c & s	NE	17a0	s & h	NE	F	-
22	11a0	s	shfty [4]	13a0	s	NW	F	-
23	11a0	c	NE	17a0	c	N	F	-
24	4a0	c	NW	11a0	c	W	F	-
25	2b0	f	W N W	16a0	f	W	F	-
26	-	c	SW	-	c	SW	F	-
27	-	f	-	-	f	-	-	-
28	5a0	c s	NW	18a0	c a s	NW	R	-
29	16a0	f	W	23a0	f	-	R	-
30	22a0	c & s	N	16a0	f a s	-	R	-
31	10a0	f	SW by W	15a0	f	W	R	-

1 Reference: Coues, Volume III, pages 1264-65, 1282; Moulton, Volume 2, pages 169-172; Thwaites, Volume 6, Part II, pages 166-167.

2 River observations for January were taken at sunrise for a 24-hour period. While at Camp Dubois river observations were taken at the mouth of the Mississippi and Wood Rivers.

3 Clark's Journal Codex C lists this weather data as "c a r h."

4 Clark's Journal Codex C lists this wind direction as "S."

February 1804

Lewis and Clark Combined Entries [1]

Day of the Month	Temp. at Sunrise	Weather at Sunrise	Wind at Sunrise	Temp. at 4 PM	Weather at 4 PM	Wind at 4 PM	Rise [2] or Fall	Feet ' [2] Inches "
1	10a0	f	SW	20a0	f	S W S	R	1 ½"
2	12a0	f	NW	10a0	f	NW	R	½" [3]
3	12a0	f	SW	19a0	f	W	-	-
4	17a0	f	SW	28a0	f	S	R	½"
5	18a0	f	SE	31a0	c a f	S E S	R	2' 6 ½"
6	19a0	f	NW	15a0	c	S	-	-
7	29a0	r a c	SE	30a0	r & c	S E	F	8"
8	22a0	c a r	NW	20a0	c a s	N	R	1'
9	10a0	f a s	NNE	12a0	c	NE	R	2'
10	3a0	f	NE	17a0	f	SW	R	1' 4"
11	18a0	h a c	SE	31a0	s a h f	SE	R	1'
12	15a0	f	SSE	25a0	f	SW	F	2"
13	12a0	f	NW	20a0	f	W	R & F	1"
14	15a0	f	SW	32a0	f	SW	F	-
15	18a0	f	SW	32a0	f	W	F	-
16	28a0	c	SE	30a0	r a c	SSE	R	2 ½"
17	15a0	c a r	SW	32a0	f	W	R	2"
18	10a0	f	NW	-	-	-	R	7 ½"
19	10	f	NW	-	-	-	-	-
20	10a0	f	NW	28a0	-	SSW	F	2 ½"
21	20a0	f	NW	34a0	-	NW	F	½" [4]
22	14a0	f	NE	26a0	-	NE	R	1 ½"
23	6a0	f	NW	24a0	-	NW	R	1"
24	6a0	f	NE	26a0	-	NE	F	2"
25	20a0	f	NE	38a0 [5]	-	SSW	-	-
26	16a0	f	NE	30a0	-	NE	F	½"
27	21a0 [6]	c	NE	24a0	r & f s	NW	F	1"
28	4a0	c & s	NW	6a0	c a s	NW	F	2"
29	8a0	h & s	NW	12a0	c a s	NW	F	2 ½"

1 Reference: Coues, Volume III, pages 1265, 1282-83; Moulton, Volume 2, pages 176-178; Thwaites, Volume 6, Part II, pages 168-169.

2 River observations for February were taken at sunrise for a 24-hour period. While at Camp Dubois river observations were taken at the mouth of the Mississippi and Wood Rivers.

3 Clark's Journal Codex C lists the river rise as "1 1 /2 inches."

4 Clark's Journal Codex C lists the river rise as "1 1 /2 inches."

5 Clark's Journal Codex C lists this temperature as "28."

6 Clark's Journal Codex C lists this temperature as "4."

March 1804

Lewis and Clark Combined Entries [1] [2] [3]

Day of the Month	Temp. at Sunrise	Weather at Sunrise	Wind at Sunrise	Temp. at 4 PM	Weather at 4 PM	Wind at 4 PM	Rise [4] or Fall	Feet ' [4] Inches "
1	12b0	f	NW	4a0	-	NW	F	9"
2	11b0	f	NW	22a0	-	E	F	3"
3	10a0	f	E	18a0	-	SW	F	6 ½"
4	4a0	f	NE	20a0	-	E	F	5"
5	10a0	f	NW	20a0	-	NW	F	3"
6	4a0	f	NW	10a0	-	NW	F	3"
7	8b0	c & s	NW	18a0	s	NW	-	-
8	6a0	c & s	NW	20a0	s	NW	F	½" [5]
9	18a0	c	NW	28a0 [6]	c	NW	R	2"
10	14a0	c & f	NW	32a0	f	NW	R	2 ½"
11	20a0	f	E	38a0 [7]	f	SW	F	2 ½"
12	22a0	f	NE	24a0	f	NE	R	1 ½"
13	16a0	f	NW	20a0	f	NW	F	1 ½"
14	12a0	f	NE	18a0	f	NE	F	4 ½"
15	2a0	c & s	NW	48a0	r a s	NE	R	5"
16	6a0	f	E	48a0	f	SSW	R	11"
17	20a0	f	NE	46a0	f	NE	R	7"
18	10a0	f	E	52a0	f	NE	F	3"
19	10a0	f	NE	60a0	f	SSW	F	2 ½"
20	12a0	f	E	68a0	f	SSW	F	1 ½"
21	34a0	f	SSW	54a0 [8]	f	NW	F	2"
22	30a0	f	NW	48a0	f	NW	F	2"
23	22a0	f	NE	52a0	f	NE	R	4"
24	14a0	f	E	60a0	f	SSW	R	1' 5 ½"
25	24a0	f	SSW	54a0	f	E	R	2'
26	36a0	f	E	52a0	f	E	R	10"
27	42a0	r & t	E	50a0	f a r	NE	R	7"
28	42a0	c	NE	52a0	c	E	R	5 ½"
29	28a0	r a t	NE	38a0	h & r	NE	R	1"
30	-	c a r	NW	-	f	NW	R	2"
31	-	f	NW	-	f	NWW [9]	R	2"

1 Reference: Coues, Volume III, pages 1265-66, 1283; Moulton, Volume 2, pages 184-186; Thwaites, Volume 6, Part II, pages 170-171.

2 "This table follows Lewis's Weather Diary, kept by Clark this month; its temperature readings are eight degrees higher than those in (Clark's Journal) Codex C, with exceptions noted within the table. In Codex C, Clark indicated that the thermometer registered eight degrees too low (see notes for the January 1804 Weather Diary); Lewis gave the error as eleven degrees, but in April and May Lewis applies the eight-degree correction. Since Clark compensated for the error in March in the Weather Diary but not in Codex C, he apparently did not keep the two tables simultaneously." Moulton, Volume 2, page 186.

3 Some of the entries in the Remarks sections are split between Lewis and Clark. Some of these remarks are when one of them was across the Mississippi River in St. Louis instead at the encampment on the Dubois River.

4 River observations for March were taken at sunrise for a 24-hour period. While at Camp Dubois river observations

were taken at the mouth of the Mississippi and Wood Rivers.

5 Clark's Journal Codex C lists the river fall as "1 1 /2 inches."

6 Clark's Journal Codex C lists this temperature as "10 a 0."

7 Clark's Journal Codex C lists this temperature as "20 a 0."

8 Clark's Journal Codex C lists this temperature as "36 a 0."

9 Clark's Journal Codex C lists this wind direction as "NW."

April 1804

Lewis and Clark Combined Entries [1] [2] [3]

Day of the Month	Temp. at Sunrise	Weather at Sunrise	Wind at Sunrise	Temp. at 4 PM	Weather at 4 PM	Wind at 4 PM	Rise [4] or Fall	Feet ' [4] Inches "
1	-	f	NE	-	f	NE	R	2 ½"
2	16a0	f	-	-	f	NE	R	3 ½"
3	50a0	f	NE	-	r	NE	R	3 ½"
4	52a0	c a r	NW	-	-	-	R	11"
5	32a0	c a r	NE	-	t r	-	R	2"
6	26a0	c r	NW	-	s a r	-	F	4 ½"
7	18a0	f a c	NW	-	c	-	F	2"
8	18a0 [5]	c	NE	-	c r	-	F	2 ½"
9	26a0	f a c	NE	-	c	-	F	2"
10	18a0	f	NW	-	f	-	F	6 ½"
11	18a0	f	NE	-	f	-	F	7 ½"
12	24a0	c	NW	-	f a c	-	F	7"
13	34a0	c	NE	-	c	-	F	6 ½"
14	30a0	f	SW	-	f	-	F	5"
15	30a0	f	NW	-	-	-	F	6 ½"
16	44a0	c	NW	-	f a c	-	F	5 ½"
17	34a0	f a c	NW	-	f	-	F	5"
18	26a0 [6]	f a c	NWW [7]	-	c	-	F	3"
19	42a0	r	SSE	-	-	-	F	4"
20	42a0	c r	SE	45a0	r	SE	F	3 ½"
21	39a0	r	SW	50a0	f a r	W	R	1' 2"
22	36a0	c	NW	42a0	c	NW	R	1' 6"
23	30a	f	NW	72a	f	W	F	1"
24	44a	f	NW	52a	f	NW	R	8"
25	34a	f	NW	46a	c	NW	R	2 ½"
26	24a	f	NW	66a	f	NW	F	6"
27	36a	t l r	W	70a	f	SW	F	8"
28	38a	f	NW	72a	f	NW	F	7"
29	40a	f	NW	60a	f	SE	F	7"
30	26a	f	SE	64a	f	NE	F	6"

1 Reference: Coues, Volume III, pages 1266-67, 1283-84; Moulton, Volume 2, pages 207-210; Thwaites, Volume 6, Part II, pages 171-173.

2 "The temperature readings in (Clark's Journal) Codex C are generally eight degrees below those in the Weather Diary (Lewis's Journal), as in March, but some discrepancies are noted within the table. " Moulton, Volume 2, page 209.

3 Some of the entries in the Remarks sections are split between Lewis and Clark. Some of these remarks are when one of them was across the Mississippi River in St. Louis instead at the encampment on the Dubois River.

4 River observations for April were taken at sunrise for a 24-hour period. While at Camp Dubois river observations were taken at the mouth of the Mississippi and Wood Rivers.

5 Clark's Journal Codex C lists this temperature as "10 a 0."

6 Clark's Journal Codex C lists this temperature as "16 a 0."

7 Clark's Journal Codex C lists this wind direction as "NNW."

May 1804

Lewis and Clark Combined Entries [1] [2]

Day of the Month	Temp. at Sunrise	Weather at Sunrise	Wind at Sunrise	Temp. at 4 PM	Weather at 4 PM	Wind at 4 PM	Rise [3] or Fall	Feet ' [3] Inches "
1	28a	f	SE	62a	f	NE	F	4 ½"
2	27a	f	SE	76a	f	SSE	F	6"
3	32a	f	SSE	80a	f	SSW	F	4 ½"
4	48a	t l c r	S	64a	c a r	S	R	2"
5	50a	t l r	W	66a	c a r	W	R	2 ½"
6	42a	f	SW	78a	f	SW	F	2 ½"
7	46a	f	SE	60a	f	SSW	F	4 ½"
8	52a	f	NE	70a	f	SW	F	4"
9	50a	f	E	84a	f	SW	F	2"
10	54a	c	NE	75a	f	NW	F	3 ½"
11	48a	f	E	78a	f	SW	F	2 ½"
12	44a	f	E	80a	f	W	F	3"
13	50	c a r	W	48a	c a r	NW	F	2"
14	42a	c	SE	64	f	N	F	0
15	* [4]	* [4]	* [4]	* [4]	* [4]	* [4]	* [4]	* [4]

1 Reference: Coues, Volume III, pages 1267, 1284; Moulton, Volume 2, pages 216-217; Thwaites, Volume 6, Part II, pages 173-174.

2 "This table for May is based on Lewis's Weather Diary, kept by Lewis. Its temperature readings are consistently eight degrees above those in Clark's Codex C. No observations were tabulated by either captain after May 14 until September 1804, or at least no such tables have been found." Moulton, Volume 2, pages 216-217.

3 River observations for May were taken at sunrise for a 24-hour period. While at Camp Dubois river observations were taken at the mouth of the Mississippi and Wood Rivers.

4 No weather observations in table form have been found for the rest of the month.

June 1804

Lewis and Clark Combined Entries [1]

"No tables of weather observations for June 1804 have been found, but both captains entered a few remarks, Clark in Codex C and Lewis in his Weather Diary. These are observations of natural phenomena related to seasonal change and climate such as plant ripening and animal migrations, rather than weather data as such." ***Moulton, Volume 2, page 336.***

1 Reference: Coues, Volume III, page 1284; Moulton, Volume 2, pages 335-336; Thwaites, Volume 6, Part II, page 174.

July 1804

Lewis and Clark Combined Entries [2]

No weather observation tables are noted in the journals for this month.

"Weather observations apparently ceased entirely after July 23 until September 18, as far as known records indicate, except for casual observations in Clark's daily journals." ***Moulton, Volume 2, page 433.***

2 Reference: Coues, Volume III, page 1284; Moulton, Volume 2, pages 432-433; Thwaites, Volume 6, Part II, page 174.

August 1804

Lewis and Clark Combined Entries [3]

No weather observation tables are noted in the journals for this month. No remarks are taken for this month. General weather comments are made by Clark in his daily journal entries.

