

Scientific Method & MET Manual Method



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Scientific Method & MET Manual Method

INTRODUCTION

A foundation principal of the Hugo Emigrant Trails Committee (HETC), Hugo Neighborhood Association & Historical Society (HNAHS), carrying out its mission in the winter-wet, mountainous terrain of Southwestern Oregon is to map emigrant trails through the use of the methods and procedures identified in the Oregon-California Trails Association's (OCTA) *Mapping Emigrant Trails (MET) Manual*.

The MET Manual is OCTA's program for locating, verifying, classifying and plotting emigrant trails based on standard research methods and procedures. The MET approach was evaluated by the HNA&HS and it found a sound systematic repeatable system of trail classification. In 2005 the MET Manual was adopted by the HNAHS when it formally created the HETC through its *Mapping Action Plan*.

Another key idea is the HETC's first tier of focus for locating *Trail* sites. This focus is through the use of accurate historical and modern government survey notes (i.e., the 1850s GLO survey notes and maps, 1850s donation land claim survey notes and maps, and modern local Josephine County surveys and maps).

With the relative scarcity of adequate diaries and/or journals for the Hugo region, the HNA&HS would not have formed the HETC in 2005 without the knowledge that these surveys were out there to be discovered, especially the GLO surveys. Significantly, the importance of the 1850s GLO surveys to the HETC's mission is reflected in its name, "General Land Office Field Survey Subcommittee."

The crucial importance of the government surveys was further enhanced because after 150 years the *Trail* in Southwestern Oregon is usually buried beneath 6 - 12 inches of soil and debris, and there is little physical and vegetation evidence remaining of the *Trail*. Members of the HETC joke that in the field what is usually seen and heard is the participant's imagination and opinion. Ruts are gone and traces are few, but a verified surveyed *Trail* site can make sense of the local terrain where there are several skid roads, and faint traces aligned along the recorded course of the *Trail* are clarified to their significance beyond a normally appearing natural swale. On occasion the mystery of a cairn could appear at the end of a GLO bearing and distance track. These verified surveyed *Trail* sites greatly facilitate the search for the *Trail* by showing the researcher where to look for reliable *Trail* traces. They solve the mystery of several traces or logging skid roads in the same vicinity by determining and verifying which of the traces or evolved roads are related to historic emigrant wagon use.

Government surveys are also of value in hilly or mountainous terrain that is forested and has a history of logging. The MET Manual is again helpful by providing guidelines for the location of wagon trails. For example, see the following.

1. In hilly or mountainous terrain, emigrant wagons generally followed ridges or higher elevations rather than gullies, ravines, or canyons.

2. Trails traversing along the sides of slopes usually will not be emigrant wagon trails. Exceptions might be where there was either no alternative to a steep slope or the slope angle was not steep enough to make wagons unstable.
3. Generally, wagons ascended and descended on the spine of a ridge rather than up or down gullies.

Of significance is the focus on the specific GLO surveyed sites, not on evidence along the GLO mapped route of the trail between surveyed sites at section lines. The HETC has historically considered the “average” one mile distance between section lines of GLO surveys as professional artwork identifying the general location of the *Trail*. In the future the HETC expects to spend more time on these big ugly unknown grey areas. Instead of being anomalies for it, the following vegetation, topography, and artifact examples will become more common place: 1. road trace and vegetation differential NW of Soldier Creek JA-2A; GLO bearing and distance method located Harris cairn; 3. ox yoke chain artifact found at OR-JA-00-35-06-2 Silvestri property; 4. *Trail* swale of a parallel set of ruts or “Two-track” north east of Dickerson’s Corner 2 IV-7A, along the NE and SW course on both sides of Dickerson’s Corner 1 IV-6A; and 5. evolved *Trail* at original GLO route corroborated by later government surveys - Applegate Trail North Sexton Pass *Trail* segment.

The HETC is made up of two sub-committees: 1. Diaries, Journals & Reminiscences Sub-committee, and 2. the GLO Field Survey Sub-committee.

In the best of situations, the *Trail* researcher examines all the relevant written, cartographic, physical, and artifact evidence, and finds them mutually supporting. What does the researcher do when different kinds of evidence conflict? How does one determine the relative reliability of different types of evidence (MET Manual pages 4 - 12)? The eight MET identified types of evidence (Section I.A.2) used to verify trail location follow with the rank order reflecting the relative reliability of available evidence follows (MET Manual pages 5 - 8).

In summary, the need for quality research and documentation before marking the trail cannot be overemphasized.

I. OCTA MAPPING EMIGRANT TRAILS (MET) MANUAL

A. MET Manual

A foundation principal of the HETC, HNAHS, carrying out its mission in wet Western Oregon is to map emigrant trails through the use of the methods and procedures identified in the OCTA's MET Manual.

MET Manual. Trail Mapping Committee. July 2002, 4th edition. *Mapping Emigrant Trails MET Manual*.
Office of National Trails Preservation & Oregon-California Trails Association. Independence, MO.

The MET approach was evaluated by the HNA&HS in 2005 and it found a sound systematic repeatable system of emigrant trail research, analysis, classification, mapping, and documentation. Especially refreshingly was that the MET process could be quality controlled basically through application of an abbreviated scientific method.

1. MET Compliance Standards The following are the MET Compliance Standards (CS). As used in the rest of the text the phrase "MET Manual Methods" (MET Methods) is a collective reference to the six compliance methods to locate and verify emigrant wagon trails.

- MET CS 1. Examine and Document All the Relevant Written, Cartographic, Physical, and Artifact Evidence (MET, p. 5).
- MET CS 2. Evaluate General Principles of Trail Location & Verification (MET, p. 4).
- MET CS 3. Apply Cardinal Rules of Trail Verification for Conformance (MET, p. 5).
 - . Coherence Rule. Linear Uniformity.
 - . Corroborative Rule. Confirming Evidence.
 - . Collateral Rule. Physical/Topo Evidence.
 - . Correlation Rule. Overall Agreement.
- MET CS 4. Rank Reliability of Different Types of Evidence Used to Verify Trail Location (MET, pps. 5 - 8).
- MET CS 5. Evaluate Applicability of Guidelines for Locating Wagon Trails (MET, pps. 8 - 11).
- MET CS 6. Classify Trail Location with the Classification Categories (MET, p. 13 - 16).
- MET CS 1. Document All the Relevant Written, Cartographic, Physical, and Artifact Evidence (MET, p. 5).

In the best of situations, the *Trail* researcher examines and documents all the relevant written, cartographic, physical, and artifact evidence, and finds them mutually supporting. What does the researcher do when different kinds of evidence conflict? How does one determine the relative reliability of different types of evidence? There are many approaches given in the MET Manual (pages 5 - 8). Several of those ideas follow.

1. Though it may not apply in all situations, as a general rule the closer in time the evidence is in relation to the trail under investigation, the more reliable that evidence becomes.
2. When adequate diary/journal or physical/artifact evidence is lacking, the researcher must rely heavily on the next best source of evidence, usually later reports or maps, especially GLO plats.
3. GLO plats, despite their potential for inaccuracies and omissions, are among the most useful and available sources we have for determining the emigrant trail routes.
4. Information gleaned from trail buffs, local residents, ranchers, foresters, and government agency people can be quite useful. However, as with any piece of evidence gathered by the trail researcher, it must be rigorously evaluated and verified. Just because someone insists the trail is over here or over there does not make it authoritative. The researcher should be open to but cautious about acceptance of this kind of trail information.

2. Ranking The Reliability Of Different Types Of Trail Evidence Used To Verify Trail Location

In the best of all situations, the trail researcher examines all the relevant written, cartographic, physical, and artifact evidence and finds them mutually supporting. But what does the researcher do when different kinds of evidence conflict? How does he determine the relative reliability of different types of evidence? (MET, p. 5) The author believes that it is even more important to follow the MET process in examining and documenting all the relevant evidence when it is conflicting, or not mutually supporting.

- Mutually Supporting Evidence (MSE)
- Not Mutually Supporting Evidence (NMSE)

During research it is normal for the researcher to discover both types of evidence. Sometimes the unresolved conflict continues for years. Sometimes substantial additional MSE and/or NMSE is discovered or created at a later date.

Conflicting evidence for some *Trail* sites make it difficult to rank the reliability of different types of evidence used to verify the *Trail* locations. The eight MET identified types of evidence used to verify trail location with their rank order reflecting the relative reliability of available evidence is helpful (MET 5 - 8). As nearly as possible, the following ranking reflects the relative reliability of available evidence (Appendix B).

1. Written eyewitness descriptions that locate trail with reasonable accuracy or exactness.
2. Written eyewitness descriptions that locate trail in a general way or direction.
3. Remaining physical, vegetative, or artifact evidence of wagon trails that correspond to either diary or plat evidence, such as traces, ruts, swales, wagon parts, differential vegetation, etc.
4. General Land Office (GLO) cadastral survey plats.
5. Topographic features that serve to confine wagon travel can aid interpretation of sketchy diary accounts and GLO plats.
6. Reports that describe the location of emigrant trails, such as federal, state, county, territorial, military, and railroad surveys undertaken in the 1850s or later.
7. Maps that show the location of either emigrant trails or possible emigrant trails.
8. Recent evidence and documentation (not necessarily in order of reliability; see Appendix A for four types).