3 Reference: Moulton, Volume 2, page 433.

September 1804

Lewis and Clark Combined Entries [1]

Day of the Month	Temperature at Sunrise	Weather at Sunrise	Wind at Sunrise	Temperature at 4 PM	Weather at 4 PM	Wind at 4 PM
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						
15						
16						
17						
18	* [2]	* [2]	* [2]	* [2]	* [2]	* [2]
19	46a	f	SE	71a	f	SE
20	51a	f	SE	70a	f	SE
21	58a	f	SW	88a	f	SW
22	52a	f	E	82a	f	SE
23	50a	f	SE	86	f	SE
24	54a	f	E	82	f	W
25	50	f	SW	79	f	W
26	54	f	W	78	f	SW
27	52	f	W	86	f	SW
28	45	f	SE	80	f	SE
29	45a	f	SE	67	f	SE
30	42a	c a r	SE	52	c a r	SE

1 Reference: Coues, Volume III, pages 1267, 1284; Moulton, Volume 3, pages 130-132; Thwaites, Volume 6, Part II, page 175.

2 "Both captains resumed tabled weather observations, including two daily temperature readings, on September 19, 1804, having broken off after May 14, 1804. Neither gives any explanation of the hiatus. ....Neither recorded any information about the rise and fall of the river during the month." For additional remarks see Moulton, Volume 3, page 132.

October 1804

Lewis and Clark Combined Entries [1]

Day of the Month	Temperature at Sunrise	Weather at Sunrise	Wind at Sunrise	Temperature at 4 PM	Weather at 4 PM	Wind at 4 PM
1	40	c	SE	46	c	SE
2	39	f	SE	75	c	NW [2]
3	40	c	NW	45	c a r & f	NW [3]
4	38	c a r	NW	50	c	NW
5	36	f	NW	54	f	NW
6	43	f	NW	60	f	NW
7	45	c	SE	58	f	SE
8	48	f	NW	62	f	NW
9	45	c	NE	50	c a r	N
10	42	f a r	NW	67	f	NW
11	43	f	NW	59	f	NW
12	42	f	S	65	f	SE
13	43	f	SW	49	c a r	NE
14	42	r	SE	40	r	SE
15	46	r	N	57	f a r	NW
16	45	c	NE	50	f	NE
17	47	f	NW	54	f	NW
18	30	f	NW	68	f	NW
19	43	f	SE	62	f	S
20	44	f	NW	48	f	N
21	31	s	NW	34	s	NW
22	35	c a s	NE	42	c	NE
23	32	s	NW	45	c	NE
24	33	s a f	NW	51	c a s	NW
25	31	c	SE	50	c	SE
26	42	f	SE	57	f	SE
27	39	f	SW	58	f	SW
28	34	f	SW	54	f	SW
29	32	f	SW	59	f	SW
30	32	f	SW	52	f	SW
31	33	f	W	48	f	W

1 Reference: Coues, Volume III, pages 1267-68, 1284-85; Moulton, Volume 3, pages 220-223; Thwaites, Volume 6, Part II, pages 176-177.

2 Clark's Journal Codex C lists this wind direction as "N."

3 Clark's Journal Codex C lists this wind direction as "N."

November 1804

Lewis and Clark Combined Entries [1]

Day of the Month	Temp. at Sunrise	Weather at Sunrise	Wind at Sunrise	Temp. at 4 PM	Weather at 4 PM	Wind at 4 PM	Rise or Fall	Feet ' Inches "
1	31	f	NW	47	f	NW	-	-
2	32	f	SE	63	f	SE	-	-
3	32	f	NW	53	f	NW	-	-
4	31	f	NW	43	c	W	-	-
5	30	c	NW	58	c	NW	-	-
6	31	c	SW	43	c	W	-	-
7	43	c	S	62	c	S	-	-
8	38	c	S	39	c	W	-	-
9	27	f	NW	43	f	NW	-	-
10	34	f	NW	36	c	NW	-	-
11	28	f	NW	60	f	NW	-	-
12	18	f	N	31	f	NE	* [2]	* [2]
13	18	s	SE	28	c a s	SE	F	1' ½"
14	24	s	SE	32	c a s	SE	R	1' 0"
15	22	c	NW	31	c a s	NW	R	½"
16	25	c	NW	30	f	SE	R	1/4"
17	28	f	SE	34	f	SE	R	1/4"
18	30	f	SE	38	f	W	R	1/4"
19	32	f	NW	48	f	NW	R	1' 0"
20	35	f	NW	50	f	W	R	1' 1/4"
21	33	c	S	49	f	SE	R	-
22	37	f	W	45	f	NW	R	½"
23	38	f	W	48	f	NW	-	-
24	36	f	NW	34	f	NW	-	-
25	34	f	W	32	f	SW	-	-
26	15	f	SW	21	f	W	-	-
27	10	f	SE	19	c	SE	F	3' 0"
28	12	s	SE	15	s	E	F	4' 0"
29	14	c a s	NE	18	f	W	F	2' ½"
30	17	f	W	23	f	W	F	-

1 Reference: Coues, Volume III, pages 1268-69, 1285; Moulton, Volume 3, pages 247-250; Thwaites, Volume 6, Part II, pages 178-179.

2 "Lewis here resumes noting the fall and rise of the river, which was only possible while they remained in one place during the day." Moulton, Volume 3, page 250. However, later as they resumed their journey they would take river observations but not for a 24-hour period. While at Fort Mandan, the river observations were taken at sunrise for a 24-hour period.

December 1804

Lewis and Clark Combined Entries [1]

Day of the Month	Temp. at Sunrise	Weather at Sunrise	Wind at Sunrise	Temp. at 4 PM	Weather at 4 PM	Wind at 4 PM	Rise [2] or Fall	Feet ' [2] Inches "
1	1b0	f	E	6	f	SE	R	1' 0"
2	38a	f	NW	36	f	NW	R	1"
3	26a	f	NW	30	f	NW	R	1"
4	18	f	N	29	f	N	R	1"
5	14	c	NE	27	s	NE	-	-
6	10a	s	NW	11	c a s	NW	-	-
7	a0 [3]	f	NW	1	c	NW	R	2' ½"
8	12b	s	NW	5	f a s	NW	-	-
9	7a	f	E	10	f	NW	-	-
10	10b	c	N	11	c	N	R	1 ½"
11	21b	f	N	18	f	N	F	½"
12	38b	f	N	16	f	N	-	-
13	20b	f	SE	4	c	SE	-	-
14	2b	c	SE	2	s	SE	F	1"
15	8b	c a s	W	4	c a s	W	-	-
16	22b	f	NW	4	f	NW	F	1"
17	43b [4]	f	N	28	f	N	R	3"
18	32b	f	W	16	f	SW	R	1"
19	2b	c	SW	16	f	S	R	1"
20	24a	c [4]	NW	37 [5]	f [4]	NW [4]	R [4]	3 ½" [4]
21	22a	f	NW	22	c	W	R	2"
22	10a	f	NW	23	f	NW	R	2 ½"
23	18a	c	SW	27	c	W	F	1"
24	22a	s	SW	31	c a s	W	F	2 ½"
25	15	s	NW	20	c a s	NW	F	1"
26	18	c	NW	21	f	NW	-	-
27	4b	c	NW	14	c	NW	-	-
28	12a	f	N	13	f	NW	R	2 ½"
29	9b	f	N	3	f	N	R	1"
30	20b	f	N	11	f	N	R	½"
31	10b	f	SE	12	c	SW	R	1 ½"

1 Reference: Coues, Volume III, pages 1269, 1285; Moulton, Volume 3, pages 264-266; Thwaites, Volume 6, Part II, pages 179-181.

2 River observations on the Missouri River during December were taken at sunrise for a 24-hour period.

3 Clark's Journal Codex C lists this temperature as "0 a"

4 Clark's Journal Codex C lists this temperature as "45 b" and "43 b" in Voorhis No. 4."

5 "There are several discrepancies between Lewis and Clark on this date; in Codex C Clark's sunrise weather is "f"; his 4 p.m. temperature is "22a"; his 4 p.m. weather is "c"' his 4 p.m. wind is "W"' his river rise is 2 inches. His table in Voorhis No. 4 agrees with Lewis." Moulton, Volume 3, page 266.

January 1805

Lewis and Clark Combined Entries [1]

Day of the Month	Temp. at Sunrise	Weather at Sunrise	Wind at Sunrise	Temp. at 4 PM	Weather at 4 PM	Wind at 4 PM	Rise [2] or Fall	Feet ' [2] Inches "
1	18a	s	SE	34a	f	NW	R	1' 0"
2	4b	s	NW	8b	f a s	N	-	-
3	14b	c	N	4b	s	SE	-	-
4	28a	c a s	W	4b	c	NW	R	2 ½"
5	20b	c	NW	18b	s	NE	R	2"
6	11b	c a s	NW	16b	f	NW	R	3"
7	22b	f	NW	14b	f	W	F	1"
8	20b	f	NW	10b	f	NW	R	1"
9	21b	f	W	18b	f a c	NW	R	1"
10	40b	f	NW	28 [3]	f	NW	R	1"
11	38b	f	NW	14b	f	NW	F	½"
12	20b	f	NW	16 [4]	f	NW	R	1"
13	34b	f	NW	20 [5]	f	NW	R	2"
14	16b	s	SE	8b	c a s	SE	-	-
15	10b	f	E	3a	c	SW	R	1"
16	36a	c	W	16a	f	SW	R	2 ½"
17	2b	c	W	12b	f	NW	-	-
18	1b [6]	f	NW	7a	f a c	NW	F	1"
19	12a	c	NE	6b	f	NW	R	1"
20	28a [7]	f	NE	9b	c	SE	R	3/4"
21	2b	c	NE	8a	f	SE	R	-
22	10a	f a h	NW	19a	c	NW	R	1 3/4"
23	2b	s	E	2b	c a s	N	F	2 ½"
24	12b	c	NW	2b	f	NW	R	1/4"
25	26b	f	NW	4b	f a c	W	-	-
26	12a	c	NE	20a	f a c	SE	-	-
27	20a	c	SE	16a	c	NW	R	2"
28	2b	f	NW	15a	f	SW	-	-
29	4a	f	SW	16a	f	W	R	½"
30	6a	c	NW	14a	c	NW	R	1"
31	2b	c a s	NW	8a	f a c	NW	F	1"

1 Reference: Coues, Volume III, pages 1269-70, 1286; Moulton, Volume 3, pages 281-283; Thwaites, Volume 6, Part II, pages 181-182.

2 River observations on the Missouri River during January were taken at sunrise for a 24-hour period.

3 Clark's Journal Codex C lists this temperature as "28 b."

4 Clark's Journal Codex C lists this temperature as "16 b."

5 Clark's Journal Codex C lists this temperature as "20 b."

6 In Voorhis No. 4 Clark lists this temperature as "20 b."

7 Clark's Journal Codex C lists this temperature as "28 a."

February 1805

Lewis and Clark Combined Entries [1]

Day of the Month	Temp. at Sunrise	Weather at Sunrise	Wind at Sunrise	Temp. at 4 PM	Weather at 4 PM	Wind at 4 PM	Rise [2] or Fall	Feet ' [2] Inches "
1	6a	c	NW	16a	f	NW	R	2 ½"
2	12b	f	NW	3a	f	S	F	1"
3	8b	f	SW	2a	f	W	-	-
4	18b	f	NW	9b	f	W	-	-
5	10a	f	NW	20a	f	NW	R	1"
6	4b	f	NW	12a	f	W	R	½"
7	18a	f	SE	29 [3]	c	S	R	½"
8	18a	f	NW	28	c	NE	F	1"
9	10a	f	SE	33a	c	SE	-	-
10	18a	c a s	NW	12a	c	NW	-	-
11	8b	f	NW	2b	f	NW	-	-
12	14b	f	SE	2a	f	W	-	-
13	2b	c	SE	10a	c	NW	F	1"
14	2a	c a s	NW	2b	f	NW	-	-
15	16b	f	SW	6b	f	W	-	-
16	2a	f	SE	8a	f	W	F	1"
17	4a	c	SE	12a	f	NW	F [4]	½"
18	4a	s	NE	10a	f	S	-	-
19	4a	f	SE	20a	f	S	-	-
20	2a	f	S	22a	f	S	-	-
21	6a	f	S	30a	f	S	-	-
22	8a	c	N	32a	c a r & s	NW	-	-
23	18a	f	NW	32a	f	W	R	½"
24	8a	f	NW	32a	f	W	-	-
25	16a	f	W	38a	f	NW	-	-
26	20a	f	NE	31a	f	N	-	-
27	26a	f	SE	36a	f	E	F	½"
28	24a	f	E	38a	c	SE	-	-

1 Reference: Coues, Volume III, pages 1270, 1286; Moulton, Volume 3, pages 305-307; Thwaites, Volume 6, Part II, pages 182-183.

2 River observations on the Missouri River during February were taken at sunrise for a 24-hour period.

3 Clark's Journal Codex C lists this temperature as "29 a."

4 Lewis does not record rise or fall but does record "½" inch. Clark gives neither a rise or fall or depth.

March 1805

Lewis and Clark Combined Entries [1]

Day of the Month	Temp. at Sunrise	Weather at Sunrise	Wind at Sunrise	Temp. at 4 PM	Weather at 4 PM	Wind at 4 PM	Rise [2] or Fall	Feet ' [2] Inches "
1	28a	c	W	38a	f	NW	-	-
2	28a	f	NE	36a	f	NE	R	1 ½"
3	28a	c	E	39a	f	NW	-	-
4	26a	f	NW	36a	f	NW	-	-
5	22a	f	E	40a	f	NW	-	-
6	26a	c	E	36a	f	E	R	2"
7	12a	f	E	26a	c	E	R	2"
8	7a	c	E	12a	f	E	R	2 ½"
9	2a	c	N	18a	f	NW	R	2"
10	2b	f	NW	12a	f	NW	R	3 ½"
11	12a	c	SE	26 [3]	f a c	NW	R	4 ½"
12	2b	f a s	N	10a	f	NW	R	5"
13	1b	f	SE	28a	f	SW	R	3 ½"
14	18a	f	SE	40a	f	W	-	-
15	24a	f	SE	38a	f	W	F	1"
16	32a	c	E	42a	c	W	F	3"
17	30a	f	SE	46a	f	SW	R	2"
18	24a	c	N	34a	c	N	F	1"
19	20a	c a s	N	31 [4]	f	NW	R	1"
20	28a	c	NW	28 [5]	f	NW	R	3"
21	16a	c	E	26a	s & h	S	-	-
22	22a	f a s	S	36a	f	SW	F	4"
23	34a	f	W	38a	c a r	NW	F	4"
24	28a	c a s	NE	30a	c a s	N	R	1"
25	16	f	E	32a	f	S	R	5"
26	20	f	SE	46a	f	W	R	4 ½"
27	28	f	SE	60a	f	SW	R	9"
28	40	f	SE	64a	f	SW	R	1"
29	42	f	NW	52a	f	NW	F	11"
30	28	f	NW	49a	f	NW	R	1' 1"
31	35	c a r	SE	45a	c	SE	R	9"

1 Reference: Coues, Volume III, pages 1270-71, 1286-87; Moulton, Volume 3, pages 324-327; Thwaites, Volume 6, Part II, pages 183-185.