The conclusion of the MET Manual states the quandary of “evidence not mutually supporting” well (MET p. 12).

These **guidelines for determining trail remnants and segments can not cover all situations** (emphasis added). Even our most experienced trail trackers encountered puzzling anomalies leading to unanswerable questions. Why has the trail vanished in some undisturbed places while in other undisturbed places – often very near, in similar terrain, and with identical soil conditions – the trail remains in pristine condition? Quite often there is no obvious explanation why no visible trace remains when it can be established beyond doubt that the trail passed that way. Why do some remaining ruts, swales and depressions appear so differently? Why are some swales twenty feet wide and several feet deep while on a segment perhaps a half mile back, in similar terrain, the trail is no wider than one wagon and consists of a shallow depression? There is much to learn about the conditions that have led to the survival of some trail traces and the disappearance of others.

Most trail segments that remain visible today have been impacted by man and nature during the post-emigrant period (emphasis added). Subsequent human impact on earlier emigrant trails may have taken the form of stage, freighting, or ranch use and even road building. Nature may have been involved, in which case the trail may not appear as an eroded trough, deep, wide swale or gully. In some sand areas, wind will have blown away loose soil and sand, leaving huge, deep, wide swales not covered with grass. Where the original emigrant trail has not had some kind of subsequent use or impact, it may have all but vanished – gradually fading into the surrounding terrain. Often, only vestiges of emigrant trails remain, barely kept visible by cattle and humans walking on them. Therefore, the vanishing character of emigrant trails makes it all the more imperative that we locate, verify, and map them before they become indistinguishable from the surrounding landscape.

The Mapping Committee is convinced that careful adherence to the MET research and investigative procedures will lead to increased accuracy in locating and verifying emigrant trails (emphasis added). (For a very effective way of using diary/journal accounts to locate and verify emigrant trail segments, see Appendix C, “the Composite Trail Description Method of Locating and Verifying Trails.”) Also, gathering as much information as possible before going into the field – from diaries, GLO plats, old survey, and maps, and more recent public and private surveys – will make the mapping task much more effective. However, all experienced trail mappers have learned that the more research and field verification they conduct the more questions they raise that, in turn, lead to longer hours in the field seeking verification of trails. **One should avoid jumping to quick conclusions** (emphasis added). When in doubt, contact other MET mappers and engage them in a dialogue. They may have alternative solutions and/or insights. Involving other trail experts is always helpful in resolving conflicting evidence or seemingly unanswerable questions. No single person is capable of furnishing all the answers. The more questions and alternatives that are raised and reviewed, the closer the record comes to being an accurate representation of the past.

Most importantly, the mapper should conduct field investigation and authentication with an open mind. The easy things are readily resolved; the difficult problems may require additional research and field work. The mapper should avoid going into the field with preconceptions that lead to “make things fit” especially when they don’t seem to square with the evidence. **The MET program is open-ended. It is designed to allow for doubts and to provide for corrections and additions as new materials and evidence come to light** (emphasis added). History is a matter of building upon what has gone before. It isn’t a matter of being “right.” It is more a matter of putting forth what research has indicated has the highest degree of probability. All mapping endeavors should be considered as the opening of an on-going dialogue. That’s the historical process at work.

3. Emigrant Trail Classification Categories **Trail Classification Categories** The following five classification categories for overland emigrant trails are designed to assess the condition of trails at the time of mapping and establish a basis on which to recommend levels of preservation and use for trails on public lands. The five categories are OCTA’s standard classifications for all emigrant trail mapping (MET Manual, pages 13 - 15).

- Class 1 ① Unaltered Trail. It retains its original character. Should Be Preserved (MET, p. 13).
- Class 2 ② Used Trail. It retains elements of its original character, but shows use by motor vehicles. Should Be Preserved (MET, p. 13).
- Class 3 ③ Verified Trail. It is accurately located and verified, but trail traces are nonexistent or insignificant. Should Be Preserved (MET, p. 14).
- Class 4 ④ Altered Trail. It is verified, but elements of its original condition are permanently altered. May be Desirable to Preserve (MET, p. 14).
- Class 5 ⑤ Approximate Trail. It is obliterated or unverifiable and its location is known only approximately. No Preservation Recommended (MET, p. 14).

4. Quality Research and Documentation MET CS 1. Examine and Document All the Relevant Written, Cartographic, Physical, and Artifact Evidence (MET, p. 5). Relevant documentation includes the normal standalone bibliographic elements, including a purpose of supporting or conflicting evidence for locating and verifying emigrant trails, analysis, and a conclusion (Appendix A). Standalone means the document will be understood without any other context documents available to the researcher. The following quotes from the MET illustrate the value of documentation.

- Because the accuracy and reliability of the MET program rests on quality research, it is important to emphasize the methods used to locate and verify emigrant wagon trails. Documentary evidence (trail literature of all types - eight MET identified types of evidence used to verify trail location with their rank order reflecting the relative reliability of available evidence (MET, p. 6) is the main historical resource available to the trail researcher, therefore, MET participants must have a basic familiarity with the literature of the trails (MET Overview, p. 4).
- The following discussion on general principals, cardinal rules, ranking reliability of evidence, and guidelines for locating wagon trails focuses on the primary methods used in documentary research and investigative fieldwork. These methods are designed to impart order and discipline into the use of evidence in locating and verifying emigrant trail segments (MET Overview, p. 4).
- Any piece of evidence gathered by the trail researcher must be rigorously evaluated and verified MET Manual (p. 8).
- These (MET) guidelines for determining trail remnants and segments can not cover all situations. Even our most experienced trail trackers have encountered puzzling anomalies leading to unanswerable questions . . . Quite often there is no obvious explanation . . . (MET Conclusion, p. 12).
- Therefore, the vanishing character of emigrant trails makes it all the more imperative that we locate, verify, and map them before they become indistinguishable from the surrounding landscape (MET Conclusion, p. 12).
- The Mapping Committee is convinced that careful adherence to the MET research and investigative procedures will lead to increased accuracy in locating and verifying emigrant trails (MET Conclusion, p. 12).

“The need for quality research and documentation before marking the trail cannot be overemphasized.”

- History is a matter of building upon what has gone before. It isn't a matter of being "right." It is more a matter of putting forth what research has indicated has the highest degree of probability. All mapping endeavors should be considered as the opening of an on-going dialogue. That's the historical process at work (MET Conclusion, p. 12).
- The following example, of the Composite Trail Description Method for locating and verifying emigrant trails, is based on a detailed study undertaken in 1994 and 1995 by Don Wiggins of Reno, Nevada . . . (Appendix C, MET Manual. The Composite Trail Description Method for Locating and Verifying Trails).

Documentation includes the philosophy of standalone bibliographic elements for all documents, including maps. This is part of the MET CS 1 standard.

In summary, "The need for quality research and documentation before marking the trail cannot be overemphasized." [*Oregon-California Trails Association Trail Marker and Trail Marking Policies*, Section I.B]. Research and analysis that is not documented is not available to history and the sound systematic repeatable system of the scientific and MET methods.

B. HNAHS Policy

The HETC, *Hugo Neighborhood*, has been working on researching, mapping, and documenting the 1846 - 1883 *Trail* in northern Josephine County, Oregon for over a decade. The HETC was formally organized by the HNAHS Board in 2005. Per the 2005 policy, the standards for all emigrant trail inventories and decisions would be documented using the standards of OCTA's *Mapping Emigrant Trails Manual (MET)*. This policy was continued March 2012 when the *Hugo Applegate Trail Marking & Mapping Project Agreement* was finalized and signed by its partners.

Per the 2005 policy, all emigrant trail inventories and decisions would be documented using the standards of the *MET* (i.e., verified analysis and documentation completed prior to wooden *Trail* stakes placed). This policy was formally corroborated and continued by the 2012 *Project Agreement* (i.e., verified analysis and documentation completed prior to NWOCTA carsonite markers placed).

The HNAHS's policy standards and criteria for compliance with the MET process follow.

- Trail Mapping Committee, Office of National Trails Preservation & Oregon-California Trails Association. July 2002, 4th edition. *Mapping Emigrant Trails MET Manual*. Independence, MO.
- *Hugo Neighborhood*. May 14, 2005. *Mapping Action Plan For Applegate Trail Program*. Hugo, OR.
- Welch, David, Oregon-California Trails Association. October 10, 2006. *Oregon-California Trails Association Trail Marker and Trail Marking Policies*. Adopted by OCTA Board of Directors March 9, 2002. Independence, MO.
- Northwest Chapter, Oregon-California Trails Association (NWOCTA); *Hugo Neighborhood*; and the Josephine County Historical Society (JCHS). March 2012. *Hugo Applegate Trail Marking & Mapping Project Agreement*. Hugo, OR.

The HNAHS's MET Compliance Standards (CS) follow.

- MET CS 1. Examine and Document All the Relevant Written, Cartographic, Physical, and Artifact Evidence (MET, p. 5).
- MET CS 2. Evaluate General Principles of Trail Location & Verification (MET, p. 4).
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 - . Correlation Rule. Overall Agreement.
- MET CS 4. Rank Reliability of Different Types of Evidence Used to Verify Trail Location (MET, pps. 5 - 8).
- MET CS 5. Evaluate Applicability of Guidelines for Locating Wagon Trails (MET, pps. 8 - 11).
- MET CS 6. Classify Trail Location with the Classification Categories (MET, p. 13 - 16).
- MET CS 1. Document All the Relevant Written, Cartographic, Physical, and Artifact Evidence (MET, p. 5).

HETC Guidelines follow.

- Rose, Karen and Walker, Mike, Co-Project Leaders, Hugo Emigrant Trails Committee. December 8, 2013. *Emigrant Trail Inventories and Decisions*. Hugo Neighborhood Association & Historical Society. Hugo, OR.

Draft HETC Guidelines follow.

- Walker, Mike, Co-Project Leader, HETC; Education Chair, HNAHS. Draft July 4, 2012. *Historical Trail Inventories Must Document Verification And Reliability of Evidence*. Hugo, OR.
- Walker, Mike, Member, HETC; Education Chair, HNAHS. Draft July 4, 2012; Updated Draft May 3, 2015. *Scientific & MET Manual Methods*. Hugo, OR.

Other Similar HNAHS Analysis Guidelines.

- Hugo Native American Team, Hugo Neighborhood Association & Historical Society. August 12, 2012. *Appendix F. Maps For Use In Identifying & Mapping Indian Trails, Indian Trail Over Grave Creek Hills: 1855*. Hugo, OR.

II. SCIENTIFIC METHOD

A. Inquiry & Method (Formation Of A Question)

1. Scientific Inquiry The goal of a scientific inquiry is to obtain knowledge in the form of testable explanations that can predict the results of future experiments. This allows scientists to gain an understanding of reality, and later use that understanding to intervene in its causal mechanisms (such as to cure disease). The better an explanation is at making predictions, the more useful it is, and the more likely it is to be correct. The most successful explanations, which explain and make accurate predictions in a wide range of circumstances, are called scientific theories.

2. Scientific Method (http://en.wikipedia.org/wiki/Scientific_method) From Wikipedia, the free encyclopedia, Downloaded July 4, 2012.

The scientific method is a body of techniques for investigating phenomena, acquiring new knowledge, or correcting and integrating previous knowledge. To be termed scientific, a method of inquiry must be based on empirical and measurable evidence subject to specific principles of reasoning.

The chief characteristic which distinguishes the scientific method from other methods of acquiring knowledge is that scientists seek to let reality speak for itself, supporting a theory when a theory's predictions are confirmed and challenging a theory when its predictions prove false. Although procedures vary from one field of inquiry to another, identifiable features distinguish scientific inquiry from other methods of obtaining knowledge. Scientific researchers propose hypotheses as explanations of phenomena, and design experimental studies to test these hypotheses via predictions which can be derived from them. These steps must be repeatable, to guard against mistake or confusion in any particular experimenter.

Scientific inquiry is generally intended to be as objective as possible in order to reduce biased interpretations of results. Another basic expectation is to document, archive and share all data and methodology so they are available for careful scrutiny by other scientists, giving them the opportunity to verify results by attempting to reproduce them. This practice is called full disclosure.

Scientific methodology directs that hypotheses be tested in controlled conditions which can be reproduced by others. The scientific community's pursuit of experimental control and reproducibility diminishes the effects of cognitive biases.

For example, pre-existing beliefs can alter the interpretation of results, as in confirmation bias; this is a heuristic that leads a person with a particular belief to see things as reinforcing their belief, even if another observer might disagree (in other words, people tend to observe what they expect to observe).

3. General Principles of the Scientific Method Though the scientific method is often presented as a fixed sequence of steps, they are better considered as general principles. Not all steps take place in every scientific inquiry (or to the same degree), and not always in the same order.

Formulation of a Question

Hypothesis

Prediction

Testing

Analysis

B. Hypothesis

A hypothesis is an explanation for a phenomenon that can be tested in some way that ideally either proves or disproves it. For the duration of testing, the hypothesis is taken to be true, and the goal of the researcher is to rigorously test its terms. The concept is a very important part of the scientific method.

A hypothesis does not have to be right or wrong. In some instances, a hypothesis turns out to be wrong, and this is considered perfectly acceptable, because it still furthers the cause of science. It is also possible for a hypothesis to turn out to be inconclusive after testing.

A hypothesis is a conjecture, based on the knowledge obtained while formulating the question, that may explain the observed behavior of a part of our universe. The hypothesis might be very specific (i.e., Penny Ridge JA-13 is part of the North Oxbow of the Applegate Trail), or it might be broad (i.e., there are unknown *Trail* sites in the unexplored wilds of the south slope of Grave Creek Hills). A statistical hypothesis is a conjecture about some population. For example, the population might be emigrant wagons with a particular sidling design loaded or unloaded. The conjecture might be that a certain household goods wagon loading process will result in a known angle of sidling. Terms commonly associated with statistical hypotheses are null hypothesis and alternative hypothesis. A null hypothesis is the conjecture that the statistical hypothesis is false (i.e., that the new household goods wagon loading process does nothing and that any safe passages along side hills are due to chance effects). Researchers normally want to show that the null hypothesis is false. The alternative hypothesis is the desired outcome (i.e., that the loading process does better than chance). A final point: a scientific hypothesis must be falsifiable, meaning that one can identify a possible outcome of an experiment that conflicts with predictions deduced from the hypothesis; otherwise, it cannot be meaningfully tested.

With a small amount of rewriting, examples of hypotheses are the MET guidelines for locating emigrant wagon trains (MET, pps. 8 - 10).

C. Other Components

The scientific method also includes other components required even when all the iterations of the steps above have been completed.

1. Replication If an experiment cannot be repeated to produce the same results, this implies that the original results were in error. As a result, it is common for a single experiment to be performed multiple times, especially when there are uncontrolled variables or other indications of experimental error. For significant or surprising results, other scientists may also attempt to replicate the results for themselves, especially if those results would be important to their own work.

2. External review The process of peer review involves evaluation of the experiment by experts, who give their opinions anonymously to allow them to give unbiased criticism. It does not certify correctness of the results, only that the experiments themselves were sound (based on the description supplied by the experimenter). If the work passes peer review, which may require new experiments requested by the reviewers, it will be published in a peer-reviewed scientific journal. The specific journal that publishes the results indicates the perceived quality of the work.

3. Data recording and sharing Scientists must record all data very precisely in order to reduce their own bias and aid in replication by others. They must supply this data to other scientists who wish to replicate any results, extending to the sharing of any experimental samples that may be difficult to obtain.

III. SCIENTIFIC METHOD & MET MANUAL METHOD

The MET approach was evaluated by the HNA&HS in 2005; it found a sound systematic repeatable system of trail research, analysis, classification, and documentation. Especially refreshingly was that the MET process could be quality controlled through application of methods similar to the scientific method.

A. Similarities Between MET Manual Methods & Scientific Method

The HNA&HS's evaluation of the MET Manual and the scientific method found the following similarities.

- 1. Knowledge Improves Understanding** The scientific method is the process by which science is carried out. Because science builds on previous knowledge, it consistently improves understanding the world.
- 2. Application Of Method Becomes More Effective Over Time** The scientific method also improves itself in the same way, meaning that it gradually becomes more effective at generating new knowledge.
- 3. Process Involves Testing Hypotheses** The overall process involves making conjectures (hypotheses), deriving predictions from them as logical consequences, and then carrying out experiments based on those predictions to determine whether the original conjecture was correct.
- 4. Quality Control Must Replicate Results** If an experiment cannot be repeated to produce the same results, this implies that the original results were in error. As a result, it is common for a single experiment to be performed multiple times, especially when there are uncontrolled variables or other indications of experimental error. For significant or surprising results, other scientists may also attempt to replicate the results for themselves, especially if those results would be important to their own work.
- 5. Open To Scrutiny Outside Primary Research Team** The process of peer review involves evaluation of the experiment by experts, who give their opinions anonymously to allow them to give unbiased criticism. It does not certify correctness of the results, only that the experiments themselves were sound (based on the description supplied by the experimenter). If the work passes peer review, which may require new experiments requested by the reviewers, it will be published in a peer-reviewed scientific journal. The specific journal that publishes the results indicates the perceived quality of the work.
- 6. Public Documentation** Scientists must record all data very precisely in order to reduce their own bias and aid in replication by others. They must supply this data to other scientists who wish to replicate any results, extending to the sharing of any experimental samples that may be difficult to obtain.

B. Examples of Similarities Between Scientific Method & MET Manual Method In Locating And Verifying Emigrant Trails

Though the scientific method is often presented as a fixed sequence of steps, they are better considered as general principles. Not all steps take place in every scientific inquiry (or to the same degree), and not always in the same order.