2 River observations on the Missouri River during March were taken at sunrise for a 24-hour period.

3 Clark's Journal Codex C lists this temperature as "26 a."

4 Clark's Journal Codex C lists this temperature as "31 a."

5 Clark's Journal Codex C lists this temperature as "28 a."

April 1805

Lewis and Clark Combined Entries [1]

Day of the Month	Temp. at Sunrise	Weather at Sunrise	Wind at Sunrise	Temp. at 4 PM	Weather at 4 PM	Wind at 4 PM	Rise [2] or Fall	Feet ' [2] Inches "
1	33a [3]	c	NW	43a	c a t l r & h [4]	W	F	11"
2	28a	c a r	NW	38a	f a c	W	F	5"
3	24a	f	N	44a	f	W [5]	F	4"
4	36a	f	S	55a	f	NW	F	4"
5	30a	f	NW	39a	f	N [6]	F	2"
6	19a	f	N	48a	c	NW	F	1"
7	28a	f	W	64a	f	SW	R	2" [7]
8	19a	f	NW	56a	f	NW	F [8]	2" [8]
9	38a	f	SE	70a	f	SW	F	½"
10	42a	f	E	74a	f	SW	R	1/8"
11	42a	f	NW	76a	f	W	F	½"
12	56a	f	NW	74a	c a r t & l	W	R	1/8"
13	58a	f	SE	80a	f	SE	F	1"
14	52a	c	SE	82a	f	SW	F	3/4"
15	51a	f	E	78a	f	SW	F	½"
16	54a	f	SE	78a	f	S	F	½"
17	56a	f	NE	74a	c	SW	F	½"
18	52a	f	NE	64a	c	N	-	-
19	45a [9]	c	NW	56a	c	NW	-	-
20	40a	c	NW	42a	c a s	NW	-	-
21	28a	f	NW	40a	c	NW	F	½"
22	34a	f a c	W	40	f	NW	R	2"
23	34a	f	W	52	c	NW	R	2"
24	40a	f	N	56	f	N	R	1"
25	36a	f	N	52a	f	NW	R	2"
26	32a	f	S	63a	f	SE	R	3"
27	36a	f	SW	64a	f	NW	F	2"
28	44a	f	SE	63a	f	SE	F	1 ½"
29	42a	f	NE	64a	f	E	F	1 ½"
30	50a	f	NW	58a	f	SE	F	½"

1 Reference: Coues, Volume III, pages 1271-72, 1287-88; Moulton, Volume 4, pages 91-96; Thwaites, Volume 6, Part II, pages 185-188.

2 River observations on the Missouri River during March were taken at sunrise for a 24-hour period.

3 Clark's Journal Codex C lists this temperature as "38 a."

4 Clark's Journal Codex C lists this weather data as "c a t c h & r."

5 Clark's Journal Codex I lists this wind direction as "N."

6 Clark's Journal Codex C lists this wind direction as "NW."

7 Clark's Journal Codex C lists this river rise as "½."

8 River rise and fall observations continued during the ascent of the Missouri River from Fort Mandan. Although not like previous recording episodes, the data usually is not for a 24-hour period unless they are encamped. In most cases, when the party stopped for the evening, following Lewis' habit from previous journal entries, it is surmised that a mark was made and measured the next morning. Thus many observations were only a 8 to 10 hour long.

9 Clark's Journal Codex I lists this temperature as "54 a."

May 1805

Lewis and Clark Combined Entries [1]

Day of the Month	Temp. at Sunrise	Weather at Sunrise	Wind at Sunrise	Temp. at 4 PM	Weather at 4 PM	Wind at 4 PM	Rise [2] or Fall	Feet ' [2] Inches "
1	36a	c	E	46a	c a f	NE	F	1 ½"
2	28a	s	NE	34a	c a s	NW	F	1"
3	26a	f	W	46a	c	W	F	1/4"
4	38a	c	W	48a	f a c	W	-	-
5	38a	f	NW	62a	f a r	SE	R	1"
6	48a	f	E	61a	c a r	SE	R	2"
7	42a	c	S	60a	f	NE	R	1 ½"
8	41a	c	E	52a	c a r	E	F	1/4"
9	38a	f	E	58a	f	W	R	3/4"
10	38a	f a c	WNW	62a	c a r	NW	F	3/4"
11	44a	f	NE	60a	c	SW	-	-
12	52a	f	SE	54a	c a r	NW	R	2"
13	52a	c a r	NW	54a	f a c	NW	F	2 1/4"
14	32a	f	SW	52a	c	SW	F	1 3/4"
15	48	c a r	SW	54a	c	NW	F	3/4"
16	48	c	SW	67a	f	SW	-	-
17	60a	f	NE	68a	f	SW	-	-
18	58a	f	W	46a	c a r	NW	F	1"
19	38a	f	E	68a	f a c	SW	-	-
20	52a	f	NE	76a	f	E	F	1"
21	50a	f	SW	76a	f	NW	-	-
22	46a	c	NW	48a	c	NW	F	½"
23	32a	f	SW	54a	f	SW	F	½"
24	32a	f	NW	68a	f	SE	R	3 ½"
25	46a	f	SW	82a	f	SW	R	2"
26	58a	f	SW	80a	f	SW	R	½"
27	62a	f	SW	82a	f	SW	-	-
28	62a	c	SW	72a	c & r	SW	R	½"
29	62a	c a r	SW	67a	r	SW	R	1"
30	56a	c a r	SW	50a	r	SW	R	5"
31	48a	c a r	W	53a	c a r	SW	R	1 ½"

1 Reference: Coues, Volume III, pages 1272, 1288-1289; Moulton, Volume 4, pages 234-238; Thwaites, Volume 6, Part II, pages 189-191.\

2 River rise and fall observations continued during the ascent of the Missouri River from Fort Mandan. The data usually is not for a 24-hour period unless they are encamped. In most cases, when the party stopped for the evening, following Lewis' habit from previous journal entries, it is surmised that a mark was made and measured the next morning. Thus many observations were only a 8 to 10 hour long.

June 1805

Lewis and Clark Combined Entries [1]

Day of the Month	Temp. at Sunrise	Weather at Sunrise	Wind at Sunrise	Temp. at 4 PM	Weather at 4 PM	Wind at 4 PM	Rise [2] or Fall	Feet ' [2] Inches "
1	50a	c	SW	62a	c	-	R	1 ½"
2	56a	c a r	SW	68a	f	SW	-	-
3	46a	f	SW	60a	f	SW	-	-
4	48a	f a c	NE	61a	f	SW	F	3/4"
5	40a	r	SW	42a	c a r	NE	F	3/4"
6	35a	c a r	NE	42a	r a r	NE	F	1 ½"
7	40a	c a r	SW	43a	r a r	SW	F	1 ½"
8	41	r a r	SW	48a	f a r	SW	F	1 1/4"
9	50	f	SW	62 [3]	f	SW	F	1"
10	52a	f	SW	68a	f a r	SW	R	2"
11	54a	f	SW	66a	f	SW	-	-
12	54a	f	SW	64	f a r	SW	-	-
13	52a	f	SW	72	f	SW	R [4]	3/4" [4]
14	60a	f	SW	74	f	SW	F	3/4"
15	60a	f	SW	76	f	SW	F	½"
16	64	c a r	SW	58	f	SW	R	½"
17	50a	c	SW	57	c	SW	F	½"
18	48a	c	SW	64a	f a c	SW	F	½"
19	52a	f	SW	70a	f	SW	F	½"
20	49a	c	SW	74a	f a r	SW	F	1/4"
21	49a	f	SW	70a	c	SW	F	1/4"
22	45a	c	SW	54a	f	SW	F	½"
23	48a	f	SE	65a	c	SE	F	1/4"
24	49a	c a r	SE	74a	f a c	SW	F	-
25	47a	c a r	SW	72a	f	SW	- [5]	- [5]
26	49a	f	SW	78a	f	SW	R	½"
27	49a	f	SW	77	f a r & h t l [6]	SW	R	1 1/4"
28	46a	f	SW	75	c a f	SW	R	2"
29	47a	r t & l	SW	77	f	SW	R	4 ½"
30	49a	f	SW	76	f	SW	R	2 1/4"

1 Reference: Coues, Volume III, pages 1272-73, 1289; Moulton, Volume 4, pages 346-349; Thwaites, Volume 6, Part II, pages 191-193.

2 River rise and fall observations continued during the ascent of the Missouri River from Fort Mandan. The data usually is not for a 24-hour period unless they are encamped. In most cases, when the party stopped for the evening, following Lewis' habit from previous journal entries, it is surmised that a mark was made and measured the next morning. Thus many observations were only a 8 to 10 hour long.

3 Clark's Journal Codex I lists this temperature as "52 a."

4 It appears observations were taken at the lower portage camp at Belt Creek, Montana until the upper portage camp at the White Bear Islands is established on June 23, 1805.

5 It appears observations were moved from the lower portage camp to the upper portage camp at the White Bear

Islands and continued until the Expedition began its ascent once again up the Missouri River on July 13, 1805.

6 Clark's Journal Codex C lists this weather data as "f a r h."

July 1805

Lewis and Clark Combined Entries [1]

Day of the Month	Temp. at Sunrise	Weather at Sunrise	Wind at Sunrise	Temp. at 4 PM	Weather at 4 PM	Wind at 4 PM	Rise [2] or Fall	Feet ' [2] Inches "
1	59a	f	SW	74a	f	SW	R	½"
2	60a	f a r	SW	78a	f	SW	-	-
3	58a [3]	f	SW	74a	c a f & r	SW	-	-
4	52a	f	SW	76a	f a r	SW	F	1/4"
5	49a	f a h & r [4]	SW	72a	f	SW	F	½"
6	47a	c a h r t & l c a f	SW	74a	f a c	SW	F	1/4"
7	54a	f	SW	77a	r a c	SW	F	1/4"
8	60a	f	SW	78a	f a r	SW	F	1/4"
9	56a	f a r	SW	76a	c a r	NW	F	1/4"
10	52a	f	SW	66a	f	SW	-	-
11	46a	f	SW	70a	f	SW	-	-
12	50a	f	SW	74a	f	SW	F	1/4"
13	42a	f	SW	76a	f	SW	F [5]	1/4" [5]
14	45a	f a r	SW	78a	c a r	SW	-	-
15	60a	f	SW	76a	f	SW	F	1 1/2"
16	53a	f	SW	80a	f	SW	F	3/4"
17	58a	f	SW	81a	f	SW	F	1 1/2"
18	60a	f	SW	84a	f	SW	- [6]	- [6]
19	62a	f a r	SW	68a	c a h & r	SW	F	½"
20	59a	f	SW	60a	f	NW	-	-
21	60a	f	NW	67a	f	NW	F	½"
22	52a	f	NW	80a	f	NE	-	-
23	54a	f	SW	80a	c	SW	F	½"
24	60a	f	SW	90a	f	SW	F	3/4"
25	60a	f	SW	86a	f	SW	F	½"
26	60a	c	SW	82a	c a r	SW	F	3/4"
27	52a	f a r	SW	80a	c a r	SW	F	3/4"
28	49a	f a r	SW	90a	f	SW	F	½"
29	54a	f	N	82a	f	NE	R	½"
30	50a	f	SE	80a	f	SE	-	-
31	48a		SW	92a	f	SW	-	-

1 Reference: Coues, Volume III, pages 1273, 1289-90; Moulton, Volume 5, pages 22-24; Thwaites, Volume 6, Part II, pages 193-195.

2 It appears observations were moved from the lower portage camp to the upper portage camp at the White Bear Islands and continued until the Expedition began its ascent once again up the Missouri River on July 13, 1805.

3 Lewis' Journal Codex P & Clark's Codex I lists this temperature as "56."

4 Lewis' Journal Codex P lists this weather data as " f h & r" & Clark's Codex I lists this as "h & r."

5 River observations once again change daily as the Expedition is again moving up the Missouri River. The data usually is not for a 24-hour period unless they are encamped. In most cases, when the party stopped for the evening, following Lewis' habit from previous journal entries, it is surmised that a mark was made and measured the

next morning. Thus many observations were only a 8 to 10 hour long.