Research All Relevant Evidence
Formulation of Research Questions
Hypothesis
Prediction
Testing
Analysis

The following examples of the “Similarities Between Scientific Method and MET Manual Method” are not intended to be comprehensive coverages of the supporting and conflicting evidence. They are provided only as illustrative examples of the scientific and MET methods.

1. Research All Relevant Evidence/Conflicting Evidence Trail Sites In Locating And Verifying Emigrant Trails The following example *Trail* sites had mutually supporting evidence and conflicting evidence, or not mutually supporting evidence. This evidence is the foundation for developing research questions.

- JA-13 Penny Ridge
- Applegate Trail I For North Sexton Pass I-5 East (1,060')
- JA-17 JR Of Applegate Trail: Grave Creek Road

MET CS 1. Examine and Document All the Relevant Written, Cartographic, Physical, and Artifact Evidence (MET, p. 5).

a) JA-13 Penny Ridge For a significant period the HETC had relied on the 1855 GLO survey and 1856 survey map, and many later dated maps showing the same route (i.e., Ox Bow of Applegate Trail) to support the JA-13 site.

(1) Mutually Supporting Evidence

(a) 1846 and 1847 Diarists Pringle & Hulin

Diaries / Journals / Letters
Hugo Neighborhood Association & Historical Society
<http://www.hugoneighborhood.org/diaries.htm>

In 1846 Pioneer Virgil Pringle recorded a good camp at Jumpoff Joe Creek (i.e., Pleasant Valley). The bad road was the oxbow and trail route over the mountain pass.

Saturday, October 17 – Travel 8 miles, road good and a good camp which is not common, the country being mostly burnt. 8 – 2,218 miles.

Sunday, October 18 – Have some bad road that takes till after dark to go 6 miles. 6 miles.

Monday, October 19 – Move one mile to a camp, having none last night, and spent the day burying Mr. Crowley’s daughter, who died yesterday evening, age about 14 years. 1 mile.”

The following quote, in relevant part, is from Lester G. Hulin, 1847 emigrant. The terrain on the north part of the ox bow would have necessitated side hilling or sidling.

*T. 19th. In about one M we crossed the river and left it after following it about 50 MS in all. passed among the bluffs and camped after a distance of abut 12 Ms. Some of the Indians are yet following us. Their room is better than their company.
 “W 20th. Upon leaving camp soon came to a fine creek [Jump Off Joe Creek], then bad roads entered (rough, hilly and sidling), but by night we were in a valley with good camping ground at hand [On Grave Creek in Sunny Valley]; distance 8 miles.”
 W. 21th. Upon leaving camp we soon came to a fine creek. Then bad roads ensued (rough hilly and sideling) but by night we were in a valley with good camping ground at hand. Distance 8 Ms.*

(b) 1855 GLO Survey & 1856 GLO Survey Map (T.34S., R.6W., W.M.)

1856 GLO Map: T. 34S., R. 6W., WM (Hugo)

| <u>Surveys</u> | <u>No.</u> | <u>Awarded</u> | <u>Surveyors</u> | <u>When Surveyed</u> | <u>Map In Conformance</u> |
|----------------|------------|----------------|------------------|----------------------|---------------------------|
| Township Lines | No. 54 | February 1855 | Lake & Hyde | March 31, 1856 | March 31, 1856 |
| Subdivisions | No. 54 | February 1855 | Lake & Hyde | March 31, 1856 | August 18553 |

Table II.B.3.b). General Land Office Surveys & Surveyors For Townships In Hugo, Oregon Region
 GLO Field Review SubCommittee
 General Land Office Maps
 Hugo Emigrant Trails Committee
 Hugo Neighborhood Association & Historical Society
http://www.hugoneighborhood.org/general_land_office_maps.htm

1856 GLO Map T. 34S., R. 6W., WM

Surveyor Generals Office, Salem, OR. March 31, 1856, C. T. Gardner, Surv. Gen of Oregon
 BLM Web: http://www.blm.gov/or/landrecords/survey/yPlatView1_2.php?path=POR&name=t360s060w_001.jpg

PENNY RIDGE POI

Road POI Name Penny Ridge³ ■ JA-13A
POI ID Code OR-AG-00-34-06-22/27-W-JA-13-A

1855 GLO Survey Notes for POI Page 610. Subdivisions of T. 34 S., R. 6 W. S 89° 57', W [West] on true Line between sections 22 & 27.

Chains

39.93 Set Qr Sec Post [39.93 chains = 2,635.38'
 40.40 a Ridge c S.W. (+ 5)
 62.30 a Branch in Ravine c S20° W. 5 Lks wide
63.40 Jacksonville Road S15° W (+ 20)
 [63.40 chains = 4,184.4']
 79.86 To Sec Corner (+ 15) [Sections 21, 22, 27, & 28; 79.86 ch = 5,270.76' - 2,635.38' = 2,635.38']

Education Brochure 17A - Penny Ridge JA-13A
 Points of Interest for Applegate Trail Brochure Series

(c) Hugo Mapping Action Plan

Hugo Neighborhood. May 14, 2005. *Mapping Action Plan For Applegate Trail Program*. Hugo, OR.

Section VI.D.1.a) Ridges (Sidling) Maps: Topo Ridges (Sidling)

Section VI.D.1.b) Soils (Road Stability) Maps: Soils (Rd Stability)

Appendix H - Ox Bow of Applegate Trail¹ *Mapping Action Plan*, December 31, 2005

“The *Hugo Emigrant Trails Committee* is committed to verifying, locating, and mapping approximately 17-18 miles of the Applegate Trail in the Hugo region (Chapter V; Appendix B - MAPPING ACTION PLAN for Applegate Trail Program).¹ However, emigrant trails often defy modern reasoning on the route these trails should have taken. Why the ox bow turn in sections 22 and 27 of Hugo’s portion of the Applegate Trail? Why didn’t the emigrants travel straight up the draw in the location of today’s Hasis Drive? We speak of the 180 degree switchback curve as an ox bow because in later years (ca., 1904 - 1913) the road was shortened by going straight up the mountain close to Maple Creek and the switchback section was not used anymore by through traffic.”

The following are selected passages from Appendix H.

- quotes, in relevant part, are from “The Applegate Trail of 1846” by William Emerson.² Map 10, Map 11, and Map 12.
- 1846 Pioneer Virgil Pringle recorded a good camp at Jumpoff Joe Creek (i.e., Pleasant Valley).³ The bad road was the oxbow and trail route over the mountain pass.
- 1846 Pioneer Quinn Thornton’s reminiscences recorded a horse trail too rough for wagons.³
- The following quote, in relevant part, is from Lester G. Hulin, 1847 emigrant (see Section VI.A.3.i - MAPPING ACTION PLAN).³ The terrain on the north part of the ox bow would have necessitated side hilling or sidling (Map 12).
- The hypothesis is that the ox bow was a result of emigrants blazing wider an existing trace or trail (i.e., western portion of ox bow up ridge course northeast - Map 12) and their inclination to avoid seasonal muddy ground in low land (e.g., Maple Creek in middle part of the ox bow - Map 12) that could trap them and side hilling that could tip wagons. A major effort was expended in energy and time to widen the Trapper’s Trail, but not as much as if the emigrants had hacked a brand new trail in the brush and trees. Also, the southern part (Map 12) of the ox bow on the Trappers’ trail suited the emigrants as in hilly or mountainous terrain, emigrant wagons generally followed ridges or higher elevations rather than gullies, ravines, or canyons.^{4&5} Further, when encountering hills or steep ascents/descents, wagons normally traveled directly up or down to avoid sideling or side hilling on steep slopes.
- The emigrants’ normal practice of following ridges or higher elevations and traveling directly up or down grades to avoid side hilling on steep slopes fits the topography for the south and west portions of the ox bow. The northern portion of the ox bow does not fit these guidelines as the route to the mountain pass is in or close to the draw of Maple Creek and the assumption is that at this location the wagon train was traveling close to the creek bottom (i.e., as mapped on the 1856 GLO maps - Map 10 & Map 11).
- Analytical discussions about the ox bow and the accuracy of the 1856 map occurred among the members of the *1856 General Land Office Field Survey Sub-Committee* (Mike Walker, Malcolm Drake, Kelly Rarey, & Glen Campbell) during the fall and winter of 2005 (see following December 7, 2005 email from Malcolm Drake and December 10, 2005 [edited December 31, 2005] response from Mike Walker).

Walker's December 10, 2005 Analysis & Response To Drake's December 7, 2005 Analysis (edited December 22, 2005)

Measurements on North Line of Section 27 Your detailed analysis looks good. It brought back memories of my own struggles with the 1856 General Land Office field survey data (i.e., T.34S., R.6.W., north line of Section 27). S 89° 57' W West on true Line Bet Secs 22 & 27

Walker concluded that "Without any other information I would go with your (Malcolm's) flip hypothesis. My conflict is there is so much information supporting the ox bow location."