6 Clark Journal Codex I lists that the river fell one-half inch.

August 1805

Lewis and Clark Combined Entries [1]

Day of the Month	Temp. at Sunrise	Weather at Sunrise	Wind at Sunrise	Temp. at 4 PM	Weather at 4 PM	Wind at 4 PM	Rise [2] or Fall	Feet ' [2] Inches "
1	54a	f	SW	91a	f	SW	F	½"
2	48a	f	NW	81a	f	NW	F	½"
3	50a	f	NE	86a	f	NE	F	½"
4	48a	f	S	92a	f	S	F	½"
5	49a	f	SE	79a	f	SE	F	1/4"
6	52a	f	SW	71a	c	SW	* [3]	* [3]
7	54a	c a r	SW	80a	c	SW		
8	54a	f a r	SW	82a	c a f	SW		
9	58a	f	NE	78a	c	SW		
10	60a	c a r f & l	SW	68a	t l & r	SW		
11	58a	c a r & h	NE	70a	f	SW		
12	58a	f a r & h	W	72a	f a r a h	NW		
13	52a	c a f	NW	70a	f a r	NW		
14	51a	f a r	NW	76a	f	NW		
15	43a [4]	f	SE	74a	f	SW		
16	48a	f	SW	70a	f	SW		
17	42a	f	NE	76a	f	SW		
18	45a	c	SW	78a	r	SW		
19	30a	f a r	SW	71a	f a r	SW		
20	32a	f a r [5]	SW	74a	f	SW		
21	19a	f	SE	78a	f	E		
22	22a	f	E	70a	f	E		
23	35a	f	E	72a	f	SE		
24	40a	f	SE	76a	f a r	SE		
25	32a	f a r	SE	65a	c	SE		
26	31a	f	SE	45a	f	SE		
27	32a	f	SE	56a	f	SE		
28	35a	f	SW	66a	f	SW		
29	32a	f	SW	68a	f	SW		
30	34a	c	NE	59a	c	NE		
31	38a	c a r	NE	58a	c a r & h	NE		

1 Reference: Coues, Volume III, pages 1273-74, 1290; Moulton, Volume 5, pages 180-182; Thwaites, Volume 6, Part II, pages 195-196.

2 River observations were taken on the Jefferson Fork of the Missouri. The data usually is not for a 24-hour period unless they are encamped. In most cases, when the party stopped for the evening, following Lewis' habit from previous journal entries, it is surmised that a mark was made and measured the next morning. Thus many observations were only a 8 to 10 hour long.

3 This is the last entry in the Weather Diary for Missouri River rise and fall. No explanation is given as to why they stopped. They are located at the Big Hole River near present-day town of Twin Bridges. They had followed up that river a short distance before returning to the Jefferson River. Since the river was becoming so shallow and observation changes were so minimal, it could be assumed that they decided that the remarks were no longer necessary.

4 Clark's Journal Codex I lists this temperature as "52 a."

5 Clark's Journal Codex C list this weather data as "f."

September 1805

Lewis and Clark Combined Entries [1] [2]

Day of the Month	Temp. at Sunrise	Weather at Sunrise	Wind at Sunrise	Temp. at 4 PM	Weather at 4 PM	Wind at 4 PM
1	38a	c	NW	67a	c	NW
2	36a	c a r	NE	60a	c a r h	NE
3	34a	c a r	NE	52a	c a r	NE
4	19a	r a s	NE	34a	c a r	NE
5	17a	c a s	NE	29a	c a r & s	NE
6	* [3]	c a r	NE	* [3]	r	NE
7		c a r	NE		c a r	NE
8		c	NE		c a r	NE
9		c a r	NE		f a r	NE
10		f	NW		f	NW
11		f	NW		f	NW
12		f	NW		f	NE
13		c	NE		r	NE
14		c a r	SW		c a r & s [4]	SW
15		c a l & s [5]	SW		s	SW
16		c a s	SW		f	SW
17		f	SW		f	SW
18		f	SW		f	SW
19		f	SW		f	SW
20		f	SW		f	SW
21		f	SE		f	SW
22		f	SW		f	SW
23		f	SW		f	SW
24		f a r t & l [6]	SE		f a r [7]	SE
25		f	E		f	SW
26		f	E		f	SW
27		f	E		f	SW
28		f	E		f	SW
29		f	E		f	SW
30		f	E		f	SW

1 Reference: Coues, Volume III, pages 1274-75; Moulton, Volume 5, pages 240-243; Thwaites, Volume 6, Part II, pages 196-198.

2 There is no record of river rise or fall during this month.

3 The Daily Narrative Journals note that the Expedition's last thermometer was broken during an accident this day as they proceeded up the Lost Trail pass. However, the Weather Dairy does not record this until September 6, 1805 in the remarks section which appears to be after the fact. Temperature observations are noted for two additional days in the Weather Diary, but the readings may be suspect. No further temperature observations are recorded for the rest of the journey.

4 Lewis' Journal Codex P & Clark's Codex I lists this weather data as "c a r."

5 Lewis' Journal Codex P & Clark's Codex I lists this weather data as "c a s."

6 Lewis' Journal Codex P lists this weather data as "f."

7 Lewis' Journal Codex P & Clark's Codex I lists this weather data as "f."

October 1805

Clark Entries [1] [2] [3] [4]

Day of the Month	Wind	State of the Weather
1	E	f
2	N	f
3	E	f
4	E	f
5	E	f
6	E	f
7	E	f
8	E	f
9	SW	c
10	NW	f
11	E & SW	c
12	E & SW	f
13	SW	f a r
14	SW	f
15	SW	f
16	SW	f
17	SE	f
18	SE	f
19	SE	f
20	SW	f
21	SW	f
22	SW	f
23	SW	f
24	W	f
25	W	f
26	W	f
27	W	f
28	NW	r a f
29	W	f a r
30	SE	r a r
31	SW	f a r

1 Reference: Coues, Volume III, page 1275; Moulton, Volume 5, pages 364-366; Thwaites, Volume 6, Part II, pages 198-199.

2 Lewis kept no weather data for this month. Clark wrote a combined table for October, November and December of 1805.

3 Although not stated, when looking through the daily journal entries, it looks like the weather record entered into the table above was conducted generally in the morning.

4 No river observations were made during the month of October.

November 1805

Clark Entries [1] [2] [3] [4]

Day of the Month	Wind	State of the Weather
	NE	
1	SW	f
2	NE	f
3	W	f a fog
4	SW	c a r
5	SW	r c r
6	SW	r a r
7	SW	r a fog [5]
8	SW	f a r
9	S	r
10	NW	r a r
11	SW	r
12	SW	h r t & l
13	SW	r
14	-	r
15	SE	f a r
16	WSW	f
17	E	c a f
18	SE	f a c
19	SE	c a r
20	SE	f a r
21	SE	c a r
22	SSE	r
23	SW	c a r
24	W	f a r
25	ESE	c a r
26	ENE	r
27	SW	r
28	SW & NW	r
29	SW	r
30	SW	f a r & h

1 Reference: Coues, Volume III, pages 1275, 1290; Moulton, Volume 6, pages 99-101; Thwaites, Volume 6, Part II, pages 198-200.

2 Lewis kept no weather data for this month. Clark wrote a combined table for October, November and December of 1805.

3 Although not stated, when looking through the daily journal entries, it looks like the weather record entered into the table above was conducted generally in the morning.

4 No river observations were made during the month of November.

5 Clark's Journal Codex I lists this weather data as "r a r fog."

December 1805

Clark Entries [1] [2] [3] [4]

Day of the Month	Wind	State of the Weather
1	E	c a r
2	SW	c a r
3	E	f a r
4	SE	r
5	SW	r
6	SW	r
7	NE	f a r
8	NE	c a r [5]
9	NE	c r
10	NE	r
11	SW	r
12	SW	r
13	SW	r
14	SW	r
15	SW	c a r
16	SW	r
17	SW	f a r & h
18	SE	c a r s h
19	SW	h r & c
20	SW	f a r h
21	SW	r
22	SW	r
23	SW	r h & l
24	SW	r
25	SW	c r
26	SW	r a t & l
27	SW	r
28	SE	r
29	SE	c a r
30	SE	f a r
31	SW	r

1 Reference: Coues, Volume III, pages 1275, 1290-91; Moulton, Volume 6, pages 148-151; Thwaites, Volume 6, Part II, pages 198, 200-201.

2 Lewis kept no weather data for this month. Clark wrote a combined table for October, November and December of 1805.

3 Although not stated, when looking through the daily journal entries, it looks like the weather record entered into the table above was conducted generally in the morning.

4 No river observations were made during the month of December.

5 Clark's Journal Codex I lists this weather data as "c."

January 1806

Lewis and Clark Combined Entries [1] [2]

Day of the Month	Aspect of the Weather at Sunrise	Wind at Sunrise	Aspect of the Weather at 4 PM	Wind at 4 PM
1	c a r	SW	r a c	S
2	c a r	SW	r	SW
3	c a r h t & l	SW	c a r h f	SW
4	c a r & h	SW	r a f & r	SE
5	r	SE	r	SE
6	c a r	SE	f	E
7	f	NE	c a r [3]	SE
8	f	NE	c a f	SE
9	f	SW	c a f	SW
10	f a r	SW	c a f	SW
11	c	SW	c a r	SW
12	f a c	NW	c	NW
13	r	SW	r	SW
14	f a r	NE [4]	c a f	S
15	r a c & r	SE	r a r	S
16	r a r	SW	r a r	SW
17	c a r	SW	c	SW
18	r a r	SW	c a r	SW
19	c a r	S	c a r	SW
20	r a r	SW	r a r	SW
21	c a r	SW	c a r	SW
22	r a r	SW	c a r	SW
23	c a r h t & l [5]	SW	c a f	SW
24	c a r & s	SE	c a r h & s	E
25	h a r h & s	NE	c a r h & s	NE
26	c a h & s	NE	c a s	NE
27	f a s	NE	f	NE
28	f	NE	f	NE
29	f	NE	f	NE
30	s a s	N	c a s	W
31	f a c	NE	f	NE

1 Reference: Coues, Volume III, pages 1276, 1291-92; Moulton, Volume 6, pages 258-262; Thwaites, Volume 6, Part II, pages 202-205.

2 No data for rivers was recorded while the party was camped at Fort Clatsop.

3 Clark's Journal Codex I lists this weather data as "c a f."

4 Clark's Journal Codex I lists this wind direction as "NW."

5 Clark's Journal Codex I lists this weather data as "c a r t & l."

February 1806

Lewis and Clark Combined Entries [1] [2]

Day of the Month	Aspect of the Weather at Sunrise	Wind at Sunrise	Aspect of the Weather at 4 PM	Wind at 4 PM
1	f	NE	f	NE
2	f	NE	c a s	SW
3	c a s & r	NW	c a f	NE
4	f	NE	f	NE
5	f	NE	f	NE
6	f	NE	c	SW [3]
7	c	SW	c	SW
8	c a s r & h	SW	c a f r h & s	SW
9	c a r & h	SW	c a r & h	SW
10	c a r h & s	N	c a f & c	SW
11	c a f & c	SW	r a f & r	SW
12	r a r & c	SW	r a c & r	SW
13	c a r	SW	c a r	SW
14	c a f & s	SW	r a r f & r	SW
15	c a r & f	S	c a r & f	SW
16	r a s & f	SW	r a f & r	SW
17	c a r h & s	SW	r a f h s & r	SW
18	c a r & h	SW	r a r & h	SW
19	r a r	SW	r a r	SW
20	c a r	SW	c a r	SW
21	r a c & r	SW	r a c & r	SW
22	f a r	NE	c a f	NE
23	f	SW	c a f	SW
24	c a f & c	SW	r a c & r	S
25	r a r	S	r a r	S
26	f a r	NE	c a f & r	S
27	c a r	SW	r a r	SW
28	r a r	SW	c a c & f	SW

1 Reference: Coues, Volume III, pages 1276-77, 1292-93; Moulton, Volume 6, pages 362-365; Thwaites, Volume 6, Part II, pages 205-207.

2 No data for rivers was recorded while the party was camped at Fort Clatsop.

3 Clark's Journal Voorhis No. 2 lists this wind direction as "NW."

March 1806

Lewis and Clark Combined Entries [1]

Day of the Month	Aspect of the Weather at Sunrise	Wind at Sunrise	Aspect of the Weather at 4 PM	Wind at 4 PM
1	f a r & c	SW	r a c & r	SW
2	r a c & r	S	r a c & r	S
3	c a r	S	c a r	S
4	r a c & r	S	r a r	S
5	c a r	NE	c a r	S
6	f a r	SE	c a f	SE
7	r a r & h	SE	r a f r h c & f	SE
8	h & r a h r & s	S	r a r & h	SE
9	s & h a r s & h	SW	r a h & r	SW
10	s & r a h r & s	SW	f a r h & s	SW
11	f a r h & s	SE	f a r & h	SE
12	f a c	NE	c a f	NE
13	f a r	NE	f	NE
14	c a f	NE	c	NE
15	c a c	NE	f	NE
16	r a f & c	SW	c a f c r	SW
17	c a r	SW	r a f h a s & r [3]	SW
18	r a c & r	SW	r a f r & h	SW
19	r & h a c r & h	SW	r a f r & h	SW
20	r a r & h	SW	r	SW
21	r a r	SW	c a r	NE
22	r a r	SW	r a c & r	SW & NE
23	r a r	SW	f a c & r	SW
24	r a c& r	SW	f a c	NW & SW
25	c a f	SE	r a c & r	SE
26	c a r	NW	c a f & c	SE
27	r a c	SE	r a c & r	SE
28	c a r	N	f a f & r	SW
29	c a r & f	S	c a r	SW
30	c	S	f a c	SW
31	f	SE	f	SE

1 Reference: Coues, Volume III, pages 1277, 1293-94; Moulton, Volume 7, pages 42-48; Thwaites, Volume 6, Part II, pages 208-211.

2 No data for rivers was recorded while the party was camped at Fort Clatsop.

3 Clark's Journal Codex J lists this weather data as "r a f h s & r."

April 1806

Lewis and Clark Combined Entries [1]

Day of the Month	State of the Weather at Sunrise	Wind at Sunrise	State of the Weather at 4 PM	Wind at 4 PM	Rise [2] or Fall	Feet ' [2] Inches "
1	c a f	SE	c a f	SE	R	1"
2	c	SE	c a f	SE	F	1/8"
3	c a r	SW	c a r	W	F	3 ½"
4	c a r	SW	c a r	SW	F	4 ½"
5	c a r	SW	c a f & c	SW	F	2 ½"
6	f a c	SW	f	SW	F	1"
7	f	SW	f	SW	R	½"
8	f	E	f	E	R	1 1/2"
9	f	W	f	W	-	-
10	c a r	W	c a r	SW	R	1"
11	r a r	W	c a r	SW	R	2"
12	c a r	W	r a c & r	W	R	2"
13	r a c & r	W	c a r & f	W	R	2 ½"
14	f	W	f	W	R	1"
15	f	W	f	W	-	-
16	f a c	SW	f	SW	F	2"
17	f	NE	c a f	SW	F	2"
18	f a c	SW	f	SW	F	1"
19	c a r	SW	c	SW	F	3"
20	f a r [3]	SW	c a r	SW	F	2 ½"
21	f	NE	f	E	F	2"
22	f	NW	f	W	F	1"
23	f a c	E	f	NE	F	4"
24	f	NW	f	NW	F	2"
25	f	NE	f	NE	F	2"
26	f a c	NW	f	NE	F	2 ½"
27	f a r	SE	f	NW	F	1 1/2"
28	f a t	SW	f	NE	F	2"
29	f a c	NW	f	NW	F	1"
30	c a r	NW	f a c	NW	F	2"

1 Reference: Coues, Volume III, pages 1278, 1294-95; Moulton, Volume 7, pages 191-195; Thwaites, Volume 6, Part II, pages 212-214.

2 River rise and fall observations begin again during the trip up the Columbia River. Although not like previous recording episodes, the data usually is not for a 24-hour period unless they are encamped. In most cases, when the party stopped for the evening, following Lewis' habit from previous journal entries, it is surmised that a mark was made and measured the next morning. Thus many observations were only a 8 to 10 hour long.

3 Clark's Journal Voorhis No. 3 lists this weather data as "c a r."

May 1806

Lewis and Clark Combined Entries [1]

Day of the Month	State of the Weather at Sunrise	Wind at Sunrise	State of the Weather at 4 PM	Wind at 4 PM	Rise or Fall	Feet ' Inches "
1	c a r	SW	c	SW		
2	f a c	NE	f	SW		
3	c a h r & s	SW	c a r h & s	SW		
4	f a h	SW	c a r & h	SW		
5	f	SW	f	SW		
6	r a c & r	NE	f a r	NE		
7	f a c	NE	f	SW		
8	f	SW	f	SW		
9	f	SW	f a c	W		
10	c a r & s	SW	f a s	SW		
11	f a r	SW	f a c	SW		
12	f	E	f	SW		
13	f	SW	f	SW		
14	f	SW	f	SW		
15	f	N	f a c	NW	* [2]	* [2]
16	c	SE	c a r	SE	R	6"
17	r a r	SE	c a r	SE	R	10 3/4"
18	c a r	SE	c	SE	R	2"
19	r a r	SE	c a r	SE	F	4"
20	r a r	NW	c a r	SE	R	2"
21	c a r	SE	f a c	SE	F	1"
22	f	SE	f	SE	F	2"
23	f	NW	f	NW & SE	F	1 1/2"
24	f	SE	f	NW	F	1"
25	c a r & t	NW	f	NW	R	9 ½"
26	f a r	SE	f	NW	R	6"
27	c	SE	r a f r t l	SE	R	6 ½"
28	c a r t l	SE	c a f r t & l	SE	R	11"
29	c a r & t	SE	c a r	NW	R	1' 5"
30	c a r	SE	f	SE	F	6"
31	c a f	SE	f	SE	R	1' 1"

1 Reference: Coues, Volume III, pages 1278-79, 1295-96; Moulton, Volume 7, pages 318-322; Thwaites, Volume 6, Part II, pages 215-218.

2 River observations did not begin until they had stopped in the Nez Perce County on the KoosKooskie River (Clearwater). As in previous observations of river rise and fall, the river was probably measured at the sunrise observation providing a 24-hour reading. These observations continued until they left for the Lolo Trail on June 10, 1806.

June 1806

Lewis and Clark Combined Entries [1]

Day of the Month	State of the Weather at Sunrise	Wind at Sunrise	State of the Weather at 4 PM	Wind at 4 PM	Rise [2] or Fall	Feet ' [2] Inches "
1	f a r t & l	SE	f a c	NW	R	1' 6"
2	c a c	NW	f a c	SE	R	8"
3	c a f & c	SE	c a f	SE	R	6"
4	c a r	SE	f a c	NW	R	1 1/2"
5	f	SE	f	NW	R	4"
6	f	SE	f	NW	F	1' 0"
7	c a r	NW	c a f r & h	NW	F	3"
8	c	SE	c a f	NW	F	7"
9	c	SE	f a c	NW	F	3 ½"
10	f	SE	f	NW	F	1"
11	f	SE	f	NW	* [3]	* [3]
12	f a r t l	SE	f	NW		
13	c	SE	c a f	NW		
14	f	SE	f	NW		
15	c	NW	r a f & r	NW		
16	f a c	SE	c a f	SE		
17	c a r	E	c a f & r	SE		
18	c a r	E	c a r & h	SW		
19	f a c	SE	f	NW		
20	f	SE	f	NW		
21	f	SE	f	NW		
22	f	NW	f	NW		
23	f	NW	f	NW		
24	f	NW	f a c [4]	NW		
25	c a r	SE	c a r	NW		
26	c a r	SE	f	SE		
27	f a r & t [5]	SE	f	SE		
28	f	SE	f	SE		
29	f	SE	f a r h & t	SE		
30	f	SE	f	NW		

1 Reference: Coues, Volume III, pages 1279-80, 1296-97; Moulton, Volume 8, pages 68-74; Thwaites, Volume 6, Part II, pages 218-220.

2 River rise and fall observations were taken on the KoosKooskie River (Clearwater). As in previous observations of river rise and fall, the river was probably measured at the sunrise observation providing a 24-hour reading. These observations continued until they left for the Lolo Trail on June 10, 1806.

3 They left the river valley at this point to begin their journey towards the Bitterroot Mountains. This ends observations along the Clearwater River.

4 Clark's Journal Codex M lists this weather data as "f."

5 Clark's Journal Codex M lists this weather data as "f a r."

July 1806

Lewis Entries [1] [2]

Day of the Month	State of the Weather at Sunrise	Wind at Sunrise	State of the Weather at 4 PM	Wind at 4 PM
	c a f		f	
1	f	NW	f	NW
2	f	SE	f	SE
3	f	SE	f	NW
4	f	SE	f	NW
5	f	NE	f	SW
6	c a r t & l	NE	c a f & r	SW
7	f	SW	f	W
8	c a r	SW	r	W
9	f a r	NE	f	NE
10	f	NW	f	W
11	f	NW	f	NW
12	f	NW	f	NW
13	f	NE	f	NE
14	f	SW	f	SW
15	f	SW	f	E
16	f a t l	SW	f	SW
17	f	SW	f	SW
18	f	SW	f	NE
19	f	SE	f	NE
20	f	E	f	N
21	f	N	f	NE
22	f a t & l	SE	f	NE
23	c a r t & l	SE	c a r t l	SW
24	c a r	NW	c a r	NW
25	c a r	NW	f	NW
26	f	N	f	NW
27	f a r t & l	NW	c a f h r t & l	SW
28	r a r t & l	NE	c a r	NE
29	r a r	SW	r	NE
30	c a r	NE	r	NE
31		NE		NW

1 Reference: Moulton, Volume 8, pages 142-144; Thwaites, Volume 6, Part II, pages 221-222.

2 Lewis's weather entries are separate from Clark's from July through August 12, as the two leaders went on separate trails before coming back together on the Missouri in August. Lewis takes his party which includes Sergeant Gass to the White Bear Island Camp near the Great Falls of the Missouri. There Lewis takes a smaller contingent to scout the Marias River.

July 1806

Clark Entries [1] [2]

Day of the Month	Aspect of the Weather at Sunrise	Wind at Sunrise	Weather at 4 PM	Wind at 4 PM
1	c a f	NW	f	NW
2	f	SE	f	NW
3	f	SE	f	SW
4	f	SW	f	SW
5	f	NE	f	SW
6	f	SW	c a r t & l	SW
7	c a r	W	f a r	SW by W
8	f a r	W	f	SW
9	c	SW	f	SW
10	f	SE	f	SW
11	f	SE	f	NNE
12	f	SE	f	NW
13	f	SSE	f	NE
14	f	NW	f	NW
15	f	SE by E	f	NE
16	c	NE	c	NE
17	f a r h t & l	SE	f	SW
18	f	SW	f	SE
19	f	NW	f	SE
20	f	NE	f	NE
21	f	NE	c	NE
22	f a t l & r	NE	c	NE
23	f	NE	c	SE
24	f	SW	r	SW
25	c	E	c a r	SW
26	c	SSW	f a r	NW
27	f	NE	f	SW
28	c a f r	NE	f	NW
29	c a r t & l	NE	f	N
30	f a r t l	NW	f a r	SE
31	f	NW	c a r	NE

1 Reference: Coues, Volume III, pages 1280, 1297-98; Moulton, Volume 8, pages 262-267; Thwaites, Volume 6, Part II, pages 223-226.

2 Clark takes the rest of the party up the Bitterroot Valley towards Camp Fortunate to pick the cache of goods left the last year. From there, the party returns to the Three Forks of the Missouri. Clark then splits the party and Sergeant Ordway proceeds down the Missouri with various specimens and the canoes to meet up with Sergeant Gass and assist in portaging the Great Falls of the Missouri. Clark takes a smaller contingent over Bozeman Pass and explore the Yellowstone River back to the Missouri.

August 1806

Lewis Entries [1] [2]

Day of the Month	Aspect of the Weather at Sunrise	Wind at Sunrise	Weather at Sunrise	Wind at Sunrise
1	r a r	NE	r a r	NW
2	f a r	NW	f	NW
3	f	SE	f	SE
4	f	SE	f	SE
5	c a f	NW	f	SE
6	f a r t & l	NE	f	NE
7	r a r	NE	c a r	NE
8	f	NE	f	NE
9	f	NE	f	SE
10	f	NE	c a r	NE
11	f	NE	f	NW
12	f	NW	-	-
13	* [3]	* [3]	* [3]	* [3]

1 Reference: Moulton, Volume 8, pages 159-160; Thwaites, Volume 6, Part II, pages 222-223.

2 Lewis's weather entries are separate from Clark's from July through August 12, as the two leaders went on separate trails before coming back together on the Missouri in August.

3 Lewis' weather table "apparently ceased keeping it after his reunion with Clark on August 12, as with his other journal-keeping, due to the wound he received on the eleventh." Moulton, Volume 8, page 160.

August 1806

Clark Entries [1]

Day of the Month	State of the Weather at Sunrise	Wind at Sunrise	State of the Weather at 4 PM	Wind at 4 PM	Rise [2] or Fall	Feet ' [2] Inches "
1	c a r	NW	r	N	R	5 ½"
2	c a r	N	f a r	N	R	3"
3	f	SW	f	SW	R	2 1/4"
4	-	NW	f	NE	F [3]	6 ½ " [3]
5	f	NE	f	NE	F	7"
6	c a r t & l	SW	f	NE	F	2 ½"
7	r	NE	c a r	N	F	2 ½"
8	f	N	f	NW	F	2"
9	f	NE	f	NE	F	1 1/4"
10	f	E	c	E	F	3/4"
11	f	NW	f	NW	F	2"
12	f	SW	c	SW	F	2 1/4"
13	f a r	SW	f	SW	F	2 ½"
14	f	NE	f	SW	F	3 ½"
15	f	NW	f	NW	F	2"
16	f	NW	f	NW	F	3 ½"
17	c	SE	c	SE	-	-
18	c a r	SE	f	SE	F	1 1/2"
19	t l & r	SE	c	SE	F	3/4"
20	c a t l & r	SW	f	NW	F	1 1/4"
21	f	SE	f	NW	F	2 ½"
22	c a r	SW	f	SE	F	4"
23	c	SE	r	NW	F	1 1/2"
24	f	NE	f	NW	F	2"
25	f	SW	f	NW	F	1 1/2"
26	f	SE	f	SE	F	3/4"
27	f	SE	f	SE	F	1 1/4"
28	f	SE	f	NW	-	-
29	c	NW	f a r	SE	F [4]	½" [4]
30	c a r	SE	f	SE	-	-
31	c a r t & l & w	SE	c a r	SE	-	-

1 Reference: Coues, Volume III, pages 1280-81, 1298; Moulton, Volume 8, pages 333-336; Thwaites, Volume 6, Part II, pages 226-228.

2 Clark began Yellowstone River rise and fall observations on this date. The data usually is not for a 24-hour period unless they are encamped. In most cases, when Clark's party stopped for the evening, he followed Lewis' habit from previous journal entries, placing a mark and measured the next morning. Thus many observations were only 8 to 10 hour long.

3 River observations are now on the Missouri River following the same technique noted in Footnote #2 above.

4 This is the final entry for river rise and fall data for the Missouri River. No other river data is taken or recorded for the rest of the return trip to St. Louis.

September 1806

Clark Entries[1]

Day of the Month	Aspect of the Weather at Sunrise	Wind at Sunrise	Aspect of the Weather at 4 PM	Wind at 4 PM
1	fog	SE	f a r	SE
2	f	SE	f	SE
3	f	SW	f	SW
4	f a r t & l	SE	f	SE
5	f	SE	c	SW
6	c	SE	f	SE
7	f	SE	f	SE
8	f	SE	f	SE
9	f	SE	f	SE
10	f	SE	f	SE
11	c a r	SE	f a r	SE
12	f	SE	c a r	SE
13	f	SE	f	SE
14	f	SE	c	SE
15	f	SE	f	SE
16	f	SE	f	SE
17	f	SE	f	SE
18	f	SE	c	SE
19	f	SE	f	SE
20	f	NE	f	SE
21	c a r	SE	c	SE
22	r a t l & r	S	c a r	S
23	c & r	NE	c a r	NE
24	r	-	c a r	-
25	c	NE	f	-
26	f	SE	f	SE
27	f	NE	f	SE
28	f	SE	f	SE
29	f	S	f	SE
30	f	SE	f [2]	-

1 Reference: Coues, Volume III, page 1298; Moulton, Volume 8, pages 373-375; Thwaites, Volume 6, Part II, pages 228-229.

2 This is the last entry of weather, water or climate data for the Lewis and Clark Expedition in the Weather Diary.

Appendix B

President Thomas Jefferson's Confidential Letter to Congress

Confidential. [January 18, 1803]
Gentlemen of the Senate, and of the House of Representatives:

As the continuance of the act for establishing trading houses with the Indian tribes will be under the consideration of the Legislature at its present session, I think it my duty to communicate the views which have guided me in the execution of that act, in order that you may decide on the policy of continuing it, in the present or any other form, or discontinue it altogether, if that shall, on the whole, seem most for the public good.