1. 1856 GLO Map
2. 1894 GLO Map
3. 1895 County Map
4. 1904 Mining Map
5. 1904 Map of the State of Oregon
6. 1904 Riddle Quadrangle
7. ca., 1900 - 1901 Penny House Location
8. 1995 Atlas
9. 1995 First There Was Twogood
10. The South Road
11. Cut-Off Road

**Appendix I - 1874 Survey: Earliest Josephine County Survey - *Mapping Action Plan*,
December 31, 2005** August 30, 2009 Notes: Comparisons of 1874 Survey With 1856 GLO
Map of the Jacksonville Road Section of the Applegate Trail from Louse Creek to Grave Creek.
The 1874 survey has many survey entries of the possibility that the survey was not of a built road.
The following are some examples.

| <u>PW #¹</u> | <u>Survey Notes</u> |
|-------------------------|--|
| 165 | Leave Road [Applegate Trail?] |
| 173 | Grave Creek |
| 184 | Small Stream NW Leave Road (Rat Creek?) |
| 187 | Strike Road [Applegate Trail] |
| 191 | Ascend Hill [Applegate Trail] |
| 194 | Top of Hill Descend [Sexton Pass] [Applegate Trail] |
| 196 | Leave Road [Fits with 1856 GLO map of Ox Bow] [Applegate Trail] |
| 201 | Foot of Hill |
| 202 | Ascend Hill |
| 203 | Top of Hill [Garber Pass] |
| 204 | Descend Hill |
| 208 | D Sextons |

Mike Walker Analysis. It appears that Bob Chard's July 11, 1997 Memorandum to Bob Weber might assume the April 9, 1874 road survey was a road established (developed) by the County Commissioners on April 9, 1874 rather than a survey of a new route for a new county road the segments of which would be developed in the future.

It is clear from the survey entry notes about leaving and striking the "road" (there was one north-south road in northern Josephine County from approximately 1846 through 1900) that the 1874 road survey is not a survey of an established road, but a survey of existing roads and a new route to be developed. True?

(d) Indian Trail Over Grave Creek Hills: 1855 (Hugo Native American Team, Hugo Neighborhood Association & Historical Society. August 12, 2012. *Maps For Use In Identifying & Mapping Indian Trails, Indian Trail Over Grave Creek Hills: 1855*. Hugo, OR; 2012/Updated 2014).

FA. Indian Trail Over Grave Creek Hills: 1855 (Chapters I - V)
FB. Indian Trail Over Grave Creek Hills: 1855 (Chapters VI - IX)
Appendices
Footnotes
Maps

Hugo Native American Program
Hugo Neighborhood Association & Historical Society
http://www.hugoneighborhood.org/Hugo_Native_American_Program.htm

Applicable Outline -

- II. 1856 GLO PLAT OXBOW OF APPLGATE TRAIL CONCEPT
 - A. Applegate Trail In Hugo Region: 1846 - 1883
 - B. Oxbow Of Applegate Trail Means Multiple Trails
 - C. Early Land Grants Along Applegate Trail
 - D. Working Trail Evolution Hypotheses
- III. 1856 GLO T.34S., R.6W., W.M. PLAT
 - A. Reliability Of GLO Notes & Plats
 - 1. GLO Surveyors
 - 2. GLO Rough & Copies Field Notes & Draftsman Transcribed Field Notes
 - 3. GLO Section Line Surveys
 - C. 1894 GLO Plat for T.34S., R.6W., W.M.
- IV. RELEVANT MAPS
 - C. Map Order Of Usability
- VI. INDIAN TRAIL OVER GRAVE CREEK HILLS INTERPRETATIONS
 - D. Evolution Of The Oxbow Of Indian Trail

Appendices

Appendix E. GLO Surveyors Lake & Hyde
Appendix G. Reports, Diaries, Journals, & Reminiscences

Maps

Map A1. Oxbow Applegate Trail Sections Per 1856 GLO Plat
Map A3. North Oxbow Above Maple Creek Wetlands
Map A4. Hugo's Ridges & Passes: 1901 - 1902
Map A5. Hugo's Ridges, Passes, & Creeks: 1954
Map A6. Topographic Features & Roads North Of Garbers Pass: 1998
Map A7. Alternate Jacksonville Road Routes Of Applegate Trail: 1855
Map A8.No Oxbow In Indian Trail Over Grave Creek Hills: Interpretation

(e) Hugo High Road (Hugo's High Road Committee, Hugo Neighborhood Association & Historical Society. 2008. *Hugo's High Road: 1881 - 1883, A Work In Progress*. Hugo, OR). Applicable Outline -

- I. High Road Hypothesis
- II. High Road Historical Setting
- C. General Land Office 1855 Prairies Survey & 1856 Mapping
 - 1. GLO Survey: 1855
 - 2. Two Prairies In Sections 21 & 28: 1856
- D. Hugo Pioneer Land Patents: 1800s

III. Hugo's High Road: ca., 1881 - 1883

C. Topography & Water

1. Topography

2. Winter Wet Areas (Maple Creek, Heller, Ritchie, & Peterson Wetlands)

D. Roads & Traces (White-Boldway Trace, Penny Logging Road, Heller/Hugo Hills Cutoff, & Ahern Road)

Maps

Map HM-3. Prairies: 1856

Map HM-4. Hugo Pioneer Land Patents

Map HM-5. Hugo Pioneer Land Patents: 1800s

Map HM-6. Gravel Pit Station Neighbors: 1895

Map HM-7. Hugo's Riddle Quadrangle Map: ca., 1901 - 1902

Map HM-8. Mining Map Of Hugo Region: 1904

Map CM-8. Wet Winter Soils & Hugo High Road

Map AM-1. Hugo High Road: ca., 1881 - 1883

Map AM-2. High Road Topo/Water East

Map AM-3. High Road Topo/Water West

Map AM-4. North Ox Bow Road & Applegate Trail

Map AM-5. Penny Ridge Road

Map AM-6 Heller/Hugo Hills Cutoff

Appendices

Appendix C. Northern Josephine County O & C Railroad History: 1881 - 1883

Appendix D. Low Volume Applegate Trail Wagon Traffic: 1846 - 1847

(f) Analysis of 1855 General Surveyor Office Of Oregon's Field Notes, by Surveyor Hyde, For Surveyed Point JA-13/penny Ridge

Thompson, Larry; Walker, Mike Education Chair & Co-Chair HETC, HNAHS. November 30, 2008.

Analysis of 1855 General Surveyor Office Of Oregon's Field Notes, by Surveyor Hyde, For Surveyed Point JA-13/Penny Ridge. Hugo, OR.

This document, *Analysis of 1855 General Surveyor Office of Oregon's Field Notes by Surveyor Hyde for Surveyed Point JA-13/Penny Ridge*, is the partial result of the question of the sub-committee as surveyed point JA-13 is the substantial "survey evidence" in support of the ox bow segment of the Applegate Trail.

In summary, GLO Surveyor Hyde's measurement methodology (Section III.A) and survey measurements (Appendix B) west on a true line between sections 22 and 27 are correct in their method of measurements, or order of running lines and setting corners for subdivisions of a township.

(g) 2012 - Bad Roads (Rough, Hilly and Sidling) at Oxbow of Applegate Trail And/or Grave Creek Hills Never published, no conclusion (Drake, Malcolm, Gradient Consultant; Walker Mike, Co-Project Leader, HETC, HNAHS. Draft June 6, 2012. *Bad Roads (Rough, Hilly and Sidling) at Oxbow of Applegate Trail And/or Grave Creek Hills.* For The HETC, HNAHS. Hugo, OR). Maps supporting the document "Bad Roads (Rough, Hilly and Sidling) at Oxbow of Applegate Trail And/or Grave Creek Hills" were developed to various degrees of completeness.

Map HM-1. Historical Map 1. Original 1855 Oregon Surveyor General Land Office (GLO) Map of Township: T.34 S., R.6 W, W.M.

Map HM-2. Historical Map 2. 1855 Jacksonville Road (JR) Of Applegate Trail: Section 27, T.34 S., R.6 W, W.M.
 Map HM-3. Historical Map 3. Hugo's Applegate Trail And Indian Trail GLO Surveyed Sites
 Map HM-4. Historical Map 4. 1895 Official Josephine County, Oregon Map
 Map HM-5. Historical Map 5. IV-7A to IV-8A to JA-14: 1902
 Map HM-6. Historical Map 6. *Penny's High Road House. 1932.*
 Map USGS 1. IT-4 Bummer Creek Prairie: IV-7A to IV-8A to JA-12C: 1902
 Map USGS 2. Ridges & Passes: Oxbow Of the Applegate Trail Sexton Pass: 1954
 Map USGS 3. Topographic Features & Roads: Garbers Pass Through North Oxbow: 1998
 Map USGS 4. Jacksonville Road (JR) Of Applegate Trail: 1855
 Map 1-AA. 1855 GLO Survey Notes For Section 27, T.34S., R.6W., W.M.
 Map 2-AA. Oxbow of Applegate Trail Maps
 Map 3-AA. 1895 Official Josephine County, Oregon Map
 Map 4-AA. Old Smith Hill Pass Of Applegate Trail: 1901 - 1902

GLO Surveyors The reliability of certain GLO surveyors in the 1850s western Oregon was almost beyond question among modern surveyors. The documentation of the professionalism of the GLO United States Deputy Surveyors Hyde and Lake for the Hugo region had been through (*Appendix E. GLO Surveyors Lake & Hyde, Indian Trail Over Grave Creek Hills: 1855*).