The Indian tribes residing within the limits of the United States, have, for a considerable time, been growing more and more uneasy at the constant diminution of the territory they occupy, although effected by their own voluntary sales: and the policy has long been gaining strength with them, of refusing absolutely all further sale, on any conditions; insomuch that, at this time, it hazards their friendship, and excites dangerous jealousies and perturbations in their minds to make any overture for the purchase of the smallest portions of their land. A very few tribes only are not yet obstinately in these dispositions. In order peaceably to counteract this policy of theirs, and to provide an extension of territory which the rapid increase of our numbers will call for, two measures are deemed expedient.

First: to encourage them to abandon hunting, to apply to the raising stock, to agriculture and domestic manufacture, and thereby prove to themselves that less land and labor will maintain them in this, better than in their former mode of living. The extensive forests necessary in the hunting life, will then become useless, and they will see advantage in exchanging them for the means of improving their farms, and of increasing their domestic comforts.

Secondly: to multiply trading houses among them, and place within their reach those things which will contribute more to their domestic comfort, than the possession of extensive, but uncultivated wilds. Experience and reflection will develop to them the wisdom of exchanging what they can spare and we want, for what we can spare and they want. In leading them to agriculture, to manufactures, and civilization; in bringing together their and our settlements, and in preparing them ultimately to participate in the benefits of our governments, I trust and believe we are acting for their greatest good. At these trading houses we have pursued the principles of the act of Congress, which directs that the commerce shall be carried on liberally, and requires only that the capital stock shall not be diminished. We consequently

undersell private traders, foreign and domestic, drive them from the competition; and thus, with the good will of the Indians, rid ourselves of a description of men who are constantly endeavoring to excite in the Indian mind suspicions, fears, and irritations towards us. A letter now enclosed, shows the effect of our competition on the operations of the traders, while the Indians, perceiving the advantage of purchasing from us, are soliciting generally, our establishment of trading houses among them. In one quarter this is particularly interesting. The Legislature, reflecting on the late occurrences on the Mississippi, must be sensible how desirable it is to possess a respectable breadth of country on that river, from our Southern limit to the Illinois at least; so that we may present as firm a front on that as on our Eastern border. We possess what is below the Yazoo, and can probably acquire a certain breadth from the Illinois and Wabash to the Ohio; but between the Ohio and Yazoo, the country all belongs to the Chickasaws, friendly tribe within our limits, but the most decided against the alienation of lands. The portion of their country most important for us is exactly that which they do not inhabit. Their settlements are not on the Mississippi, but in the interior country. They have lately shown a desire to become agricultural; and this leads to the desire of buying implements and comforts. In the strengthening and gratifying of these wants, I see the only prospect of planting on the Mississippi itself, the means of its own safety. Duty has required me to submit these views to the judgment of the Legislature; but as their disclosure might embarrass and defeat their effect, they are committed to the special confidence of the two Houses.

While the extension of the public commerce among the Indian tribes, may deprive of that source of profit such of our citizens as are engaged in it, it might be worthy the attention of Congress, in their care of individual as well as of the general interest, to point, in another direction, the enterprise of these citizens, as profitably for themselves, and more usefully for the public. The river Missouri, and the Indians inhabiting it, are not as well known as is rendered desirable by their connexion with the Mississippi, and consequently with us. It is, however, understood, that the country on that river is inhabited by numerous tribes, who furnish great supplies of furs and peltry to the trade of another nation, carried on in a high latitude, through an infinite number of portages and lakes, shut up by ice through a long season. The commerce on that line could bear no competition with that of the Missouri, traversing a moderate climate, offering according to the best accounts, a continued navigation from its source, and possibly with a single portage, from the Western Ocean, and finding to the Atlantic a choice of channels through the Illinois or Wabash, the lakes and Hudson, through the Ohio and Susquehanna, or Potomac or James rivers, and through the Tennessee and Savannah, rivers. An intelligent officer, with ten or twelve chosen men, fit for the enterprise, and willing to undertake it, taken from our posts, where they may be spared without inconvenience, might explore the whole line, even to the Western Ocean, have conferences with the natives on the subject of commercial intercourse, get admission among them for our traders, as others are admitted, agree on convenient deposits for an interchange of articles, and return with the information acquired, in the course of two summers. Their arms and accoutrements, some instruments of observation, and light and cheap presents for the Indians, would be all the apparatus they could carry, and with an expectation of a soldier's portion of land on their return, would constitute the whole expense. Their pay would be going on, whether here or there. While other civilized nations have encountered great expense to enlarge the boundaries of knowledge by undertaking voyages of discovery, and for other literary

purposes, in various parts and directions, our nation seems to owe to the same object, as well as to its own interests, to explore this, the only line of easy communication across the continent, and so directly traversing our own part of it. The interests of commerce place the principal object within the constitutional powers and care of Congress, and that it should incidentally advance the geographical knowledge of our own continent, cannot be but an additional gratification. The nation claiming the territory, regarding this as a literary pursuit, which is in the habit of permitting within its dominions, would not be disposed to view it with jealousy, even if the expiring state of its interests there did not render it a matter of indifference. The appropriation of $2,500, "for the purpose of extending the external commerce of the United States," while understood and considered by the Executive as giving the legislative sanction, would cover the undertaking from notice, and prevent the obstructions which interested individuals might otherwise previously prepare in its way."

TH: JEFFERSON
Jan. 18. 1803.

Source: (Richardson 1897: 340-342; Jackson, 1978: 10-13)

Appendix C

Lewis' Expedition Requirements List

Mathematical Instruments

1	Hadley's Quadrant
1	Mariner's Compas & 2 pole chain
1	Sett of plotting instruments
3	Thermometers
1	Cheap portable Microscope
1	Pocket Compass
1	brass Scale one foot in length
6	Magnetic needles in small straight silver or brass cases opening on the side with hinges.
1	Instrument for measuring made of tape with feet & inches mark'd on it,...
2	Hydrometers
1	Theodolite
1	Sett of planespheres
2	Artificial Horizons
1	Patent log
6	papers of Ink powder
4	Metal Pens brass or silver
1	Set of Small Slates & pencils
2	Creyons
	Sealing wax one bundle
1	Miller's edition of Lineus in 2 Vol:
	Books
	Maps
	Charts

	Blank Vocabularies
	Writing paper
1	Pair large brass money scales with two setts of weights . . .

Arms & Accouterments

15	Rifle
15	Powder Horns & pouches complete
15	Pairs of Bullet Moulds
15	do. Of Wipers or Gun worms
15	Ball Screws
24	Pipe Tomahawks
24	large knives
	Extra parts of Locks & tools for repairing arms
15	Gun Slings
500	best Flints

Ammunition

200	Lbs. Best rifle powder
400	lbs. Lead

Clothing

15	3 pt. Blankets
15	Watch Coats with Hoods & belts
15	Woolen Overalls
15	Rifle Frocks of waterproof Cloth if possible
30	Pairs of Socks or half Stockings
20	Fatigue Frocks or hinting shirts
30	Shirts of Strong linnen
30	yds. Common flannel.

Camp Equipage

6	Copper kettles (1 of 5 Gallons, 1 of 3, 2 of 2, & 2 of 1)
35	falling Axes.
4	Drawing Knives, short & strong

2	Augers of the patent kind . . .
1	Small permanent Vice
1	Hand Vice
36	Gimblets assorted
24	Files do.
12	Chisels do.
10	Nails do.
2	Steel plate hand saws
2	Vials of Phosforus
1	do. Of Phosforus made of allum & sugar
4	Groce fishing Hooks assorted
12	Bunches of Drum Line
2	Foot Adzes
12	Bunches of Small cord
2	Pick Axes
3	Coils of rope
2	Spades
12	Bunches Small fishing line assorted
1	lb. Turkey or Oil Stone
1	Iron Mill for Grinding Corn
20	yds. Oil linnen for wrapping & securing Articles
10	yds do. do. Of thicker quality for covering and lining boxes. &c
40	yds Do. Do. To form two half faced Tents or Shelters . . .
4	Tin blowing Trumpets
2	hand or spiral spring Steelyards
20	yds Strong Oznaburgs
24	Iron Spoons
24	Pint Tin Cups (without handles)
30	Steels for striking or making fire
100	Flints for do. do. do.
2	Frows

6 Saddlers large Needles

6 Do. Large Awls

Muscatoe Curtains

2 patent chamber lamps & wicks

15 Oil Cloth Bags for securing provision

1 Sea Grass Hammock

Provisions and Means of Subsistence

150 lbs. Portable Soup.

3 bushels of Allum or Rock Salt

Spicies assorted

6 Kegs of 5 Gallons each making 30 Gallons of rectified spirits such as is used for the Indian trade

6 Kegs bound with iron Hoops

Indian Presents

5 lbs. White Wampum

5 lbs. White Glass Beads mostly small

20 lbs. Red Do. Do. Assorted

5 lbs. Yellow or Orange Do. Do. Assorted

30 Calico Shirts

12 Pieces of East India muslin Hanckerchiefs striped or check'd with brilliant Colours.

12 Red Silk Hanckerchiefs

144 Small cheap looking Glasses

100 Burning Glasses

4 Vials of Phosforus

288 Steels for striking fire

144 Small cheap Scizors

20 Pair large Do.

12 Groces Needles Assorted No. 1 to 8 Common points

12 Groces Do. Assorted with points for sewing leather

288 Common brass thimbles - part W. office

10 lbs. Sewing Thread assorted

24 Hanks Sewing Silk

8	lbs. Red Lead
2	lbs. Vermillion - at War Office
288	Knives Small such as are generally used for the Indian trade, with fix'd blades & handles inlaid with brass
36	Large knives
36	Pipe Tomahawks - at H. Ferry
12	lbs. Brass wire Assorted
12	lbs. Iron do. Do. generally large
6	Belts of narrow Ribbons colours assorted
50	lbs. Spun Tobacco.
20	Small falling axes to be obtained in Tennessee
40	fish Griggs such as the Indians use with a single barbed point - at Harper's ferry
3	Groce fishing Hooks assorted
3	Groce Mockerson awls assorted
50	lbs. Powder secured in a Keg covered with oil Cloth
24	Belts of Worsted feiret or Gartering Colours brilliant and Assorted
15	Sheets of Copper Cut into strips of an inch in width & a foot long
20	Sheets of Tin
12	lbs. Strips of Sheet iron 1 In. wide 1 foot long
1	Pc. Red Cloth second quality
1	Nest of 8 or 9 small copper kettles
100	Block-tin rings cheap kind ornamented with Colour'd Glass or Mock-Stone
2	Groces of brass Curtain Rings & sufficently large for the Finger
1	Groce Cast Iron Combs
18	Cheap brass Combs
24	Blankets.
12	Arm Bands Silver at War Office
12	Wrist do. do. Do.
36	Ear Trinkets Do. Part do.
6	Groces Drops of Do. Part Do.
4	doz Rings for Fingers of do.
4	Groces Broaches of do.

12 Small Medals do.

Means of Transportation

1 Keeled Boat light strong at least 60 feet in length her burthen equal to 8 Tons

1 Iron frame of Canoe 40 feet long

1 Large Wooden Canoe

12 Spikes for Setting-Poles

4 Boat Hooks & points Complete

2 Chains & Pad-Locks for confining the Boat & Canoes &c.

Medicine

15 lbs. Best powder's Bark

10 lbs. Epsom or Glauber Salts

4 oz. Calomel

12 oz. Opium

_ oz. Tarter emetic

8 oz. Borax

4 oz. Powder'd Ipecacuana

8 oz. Powder Jalap

8 oz. Powdered Rhubarb

6 Best lancets

2 oz. White Vitriol

4 oz. Lacteaum Saturni

4 Pewter Penis syringes

1 Flour of Sulphur

3 Clyster pipes

4 oz. Turlingtons Balsam

2 lbs. Yellow Bascilicum

2 Sticks of Symple Diachylon

1 lb. Blistering Ointments

2 lbs. Nitre

2 lbs. Coperas

Materials for making up the Various Articles into portable Packs

30 Sheep skins taken off the Animal as perfectly whole aspossible, without being split on the belly as usual and dress'd only with lime to free them from the wool; or otherwise about the same quantity of Oil Cloth bags well painted

Raw hide for pack strings

Dress'd letter for Hoppus-Straps

Other packing

Do.	=	ditto
&c.	=	etcetera
Oznaburgs	=	strong cloth
Worsted feiret [ferret]	=	woven wool tape, used for embellishment and trade
Hoppus	=	might possible refer to an Indian term for knapsack

Source: (Jackson, 1978: 69-75)

Appendix D

President Jefferson's Expedition Instructions to Meriwether Lewis

[20 June 1803]

"To Meriwether Lewis, esquire, Captain of the 1st regiment of infantry of the United States of America.

"Your situation as Secretary of the President of the United States has made you acquainted with the objects of my confidential message of Jan. 18, 1803, to the legislature. You have seen the act they passed, which, tho' expressed in general terms, was meant to sanction those objects, and you are appointed to carry them into execution.

"Instruments for ascertaining by celestial observations the geography of the country thro' which you will pass, have been already provided. Light articles for barter, & presents among the Indians, arms for your attendants, say for from 10 to 12 men, boats, tents, & other travelling apparatus, with ammunition, medicine, surgical instruments & provision you will have prepared with such aids as the Secretary at War can yield in his department; & from him also you will receive authority to engage among our troops, by voluntary agreement, the number of attendants above mentioned, over whom you, as their commanding officer are invested with all the powers the laws give in such a case.

"As your movements while within the limits of the U.S. will be better directed by occasional communications, adapted to circumstances as they arise, they will not be noticed here. What follows will respect your proceedings after your departure from the U.S.

"Your mission has been communicated to the Ministers here from France, Spain, & Great Britain, and through them to their governments: and such assurances given them as to it's objects as we trust will satisfy them. The country <*of Louisiana*> having been ceded by Spain to France,<*and possession by this time probably given,*> the passport you have from the Minister of France, the representative of the present sovereign of the country, will be a protection with all its subjects: and that from the Minister of England will entitle you to the friendly aid of any traders of that allegiance with whom you may happen to meet.

"The object of your mission is to explore the Missouri river, & such principal stream of it, as, by it's course & communication with the water of the Pacific ocean may offer the most direct & practicable water communication across this continent, for the purposes of commerce.

"Beginning at the mouth of the Missouri, you will take <*careful*> observations of latitude and longitude at all remarkable points on the river, & especially at the mouths of rivers, at rapids, at islands & other places & objects distinguished by

such natural marks & characters of a durable kind, as that they may with certainty be recognized hereafter. The courses of the river between these points of observation may be supplied by the compass, the log-line & by time, corrected by the observations themselves. The variations of the compass too, in different places should be noticed.

"The interesting points of the portage between the heads of the Missouri & the water offering the best communication with the Pacific ocean should be fixed by observation, & the course of that water to the ocean, in the same manner as that of the Missouri.

"Your observations are to be taken with great pains & accuracy to be entered distinctly, & intelligibly for others as well as yourself, to comprehend all the elements necessary, with the aid of the usual tables to fix the latitude & longitude of the places at which they were taken, & are to be rendered to the war office, for the purpose of having the calculations made concurrently by proper persons within the U.S. Several copies of these as well as of your other notes, should be made at leisure times, & put into the care of the most trustworthy of your attendants, to guard by multiplying them against the accidental losses to which they will be exposed. A further guard would be that one of these copies be written on the paper of the birch, as less liable to injury from damp than common paper.

"The commerce which may be carried on with the people inhabiting the line you will pursue, renders a knolege of these people important. You will therefore endeavor to make yourself acquainted, as far as a diligent pursuit of your journey shall admit, with the names of the nations & their numbers;

the extent & limits of their possessions;
their relations with other tribes or nations;
their language, traditions, monuments;
their ordinary occupations in agriculture, fishing, hunting, war, arts, & the implements for these;
their food, clothing, & domestic accommodations;
the diseases prevalent among them, & the remedies they use;
moral and physical circumstance which distinguish them from the tribes they know;
peculiarities in their laws, customs & dispositions;
and articles of commerce they may need or furnish, & to what extent.

"And considering the interest which every nation has in extending & strengthening the authority of reason & justice among the people around them, it will be useful to acquire what knolege you can of the state of morality, religion & information among them, as it may better enable those who endeavor to civilize & instruct them, to adapt their measures to the existing notions & practises of those on whom they are to operate.

"Other objects worthy of notice will be

the soil & face of the country, it's growth & vegetable productions, especially those not of the U.S.
the animals of the country generally, & especially those not known in the U.S. the remains & accounts of any which may be deemed rare or extinct;
the mineral productions of every kind; but more particularly metals, limestone, pit coal & saltpetre; salines & mineral waters, noting the temperature of the last & such circumstances as may indicate their character;

volcanic appearances; climate as characterized by the thermometer, by the proportion of rainy, cloudy & clear days, by lightening, hail, snow, ice, by the access & recess of frost, by the winds, prevailing at different seasons, the dates at which particular plants put forth or lose their flowers, or leaf, times of appearance of particular birds, reptiles or insects.

"Altho' your route will be along the channel of the Missouri, yet you will endeavor to inform yourself, by inquiry, of the character and extent of the country watered by its branches, & especially on it's Southern side. The North river or Rio Bravo which runs into the gulph of Mexico, and the North river, or Rio colorado which runs into the gulph of California, are understood to be the principal streams heading opposite to the waters of the Missouri, and running Southwardly. Whether the dividing grounds between the Missouri & them are mountains or flatlands, what are their distance from the Missouri, the character of the intermediate country, & the people inhabiting it, are worthy of particular enquiry. The Northern waters of the Missouri are less to be enquired after, because they have been ascertained to a considerable degree, and are still in a course of ascertainment by English traders & travellers. But if you can learn anything certain of the most Northern source of the Mississippi, & of it's position relative to the lake of the woods, it will be interesting to us.

<*Two copies of your notes at least & as many more as leisure will admit, should be made & confided to the care of the most trusty individuals of your attendants.*> Some account too of the path of the Canadian traders from the Mississippi, at the mouth of the Ouisconsing river, to where it strikes the Missouri, and of the soil and rivers in it's course, is desirable.

"In all your intercourse with the natives treat them in the most friendly & conciliatory manner which their own conduct will admit; allay all jealousies as to the object of your journey, satisfy them of it's innocence, make them acquainted with the position, extent, character, peaceable & commercial dispositions of the U.S., of our wish to be neighborly, friendly & useful to them, & of our dispositions to a commercial intercourse with them; confer with them on the points most convenient as mutual emporiums, & the articles of most desirable interchange for them & us. If a few of their influential chiefs, within practicable distance, wish to visit us, arrange such a visit with them, and furnish them with authority to call on our officers, on their entering the U.S. to have them conveyed to this place at the public expense. If any of them should wish to have some of their young people brought up with us, & taught such arts as may be useful to them, we will receive, instruct & take care of them. Such a mission, whether of influential chiefs, or of young people, would give some security to your own party. Carry with you some matter of the kine pox, inform those of them with whom you may be, of it's efficacy as a preservative from the small pox; and instruct & encourage them in the use of it. This may be especially done wherever you may winter.

"As it is impossible for us to foresee in what manner you will be received by those people, whether with hospitality or hostility, so is it impossible to prescribe the exact degree of perseverance with which you are to pursue your journey. We value too much the lives of citizens to offer them to probably destruction. Your numbers will be sufficient to secure you against the unauthorised opposition of individuals, or of small parties: but if a superior force, authorised or not authorised, by a nation, should be arrayed against your further passage, & inflexibly determined to arrest it, you must decline it's further pursuit, and return. In the loss of yourselves, we should lose also the information you will have acquired. By returning safely with that, you may enable us to renew the essay with better calculated means. To your own discretion therefore must be left the degree of danger you may risk, & the point at which you should decline, only saying we wish you to err on the side of your safety, & to bring back your party safe, even if it be with less information.

"As far up the Missouri as the white settlements extend, an intercourse will probably be found to exist between them and the Spanish posts at St. Louis, opposite Cahokia, or Ste. Genevieve opposite Kaskaskia. From still farther up the river, the traders may furnish a conveyance for letters. Beyond that you may perhaps be able to engage Indians to bring letters for the government to Cahokia or Kaskaskia, on promising that they shall there receive such special compensation as you shall have stipulated with them. Avail yourself of these means to communicate to us, at seasonable intervals, a copy of your journal, notes & observations of every kind, putting into cypher whatever might do injury if betrayed.

"Should you reach the Pacific ocean, inform yourself of the circumstances which may decide whether the furs of those parts may not be collected as advantageously at the head of the Missouri (convenient as is supposed to the waters of the Colorado & Oregon or Columbia) as at Nootka sound or any other point of that coast; & that trade be consequently conducted through the Missouri & U.S. more beneficially than by the circumnavigation now practised.

"On your arrival on that coast, endeavor to learn if there be any port within your reach frequented by the sea-vessels of any nation, and to send two of your trusty people back by sea, in such way as <*they shall judge*> shall appear practicable, with a copy of your notes. And should you be of opinion that the return of your party by the way they went will be eminently dangerous, then ship the whole, & return by sea by way of Cape Horn or the Cape of Good Hope, as you shall be able. As you will be without money, clothes or provisions, you must endeavor to use the credit of the U.S. to obtain them; for which purpose open letters of credit shall be furnished you authorizing you to draw on the Executive of the U.S. or any of its officers in any part of the world, in which draughts can be disposed of, and to apply with our recommendations to the consuls, agents, merchants or citizens of any nation with which we have intercourse, assuring them in our name that any aids they may furnish you shall be honorably repaid, and on demand. Our consuls Thomas Howes at Batavia in Java, William Buchanan of the Isles of France and Bourbon, & John Elmslie at the Cape of Good Hope will be able to supply your necessities by draughts on us.

"Should you find it safe to return by the way you go, after sending two of your party round by sea, or with your whole party, if no conveyance by sea can be found, do so; making such observations on your return as may serve to supply, correct or confirm those made on your outward journey.

"On re-entering the U.S. and reaching a place of safety, discharge any of your attendants who may desire & deserve it: procuring for them immediate paiment of all arrears of pay & cloathing which may have incurred since their departure and assure them that they shall be recommended to the liberality of the legislature for the grant of a souldier's portion of land each, as proposed in my message to Congress: & repair yourself with your papers to the seat of government <*to which I have only to add my sincere prayer for your safe return*>.

"To provide, on the accident of your death, against anarchy, dispersion & the consequent danger to your party, and total failure of the enterprise, you are hereby authorised, by any instrument signed & written in your own hand, to name the person among them who shall succeed to the command on your decease, & by like instruments to change the nomination from time to time, as further experience of the characters accompanying you shall point out superior fitness: and all the powers & authorities given to yourself are, in the event of your death, transferred to & vested in the successor so named, with further power to him, & his successors in like manner to name each his successor, who, on the death of his predecessor shall be invested with all the powers & authorities given to yourself.

Given under my hand at the city of Washington, this 20th. day of June 1803.

Th:Jefferson, Pr. U.S. of America.

Source: (Jackson, 1978: 61-66)

Appendix E

Meriwether Lewis' letter to President Jefferson upon arrival back in St. Louis

To Thomas Jefferson, President of the United States

Sir St. Louis, September 23rd 1806

It is with pleasure that I announce to you the safe arrival of myself and party at 12 OClk. today at this place with out papers and baggage. In obedience to your orders we have penitrated the Continent of North America to the Pacific Ocean, and sufficiently explored the interior of the country to affirm with confidence that we have discovered the most practicable rout which does exist across the continent by means of the navigable branches of the Missouri and Columbia Rivers. Such is that by way of the Missouri to the foot of the rapids five miles below the great falls of the Missouri of that river a distance of 2575 miles, thence by land passing the Rocky Mountains to a navigable part of the Kooskooske 340; with the Kooskooske 73 mls. a South Easterly branch of the Columbia 154 miles and the latter river 413 mls. to the Pacific Ocean; making the total distance from the confluence of the Missouri and Mississippi to the discharge of the Columbia into the Pacific Ocean 3555 miles. The navigation of the Missouri may be deemed safe and good; it's difficulties arrise from it's falling banks, timber imbeded in the mud of it's channel, it's sand bars and steady rapidity of it's current, all which may be overcome with a great degree of certainty by taking the necessary precautions. The passage by land of 340 miles from the Missouri to the Kooskooske is the most formidable part of the tract proposed across the Continent; of this distance 200 miles is along a good road, and 140 over tremendious mountains which for 60 mls. are covered with eternal snows; however a passage over these mountains is practicable from the latter part of June to the last of September, and the cheep rate at which horses are to be obtained from the Indians of the Rocky Mountains and West of them, reduces the expences of transportation over this portage to a mere trifle. The navigation of the Kooskooske, the South East branch of the Columbia itself is safe and good from the 1st of April to the middle of August, by making three portages on the latter; the first of which in decending is that of 1200 paces at the great falls of the Columbia, 261 mls. from the Ocean, the second of two miles at the long narrows six miles below the falls, and the 3rd also of 2 miles a the great rapids 65 miles still lower down. The tides flow up the Columbia 183 miles, or within seven miles of the great rapids, thus far large sloops might ascend in safety, and vessels of 300 tons burthen could with equal safety reach the entrance of the river Multnomah, a large Southern branch of the Columbia, which taking it's rise on the confines of Mexico with the Callarado and Apostles river, discharges itself into the Columbia 125 miles from it's mouth. From the head of tide water to the foot of the long narrows the Columbia could be most advantageously navigated with

large batteauxs, and from thence upwards by perogues. The Missouri possesses sufficient debth of water as far as is specifyed for boats of 15 tons burthern, but those of smaller capacity are to be prefered.

We view this passage across the Continent as affording immence advantages to the fur trade, but fear that the advantages which it offers as a communication for the productions of the East Indies to the United States and thence to Europe will never be found equal on an extensive scale to that by way of the Cap of Good hope; still we believe that many articles not bulky brittle nor of a very perishable nature may be conveyed to the United States by this rout with more facility and at less expence than by that at present practiced.

The Missouri and all it's branches from the Chyenne upwards abound more in beaver and Common Otter, than any other streams on earth, particularly that proportion of them lying within the Rocky Mountains. The furs of all this immence tract of country including such as may be collected on the upper portion of the River St. Peters, Red river and the Assinniboin with the immence country watered by the Columbia, may be conveyed to the mouth of the Columbia by the 1st of August in each year and from thence be shiped to, and arrive in Canton earlier than the furs at present shiped from Montreal annually arrive in London. The British N. West Company of Canada were they permitted by the United States might also convey their furs collected in the Athabaske, on the Saskashawan, and South and West of Lake Winnipic by that rout within the period before mentioned. Thus the productions [of] nine tenths of the most valuable fur country of America could be conveyed by the rout proposed to the East Indies.

In the infancy of the trade across the continent, or during the period that the trading establishments shall be confined to the Missouri and it's branches, the men employed in this trade will be compelled to convey the furs collected in that quarter as low on the Columbia as tide water, in which case they could not return to the falls of the Missouri untill about the 1st of October, which would be so late in the season that there would be considerable danger of the river being obstructed by ice before they could reach this place and consequently that the comodities brought from the East indies would be detained untill the following spring; but this difficulty will at once vanish when establishments are also made on the Columbia, and a sufficient number of men employed at them to convey annually the productions of the East indies to the upper establishment on the Kooskooske, and there exchange them with the men of the Missouri for their furs, in the begining of July. By this means the furs not only of the Missouri but those also of the Columbia may be shiped to the East indies by the season before mentioned, and the comodities of the East indies arrive at St. Louis or the mouth of the Ohio by the last of September in each year.