Appendix E. GLO Surveyors Lake & Hyde
 Appendices For *Indian Trail Over Grave Creek Hills: 1855*
 Applegate Trail Inventory
 Hugo Neighborhood Association & Historical Society
<http://www.hugoneighborhood.org/applegat.htm>

Because the General Land Office surveys were the basis for subsequent land ownership records, it was important that they be accurate. The rare errors had to be corrected by subsequent government surveys. Lack of such later survey is an indication that the original surveys were accurate. (Appendix B, MET Manual. GLO Plat Explanation & Examples - *Using General Land Office Notes And Maps To Relocate Trail Related Features*).

(h) 1895 Official Map of Josephine County (Hugo Neighborhood Association & Historical Society. 2014. *1895 Official Map of Josephine County, Oregon As A Genealogical Resource*. Hugo, OR).

Chapter IX. CONCLUSION

Many of the overview conclusions are based upon a limited evaluation of a small section of the 1895 Map from Sexton Mt. Pass in the north to Louse Creek in the south (Map 1. ??)

A. Overview The designer and developer of the *1895 Official Map of Josephine County, Oregon*, Meston & Dygert Book Manufacturers Company of Portland, Oregon, practiced due diligence in creating the large scale 1" = 1mile *1895 Map*. It is loaded with the details of combining townships, sections, land ownership, property parcels, communities, transportation routes, and drainages. Their quality control approach in developing the map is obvious from the easily recognizable roads and roads segments present in 2013.

In 1895, forty years after the county north of the Rogue River was surveyed in the mid-1850s with just two main roads, the road from the Willamette Valley to Jacksonville and the IV Road of the Applegate Trail, the transportation system had matured into a vast network of dirt roads along with the ever present Southern Pacific Railroad.

The *1895 Map* shows a comprehensive detailed picture of the real property parcels, the specific landowners by name, and the detailed farmer to market road system beyond the main north-south transportation arteries (i.e., Jacksonville Road of Applegate Trail and its evolutions, especially the road over today's Merlin Hill - location of I-5).

C. Value Of *1895 Map* As A Genealogical Resource [PRELIMINARY]

1. **Public Land Survey System (PLSS)** - Excellent
2. **Legal Parcels & Patents** - Excellent. The regional county map represents original work on legal parcels and patents in 1895 significant and unique to the 19th century, 20th century, and 21st century. This work at the county level has not ever been updated in a useable map.
3. **Land Ownership** - Excellent. The regional county map represents original work on 1895 land ownership significant and unique to the 19th century. This work at the county level has not ever been updated in a useable map.
4. **Drainages** (i.e., branches, creeks, and rivers) - Poor to Fair. The drainages are based on the 19th century GLO plat maps. The drainage depictions can be quite accurate and also erroneously misleading to totally wrong. Their average representations are fair.
5. **Roads** - Fair - Good. *Large scale maps*, such as 1:24000 scale maps show a smaller area in great detail. They are useful for showing the locations of buildings and other features important to engineers, planners and trail enthusiasts. *Medium scale maps*, (1:62,500) are good for agricultural planning where less detail is required. *Small scale maps* have the least detail but show large areas. These are useful for extensive projects at regional levels of analysis.

The large scale 7.5 Minute Topo at 1:24,000 was considered the best scale for the HNAT's purpose. The medium scale 15 Minute Topo at 1:62,500 and 1 Degree (°) Sheet 1:100,000 were good for orientation and demonstrating a trail or road existed. A small scale map was good for supporting the existence of a trail or road.

The medium scale of the *1895 Map* is 1" = 1 mile; 1:63,360. It can not compete with the detail of a small scale map such as the GLO plats. The *1895 Map* roads is good for general orientation, but not detailed comparisons. The *1895 Map* was not surveyed, but neither were the GLO plats inside of section lines.

6. **Railroad** - Good. The railroad tracks depiction is O.K. to good for general location.

(i) Educational Brochures

- 17A - Penny Ridge JA-13A
- 17B - Old Heller Road of Applegate Trail: Penny Ridge JA-13B
- 17C - Applegate Trail: Boldway Property JA-13C
- 17DA - Applegate Trail: White Property JA-13D
- 17DB - White's Place & Applegate Trail JA-13E

Points of Interest for Applegate Trail Brochure Series
Applegate Trail Inventory
Hugo Neighborhood Association & Historical Society
<http://www.hugoneighborhood.org/inventorybrochures.htm>

(2) Not Mutually Supporting Evidence The original July 4, 2012 draft of *Scientific & MET Manual Methods* document was updated May 3, 2015 with material from another web published source, *Maps For Use In Identifying & Mapping Indian Trails, Indian Trail Over Grave Creek Hills: 1855* for the purpose of including the best summary of presently available for “Not Mutually Supporting Evidence” (Appendices C - D).

- Walker, Mike, Co-Project Leader, HETC; Education Chair, HNAHS. Draft July 4, 2012. *Scientific & MET Manual Methods*. Hugo, OR.
- Walker, Mike, Member, HETC; Education Chair, HNAHS. Draft July 4, 2012; Updated draft May 3, 2015. *Scientific & MET Manual Methods*. Hugo, OR.
- Hugo Native American Team, Hugo Neighborhood Association & Historical Society. August 12, 2012. *Maps For Use In Identifying & Mapping Indian Trails, Indian Trail Over Grave Creek Hills: 1855*. Hugo, OR.

What follows is from “Chapter IX. Future Investigations: April 12, 2014” of the *Maps For Use In Identifying & Mapping Indian Trails, Indian Trail Over Grave Creek Hills: 1855* paper. This future investigations section was not part of the original intent of the *Indian Trail* paper which was to address the Takelma Indian trail over Grave Creek Hills. However, even with the different focus, it was felt timely by the Hugo Native American Team (HNAT), HNAHS, in light of the recent analysis and opinions of HETC members on the likelihood of the Oxbow of the Applegate Trail.

A decade long on-going investigation by the HETC was refined by Malcolm Drake, Member, HETC, on December 7, 2013 with the publication of *OCTA Authentication Process for Penny Ridge JA-13 Applegate Trail Site*. That email was followed by several other emails and papers. The reader is directed to the web published source (Appendix C, Chapter IX; Appendix D).

(a) OCTA Authentication Process for Penny Ridge JA-13 Applegate Trail Site

Drake, Malcolm. December 7, 2013 Email to Hugo Emigrant Trails Committee. *OCTA Authentication Process for Penny Ridge JA-13 Applegate Trail Site*. Email & Analysis Maps. Jumpoff Joe, OR.

Years ago, Malcolm Drake drew all the survey points of the 1855 GLO Survey Notes West on true line between sections 22 & 27, T.34S., R.6W., W.M. onto a 1998 USGS 7.5' Quad map. He determined that there were some discrepancies between the descriptions written by the 1855 GLO surveyor, including the associated 1856 GLO Plat, and the actual topography, as shown on the Quad map. These discrepancies were in addition to the most obvious error, identifying Maple Creek as a "ridge". All but one survey point, as listed in the 1856 GLO notes, are, basically, backwards. Streams are identified as ridges; ridges are identified as streams.

For Drake there is, without doubt, something wrong with the survey done by the GLO in 1856. There is evidence both for and against the surveyor making a simple confusion of east and west. To him the East-West reversal seemed much more likely than the surveyor confusing four out of five ridges with streams. There is evidence that the survey notes are correct, as written. Perhaps, as stated in the OCTA trail location guidelines, the researchers should not expect to ever know with absolute certainty, but should make their most educated guesses as to what is really true, with all available evidence.

Drake is looking forward to gathering more data to clarify his hypothesis that the surveyor confused east and west.

(b) Analysis of Point JA-13 Penny Ridge As A Possible Site on the 1846 Applegate Trail
Highlights from this paper were included because of its excellent MET methodology.

Black, Bob. December 12, 2013. *Analysis of Point JA-13 Penny Ridge As A Possible Site on the 1846 Applegate Trail*. Grants Pass, OR. This analysis was based on the Research Principles, Methods and Guidelines noted in the OCTA MET MANUAL.

Determining the Hypotheses to be Tested. The HETC field work to date has resulted in two possible routes for this segment of the Applegate Trail. These are noted as Hypothesis A—The Oxbow trail route that runs from Point JA-12 to Point JA-13 to Point JA-14 and Hypothesis B—The Hasis Drive Corridor trail route that runs from Point JA-12 to Point JA-14.

Testing the two Hypotheses against the 4 Cardinal Rules

| | <u>Coherence</u> | <u>Corroborative</u> | <u>Collateral</u> | <u>Correlation</u> |
|------------------|------------------|----------------------|-------------------|--------------------|
| Oxbow Rt.--A | NO | YES—GLO Survey | NO | NO |
| Hasis Dr Rt.-- B | YES | YES—1874 Survey | YES | YES |

Discussion. The Oxbow Route A does not have any visible trail evidence linking it SE to JA-12 or NE to JA-14. The only apparent trail runs N-S on the top of the ridge. There is no topographic evidence that a sideling trail is possible.

Discussion. The diary evidence for both routes is too vague to be helpful. There is no physical or artifact evidence of a trail on either route. Route A is shown on the GLO survey and Route B is shown on the 1874 County Road Survey. Route A has topographic features (steep sideslopes) that confine the trail route only up and down the ridge and not on a sidehill location. Route B is located on satisfactory topography for a trail. Later maps show the oxbow route but they were likely based on the 1856 GLO Survey Plat as there is no evidence that they were based on actual field surveys or observations. The 1874 field survey shows the trail to be located in the Hasis Dr. Route corridor as does the 1894 USGS Riddle Quadrangle Topo Map.

Field Checking the Hypotheses The last step is go out in the field and put yourself into an emigrant’s boots walking alongside a wagon to see whether or not a hypothetical trail segment makes trail sense. Look for “a fatal flaw” that would render a hypothesis highly unlikely to fit normal emigrant travel patterns. The field check of the Oxbow Rt—A –revealed three possible “fatal flaws”. Any one of these “fatal flaws” would negate that hypothesis. These flaws were:

1. A route too sideling for wagons to traverse.
2. A significant obstacle –the oxbow--that would require time and energy to overcome and that was not accounted for in any diary description.
3. The absence of an obstacle in the way of direct travel –the Hasis Drive route-- negates the hypothesis that had emigrants taking a circuitous route--the oxbow route.

No “fatal flaws” were found during the field check of the Hasis Dr Rt—B.

Conclusion Ultimately, the trail mapper bears the responsibility of reaching a decision on where the trail is located; the rules alone cannot do that.

Based on my analysis, I believe that the 1846 Route of the Applegate Trail followed the Hasis Drive Corridor—Route B and DID NOT follow the Oxbow Route through Point JA-13 Penny Ridge.

(c) Investigation of Applegate Trail Oxbow

Drake, Malcolm, and Rarey, Kelly. December 21, 2013. *Investigation of "Applegate Trail Oxbow" Section 22, T34S, R6W, near Hugo, Oregon.* For the Hugo Emigrant Trails Committee. Hugo, OR.

This investigation makes a case for a significant problem with the 1855 GLO survey notes for T.34S., R.6W., W.M., and specifically the GLO survey notes west on the true line between sections 22 & 27 for the Indian trail site IT-3/Jacksonville Road (JA)-13 Penny Ridge site (IT-3/JA-13). The probable consensus of the HETC supports the concept that the IT-3/JA-13 Penny Ridge site does not exist because of a flipped survey (i.e., administrative error in transcribing surveyor's notes).

The investigation also acknowledges other evidence that supports the oxbow mostly in the form of several later maps that depict the oxbow and interpretation documents that support the oxbow, or have unresolved questions (Chapter III; Chapter VI). It identifies two possible alternatives that address the seemingly conflict, and significantly it considers possible future investigations.

- Alt. 1. The oxbow does not exist; all maps subsequent to the 1856 GLO map that show the oxbow do so because they simply repeated a mistake, and nobody actually surveyed these later maps.
- Alt. 2. The oxbow does exist, even though the surveyor's flipped his survey notes East for West.

Possible future investigations for the HETC were identified by Drake and Rarey to further prove the existence or non existence of the "flipped" hypothesis, and also of the oxbow.

- Investigation 1 Hire a surveyor to demonstrate with extreme accuracy the topographic features of each survey point along the line between Section 22s and 27. This could more strongly demonstrate whether or not the surveyor "flipped" E and W on his notes.
- Investigation 2 Map the alleged route of the oxbow, as located on the 1856 GLO map and on the 1895 "Official" map, and search for traces of the trail along that route.
- Investigation 3 Perform an archaeological examination of either of the two alleged routes of the oxbow, whether it be judged to be on the original oxbow shown on the 1855 and 1895 maps, or on the currently favored route (closer to the 22/27 section line), seeking artifacts that could *only* indicate the Applegate Trail route, but not other possible uses, e.g. logging equipment, stage coaches, utility wagons, modern farm equipment, etc. This investigation could be aided by the use of metal detectors.

Drake and Rarey also identified possible conclusions.

- Conclusion 1. The HETC needs to decide, first, if the GLO surveyor wrote W instead of E on his field notes. If so, the survey was recorded backwards.
- Conclusion 2. If the survey was, in fact, recorded backwards, is this prima facie evidence that the oxbow does not, and never has, existed? Or is it somehow possible that the survey was backwards, yet the oxbow existed regardless of that finding?
- Conclusion 3. If the HETC concludes that the oxbow existed regardless of the accuracy of the GLO survey, did it exist as "proved" by the 1895 map, or lower on the mountain, passing through the saddle, close to, and north of, the 22/27 section line, then continuing more or less on contour for about ¼ mile towards the east? There is evidence for both locations, but we can't have it both ways. And, would a route that passes through the saddle just north of the South ¼ corner of section 22 still to be called an "oxbow"?

(d) The Oxbow More than Likely as it Is Shown on Plat and Probably There Is No Oxbow In The Road

Nickerson, Terry. December 8, 2013 Email to Jim Ford. *Oxbow More Than Likely Existed As Shown On Plat*. Medford, OR.

The professionalism of the GLO surveyors Hyde and Lake had been documented (Section I.B and Section III.A of *Maps For Use In Identifying & Mapping Indian Trails, Indian Trail Over Grave Creek Hills: 1855* paper). Terry Nickerson was the long-time (now retired) lead surveyor for the BLM, Medford District Office.

December 9, 2013 Email I [Terry Nickerson, Retired BLM Surveyor] have looked at the field notes and the plat for T.34S., R.6W., W.M., and in particular the line between sections 22 and 27. In general Wells Lake and George Hyde were very good surveyors for the period of time that they surveyed. Their work was very accurate considering the equipment they used. It is my opinion that the Applegate Trail (called the Jacksonville Road) is accurately depicted on the plat and the call in the field notes is more than likely correct. The "oxbow" more than likely as it is shown on the plat.

January 7, 2014 Email Subject: Applegate Trail. After looking at the Quad Sheet and the field notes again I [Terry Nickerson, Retired BLM Surveyor] have the following opinion. The field notes should be reversed, and there probably is no Oxbow in the road.

(e) Questionable Oxbow

Roberts, Roger. January 20, 2014 Email to Kelly Rarey. *Questionable Oxbow*. Medford, OR.

January 20, 2014 Email: Applegate Field Notes And/or Map Hold the Defining Answer to the Questionable Oxbow A pdf file of the maps drawn by a person unknown based on information from Jesse Applegate's 1853 military road survey (Section IX.A.5.c) was provided by Roger Roberts. Roberts views follow.

I am sending images of six pages from a report concerning how topo calls were kept during the course of the early GLO surveys.

He notes that Jesse Applegate used a Burt Solar Compass, and the mileage chart shows distances in miles and chains. [emphasis added] Perhaps Jesse's notes are in archives somewhere.

I have some reservations as to the accuracy of the mapping [emphasis added], You will see that the one sheet has the sections laid out in T33, 34 & 35 South, Range 6 West. These sections did not exist at the time of Jesse's survey. **And because it shows a flattened oxbow in the vicinity of the south line of Section 22, I'm thinking that it may have been a rough sketch taken off of the GLO plat** [emphasis added]. I can't think of how else Jesse's survey could have been correlated with the later section lines. The Applegate field notes and/or map hold the defining answer to the questionable oxbow.

I will follow up later with a statement of my review of your data.

Maps Drawn by a Person Unknown Based on Information from Jesse Applegate's 1853 Military Road Survey Independent analysis was conducted by Jim Ford, Kelly Rarey, and Mike Walker (ongoing). The six pdf maps look like one map in six sections. The geographic area covered by the map was Jesse Applegate's 1853 survey area for Col. Alvord before there were section lines. The first publicly mapped section lines for this area were in 1856 based on an 1855 GLO survey.

There is no author or date on the map. Comments are by map in the order of the pdf file.

Person Unknown. Date Unknown. Series of Historical Maps From *February 14, 2014 Email/Letter to Kelly Rarey, Hugo Emigrant Trails Committee* from Roger R. Roberts, Oregon Professional Land Surveyor. Central Point, OR.

(f) GLO Notes for this Particular Mile Appear to Be in Reverse Order

Roberts, Roger. *February 14, 2014 Email/Letter to Kelly Rarey, Hugo Emigrant Trails Committee*. Roger R. Roberts, Oregon Professional Land Surveyor. Two pages. Central Point, OR.