Although the Columbia dose not as much as the Missouri abound in beaver and Otter, yet it is by no means despicable in this rispect, and would furnish a valuable fur trade distinct from any other consideration in addition to the otter and beaver which it could furnish. There might be collected considerable quantities of the skins of three species of bear affording a great variety of colours and of superior delicacy, those also of the tyger cat, several species of fox, martin and several others of an inferior class of furs, besides the valuable Sea Otter of the coast.

If the government will only aid, even in a very limited manner, the enterprise of her Citizens I am fully convinced that we shal shortly derive the benifits of a most lucrative trade from this source, and that in the course of ten or twelve years a tour across the Continent by the rout mentioned will be undertaken by individuals with as little concern as a voyage across the Atlantic is a present.

The British N. West Company of Canada has for several years, carried on a partial trade with the Minnetares Ahwayhaways and Mandans on the Missouri from their establishments on the Assinniboin at the entrance of Mouse river; at present I have good reason for believing that they intend shortly to form an establishment near those nations with a view to engroce the fur trade of the Missouri. The known enterprize and resources of this Company, latterly strengthened by an union with their powerfull rival the X.Y. Company renders them formidable in that distant part of the continent to all other traders; and in my opinion if we are to regard the trade of the Missouri as an object of importance to the United States; the strides of this Company towards the Missouri cannot be too vigilantly watched nor too firmly and speedily opposed by our government. The embarrasments under which the navigation of the Missouri at present labours from the unfriendly dispositions of the kancez, the several bands of Tetons, Assinniboins and those tribes that resort to the British establishments on the Saskashawan is also a subject which requries the earliest attention of our government. As I shall shortly be with you I have deemed it unnecessary here to detail the several ideas which have presented themselves to my mind on those subjects, more especially when I consider that a thorough knowledge of the geography of the country is absolutely necessary to their being understood and leasure has not yet permited us to make but one general map of the country which I am unwilling to wrisk by the Mail.

As a sketch of the most prominent features of our perigrination since we left the Mandans may not be uninterseting, I shall indeavour to give it to you by way of letter from this place, where I shall necessarily be detained several days in order to settle with and discharge the men who accompanyed me on the voyage as well as to prepare for my rout to the City of Washington.

We left Fort Clatsop where we wintered near the entrance of the Columbia on the 27th of March last, and arrived at the foot of the Rocky mountains on the 10th of May where we were detained untill the 24th of June in consequence of the snow which rendered a passage over those Mountains impractiable untill that moment; had it not been for this detention I should ere this have joined you at Montichello. In my last communication to you from the Mandans I mentioned my intention of sending back a canoe with a small party from the Rocky Mountains; but on our arrival at the great falls of the Missouri on the 14th of June 1805, in view of that formidable snowey barrier, the discourageing difficulties which we had to encounter in making a portage of eighteen miles of our canoes and baggage around those falls were such that my friend Capt. Clark and myself conceived in inexpedient to reduce the party, lest by doing so we should lessen the ardor of those who remained and thus hazard the fate of the expedition, and therefore declined that measure, thinking it better that the government as well as our friends should for a moment fell some anxiety for our fate than to wrisk to much; experience has since proved the justice of our decision, for we have more than once owed our lives and the fate of the expedition

to our number which consisted of 31 men.

I have brought with me several skins of the Sea Otter, two skins of the native sheep of America, five skins and skelitons complete of the Bighorn or mountain ram, and a skin of the Mule deer beside the skins of several other quadrupeds and brids natvies of the countries through which we have passed. I have also preserved a pretty extensive collection of plants, and collected nine other vocabularies.

I have prevailed on the great Chief of the Mandan nation to accompany me to Washington; he is now with my frind and colligue Capt. Clark at this place, in good health and sperits, and very anxious to proceede.

With rispect to the exertions and services rendered by that esteemable man Capt. William Clark in the course of late voyage I cannot say too much; if sir any credit be due for the success of that ardous enterprize in which we have been mutually engaged, he is equally with myself entitled to your consideration and that of our common country.

The anxiety which I feel in returning once more to the bosom of my friends is a sufficient guarantee that no time will be unnecessarily expended in this quarter.

I have detained the post several hours for the purpose of making you this haisty communication. I hope that while I am pardoned for this detention of the mail, the situation in which I have been compelled to write will sufficiently apologize for having been this lcaonic.

The rout by which I purpose traveling fro hence to Washington is by way of Cahokia, Vincennes, Louisvill Ky., the Crab orchard, Abington, Fincastle, Stanton and Chorlottsville. Any letters directed to me at Louisville ten days after the receipt of this will most probably meet me at that place. I am very anxious to learn the state of my friends in Albermarle particularly whether my mother is yet living. I am with every sentiment of esteem Your Obt. And very Humble servent.

Meriwether Leiws Capt.
1st. U.S. Regt. Infty.

N.B. The whole of the party who accompanyed me form the Mandans have returned in good health, which is not, I assure you, to me one of the least pleasing considerations of the Voyage.

M.. L.

Source: (Jackson, 1978: 319-324)

Appendix F

William Clark's letter to his brother Jonathan or George Rogers upon the Expedition's arrival back in St. Louis

This letter was the first published in the United States describing the Expedition's return in the Frankfort, KY *Palladium* newspaper on October 9, 1806. As one would imagine, it was copied and spread throughout the nation as rapid as the means of the day would allow

Dear Brother St. Louis 23rd September 1806

We arrived at this place at 12 oClock today from the Pacific Ocian where we remained dureing the last winter near the entrance of the Columbia river. This station we left on the 27th of March last and should have reached St. Louis early in August had we not been detained by snow which bared our passage across the Rocky Mountains untill the 24th of June. In returning through those mountains we devided ourselves into several parties, disgressing from the rout by which we went out in order the more effectually to explore the Country and discover the most practicable rout which does exist across the Continent by way of the Missouri and Columbia rivers, in this we were completely successfull and have therefore no hesitation in declaring that such as nature has permited it we have discovered the best rout which does exist across the continent of North America in that direction. Such is that, by way of the Missouri to the foot of the rapids below the great falls of that river a distance of 2575 miles thence by land passing the Rocky Mountains to a navigable part of the Kooskooske 340. and with the Kooskooske 73 mls. Lewis's river 154 miles and the Columbia 413 miles to the Pacific Ocian makeing the total distance from the confluence of the Missouri and Mississippi to the discharge of the Columbia into the Pacific Ocean 3555 miles. The navegation of the Missouri may be deemed good; it's dificulties arise from it's falling banks, timber embeded in the mud of it's channel, it's sand bars and steady rapidity of it's current all which may be over come with a great degree of certainty by useing the necessary precautions. The passage by land of 340 miles from the Falls of the Missouri to the Kooskooske is the most formidable part of the tract proposed across the Continent. Of this distance 200 miles is along a good road, and 140 over tremendious Mountains which for 60 miles are covered with eternal snows. A passage over these mountains is however practicable from the latter part of June to the last of September and the cheap rate at which horses are to be obtained from the Indians of the Rocky Mountains and West of them reduce the expences of transportation over this portage to a mere trifle. The navigation of the Kooskooske,

the Lewis's river and the Columbia is safe and good from the 1st of April to the middle of August by makeing these portages on the latter river. The first of which in decending is that of 1200 paces at the Falls of the Columbia 261 miles up that river, the second of 2 miles at the long narrows 6 miles below the falls and the third also of 2 miles a the great rapids 65 miles still lower down. The tide flows up the Columbia 183 miles and within 7 miles of the great rapids. Large sloops may with safety ascend as high as tide water and Vessels of 300 tons burthen reach the entrance of the Multnomah River a large Southern branch of the Columbia, which takes it's rise on the confines of New Mexico with the Callarado and Apostles river, dischargeing itself into the Columbia 125 miles from it's entrance into the Pacific Ocian. I consider this tract across the continent emence advantage to the fur trade, as all the furs collected in 9/10ths of the most valuable furr country in America may be conveyed to the mouth of the Columbia and shiped from thence to East indies by the 1st of August in each year, and will of course reach Canton earlier than the furs which are annually exported from Montrall arive in Great Britain.

In our outward bound voyage we ascended to the foot of the rapids below the great falls of the Missouri where we arived on the 14th of June 1805. Not haveing met with any of the nativs of the Rocky Mountains we were of course ignorant of the passes by land which existed through those mountains to the Columbia river, and had we even known the rout we were destitute of horses which would have been indispensibly necessary to enable us to transport the requisit quantity of amunition and other stores to ensure the success of the remaining part of our voyage down the Columbia; we therefore deturmined to navigate the Missouri as far as it was practicable, or unless we met with some of the natives from whom we could obtain horses and information of the Country. Accordingly we undertook a most laborious portage at the falls of the Missouri of 18 miles which we effected with our Canoes and baggage by the 3rd of July. From hence ascending the Missouri we penetrated the Rocky Mountain at the distance of 71 miles above the upper part of the portage and penetrated as far as the three forks of that river a distance of 181 miles further; here the Missouri devides into three nearly equal branches at the Same point. The two largest branches are so nearly of the same dignity that we did not conceive that either of them could with propriety retain the name of the Missouri and therefore called these three streems Jefferson's Madisons and Gallitin's rivers. The confluence of those rivers is 2848 miles from the mouth of the Missouri by the meanders of that river. We arived at the three forks of the Missouri the 27th of July. Not haveing yet been so fortunate as to meet with the nativs altho' I had previously made several excurtions for that purpose, we were compelled still to continue our rout by water. The most northerly of the three forks, that to which we had given the name of Jeffersons river was deemed the most proper for our purpose and we accordingly ascended it 248 miles to the upper forks and it's extreem navigable point, makeing the total distance to which we had navigated the waters of the Missouri 3096 miles of which 429 lay within the Rocky Mountains. On the morning of the 17th of August 1805 I arrived a the forks of the Jeffersons river where I met Capt. Lewis who had previously penitrated with a party of three men to the waters of the Columbia discovered a band of the Shoshone Nation and had found means to induce thirty five of their chiefs and warriors to accompany him to that place. From these people we learned that the river on which they resided was not navagable and that a passage through the mountains in that direction was impracticable; being unwilling to confide in the unfavorable account of the natives it was concerted between Capt. Lewis and myself that one

of us should go forward immediately with a small party and explore the river while the other in the intirem would lay up the Canoes at that place and engage the nativs with their horses to assist in transporting our stores and baggage to their camp. Accordingly I set out the next day passed the deviding mountains between the waters of the Missouri and Columbia and decended the river which I since call the East fork of Lewis's river about 70 miles. Finding that the Indians account of the country in the direction of this river was correct I returned and joined Capt. Lewis on the 29th of August at the Shoshone camp excessively fatigued as you may suppose, haveing passed mountains almost inexcessable and compelled to subsist on berries dureing the greater part of my rout. We now purchased 27 horses of these indians and hired a guide who assured us that he could in 15 days take us to a large river in an open country west of these mountains by a rout some Distance to the North of the river on which they lived, and that by which the nativs west of the mountains visited the plains of the Missouri for the purpose of hunting the buffalow. Every preperation being made we set forward with our guide on the 31st of August through those tremendious mountains, in which we continued untill the 22nd of September before we reached the lower country beyond them; on our way we met with the Ootelachshoot a band of the Tuchapahs from whome we obtained axcession of seven horses and exchanged eight or ten others. This proved of infinite service to us as we were compelled to subsist on horse beef about Eight days before we reached the Kooskooske. Dureing our passage over those mountains we suffered every thing which hunger cold and fatigue could impose; nor did our difficulties with respect to provision cease on our arival at the Kooskooske for although the Pallotepallors a noumerous nation inhabiting that country were extremely hositable and for a fiew trifling articles furnish us with an abundance of roots and dryed salmon the food to which they were accustomed we found that we could not subsist on those articles and almost all of us grew sick on eating them. We were obliged therefore to have recourse to the flesh of horses and dogs as food to supply the dificiency of our guns which produced but little meat as game was scarce in the vicinity of our camp on the Kooskooske where we were compelled to remain in order to construct our perogues to decend the river. At this season the salmon are meagre and form but indifferent food. While we remained here I was my self sick for several days and my friend Capt. Lewis suffered a serious indesposition. Haveing completed four Perogues and a small canoe we gave our horses in charge to the Palletepallors untill we returned and on the 7th of October reimbarked for the Pacific Ocian. We decended by the rout I have already mentioned. The water of the river being low at this season we experienced much dificuelty in decending, we found it obstructed by a great number of dificuelt and dangerous rapids in passing of which our perogues several times filled and the men escaped narrowly with their lives. However the dificuelty does not exist in high water which happens within the periods which I have perviously mentioned.

We found the nativs extremely noumerous and generally friendly though we have on several occasion owed our lives and the fate of the expedition to our number which consisted of 31 men. On the 17th of November we reached the Ocian where various considerations induced us to spend the winter. We therefore searched for an eligible situation for that purpose and selected a spot on the South side of the little river called by the nativs the Netul which discharges itself at a small bar on the South Side of the Columbia and 14 miles within point Adams. Here we constructed some log houses and defended them with a common stockade work; this place

we called Fort Clatsop after a nation of that name who were our nearest neighbours. In this country we found an abundance of Elk on which we subsisted principally during the last winter. We left Fort Clatsop on the 27th of March. On our homeward bound voyage being much better acquinted with the Country we were enabled to take such precautions as in a great measure secured us from the want of provision at any time, and greatly lessoned our fatigues, when compared with those to which we were compelled to submit, in our Outward bound journey. We have not lost a man sence we left the Mandans a circumstance which I assure you is a pleasing consideration for me. As I shall shortly be with you and the post is now waiting I deem it unnecessary here to attempt minutely to detail the Occurencies of the last 18 month.
I am &c. Yr. affectunate brother,

Wm. Clark

Source: (Jackson, 1978: 325-329)


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