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February 14, 2014

Kelly,

On January 15, 2014, I received an email from you concerning the questionable "oxbow" in the Applegate Trail as shown on the 1856 General Land Office map, along the south boundary of Section 22 in Township 34 South, Range 6 West. You provided a copy of the report that you and Malcolm Drake prepared dated December 13, 2013. You also included a copy of "*ANALYSIS OF POINT JA-13 PENNY RIDGE AS A POSSIBLE SITE ON THE 1846 APPLGATE TRAIL*" by Bob Black, dated December 12, 2013. You asked that, due to my familiarity with the GLO records, I review the information and provide any comments that I might have.

In your analysis of the GLO notes relative to the "oxbow" trail configuration on the plat, you have noticed that, as written, the topo calls do not conform to the existing terrain conditions along the south boundary of Section 22. However, when you take the same measurements and lay them out running from west to east, they conform to the actual terrain. Factoring in the noted changes in elevation along the line, in reverse order, resulted in a profile that also conforms to the terrain. It is therefore your opinion that the GLO notes for this particular mile appear to be in reverse order.

I am in agreement with you [that the GLO notes for this particular mile appear to be in reverse order], for the following reasons:

- In running random line east, and then running back again to the west meant running the mile twice. I believe that **sometimes** (emphasis added) the measurement calls along the east-west lines were taken when the random line was run easterly, eliminating the need to rerun the line west. In that situation, the topo measurements would have to be entered into the notes at a later time, making it necessary to enter them in reverse order. **Occasionally they did not get reversed** (emphasis added), resulting in the type of situation you have encountered.
- **Sometimes** (emphasis added), when retracing the original surveyor, the topo measurements are found to not fit well with the true line, but fit better when applied to the random line, indicating that the measurements may have been taken at the time of running the random line easterly.

- In the early GLO surveys, topo measurements were not written into a field book, but kept in memory by the chainmen. They would report their topo measurements, from memory, at a later time.
- The notes that were kept in the field “tablets” were later transcribed into a clean and orderly field book format, which is what was returned to the Surveyor General at the completion of the contract. **Errors in transcribing have been found** (emphasis added) when comparing the final field notes with the measurements recorded in the field tablets.

I have consulted with Tom Newcomb, who spent his entire surveying career of over 40 years with BLM, USFS, Jackson and Josephine County Surveyors Office, and private surveyors in retracing original GLO surveys. I told him of your “oxbow” situation. He confirmed that **he has several times seen topo measurements reversed in the field notes** (emphasis added).

I attended the annual Professional Land Surveyors of Oregon conference in Salem last month. The primary instructor for two of the 3 days of topic specific sessions was a nationally known land surveyor named Dennis Moulard. He has been in surveying since 1972, has worked for BLM and has his own survey consulting firm in Arizona. He is also a Surveying Instructor for the University of Wyoming and Oklahoma State University. I had a chance to sit and visit with him, and I brought up the possibility of east-west topo calls being erroneously written in reverse order.

He is familiar with that, and has seen it many times during his career (emphasis added).

Here is a link to his resume’: <http://www.witnesstreeconsulting.com/Who.html>

I am sending to you images of six pages from a report concerning how topo calls were kept during the course of the early GLO surveys.

Thank you for giving me a chance to present my opinion on this topic.

(g) 2014 Vote By Hugo Emigrant Trails Committee A collective opinion and vote by a majority of the HETC members was based upon the Drake and Black analysis and work.

February 24, 2014 Meeting Minutes of the GLO Field Review SubCommittee, Hugo Emigrant Trails Committee – Tap Rock - Evergreen Rm – Final Copy. Attendance: Jim and Rene Ford, Joe and Leta Neiderheiser, Bob Black, Mike Walker, and Kelly Rarey.

1. Roger Robert – (Oregon Professional Land Surveyor) Roger’s extensive information seems to be all inclusive supporting no Oxbow. (See e-mails to Kelly dated February 14, 2014 and Maps January 10, 2014.) Kelly Rarey summarized Roger Robert’s paper.

2. Two motions were made to vote on the Oxbow question:

Bob Black’s motion with Kelly Rarey as second. “There is a surveying error in the field notes describing the topography along the section line. The topography is reversed from Penny Ridge to Maple Creek.” Seven votes “Yes” – Unanimous.

Bob Black’s motion with Joe Neiderheiser as second. “The Jacksonville Road is misrepresented as being on the Penny Ridge. The Jacksonville Road is on Maple Creek, resulting in no Oxbow.” Six votes “Yes”; One vote “No”.

Walker was the lone no vote. His rationale was much like in December 10, 2005.

Walker concluded that “Without any other information I would go with your (Malcolm’s) flip hypothesis. My conflict is there is so much information supporting the ox bow location.”

There was now even stronger conflict evidence from multiple sources. The issue from Walker’s point of view was that the conflict evidence were all independent of considering the mutually supporting evidence (MET CS 1. Examine and Document All the Relevant Written, Cartographic, Physical, and Artifact Evidence (MET, p. 5). He believes that the “fatal flaw” was that the HETC did not: 1. examine all the evidence (i.e, per the February 24, 2014 Meeting Minutes vote), 2. rank the reliability of all the different types of supporting and conflicting evidence, and 3. document the analyses.

MET CS 4. Rank Reliability of Different Types of Evidence Used to Verify Trail Location

- (1) MET CS 1. Examine and Document All the Relevant Evidence
 - (a) Mutually Supporting Evidence
 - (b) Not Mutually Supporting

- (2) MET CS 4. Rank Reliability of Different Types of Evidence

(d) Conclusion. From the author’s point of view, the HETC is still in the process of examining and documenting all the supporting and conflicting evidence (MET CS 1; MET, p. 5).

b) Road Feature 2. Applegate Trail I (ATI) For North Sexton Pass I-5 East (1,060')

- “Y” Road No. 1 to “Y” Road No. 2 (760') &
- “Y” Road No. 2 to Clearing Before I-5 Sign (300')

MET CS 1. Examine and Document All the Relevant Written, Cartographic, Physical, and Artifact Evidence (MET, p. 5).

(1) Mutually Supporting Evidence For many years the HETC could not figure out how the north side of the summit of Sexton Mt. Tied JA- 15 and JA-16 together to satisfy linear uniformity (Coherence Rule), especially with the absence of physical/topo evidence (Collateral Rule). It was not until it discovered the Oregon Highway Department’s strip maps was the mystery solved (i.e., the *Trail* was under what was previously thought to be either early auto roads, and/or 1940? highway construction access roads.

Applegate Trail I North Sexton Pass I-5 East: I
(Road Feature 2. Applegate Trail I (ATI) For North Sexton Pass I-5 East (1,060'))
Educational Resources For Applegate Trail: North Mt. Sexton Pass Area
Hugo Neighborhood Association & Historical Society
http://www.hugoneighborhood.org/miscellaneous_research_papers_and_documents.htm

Applegate Trail I (ATI) North Sexton Pass I-5 East: II
Educational Resources For Applegate Trail: North Mt. Sexton Pass Area
Hugo Neighborhood Association & Historical Society
http://www.hugoneighborhood.org/miscellaneous_research_papers_and_documents.htm

ODOT'S I-5: Glendale to Hugo Paving & Sexton Climbing Lane Project
Hugo Neighborhood Association & Historical Society
http://www.hugoneighborhood.org/miscellaneous_research_papers_and_documents.htm

(2) Not Mutually Supporting Evidence

There was no publicly accessible conflicting evidence.

Southern Oregon University and/or ODOT might have additional information not available to the public.

No minority reports were filed by members of the HETC.

c) JA-17, JR Of Applegate Trail: Grave Creek Road (JA-17B)

(1) Mutually Supporting Evidence The 1855 GLO plot of JA-17 on the 1996 Glendale Quad identified the POI is located approximately 350' - 400' west of the Sunny Valley Road (SVR) on Tax Lot 1900. The working hypothesis was that the 1855 ford of Grave Creek is 350' - 400' downstream of today's covered bridge. The 1856 GLO survey map matches the hypothesis. There was also linear conformity with the Twogood DLC (JR Of Applegate Trail: Twogood DLC Survey (JA-17C)).

21A - JR Of Applegate Trail: Grave Creek Road (JA-17A) - Diaries
21B - JR Of Applegate Trail: Grave Creek Road (JA-17B) - GLO Surveys
21BA - JR Of Applegate Trail: Grave Creek Road (JA-17BA) - GLO Surveys
21C - JR Of Applegate Trail: Twogood DLC Survey (JA-17C)
21D - JR Of Applegate Trail: Twogood DLC Survey (JA-17D)
21E - Wagon Train Camp At Grave Creek: October 19, 1846 (JA-17E)
21F - Martha Leland Crowley Grave: October 19, 1846 (JA-17F)
21J - JR Of Applegate Trail: Grave Creek Road Evolved: ca., 1881 - 1890 (JA-17J)

Points of Interest for Applegate Trail Brochure Series
Applegate Trail Inventory
Hugo Neighborhood Association & Historical Society
<http://www.hugoneighborhood.org/inventorybrochures.htm>

Applegate Trail Grave Creek Project
Applegate Trail Inventory
Hugo Neighborhood Association & Historical Society
http://www.hugoneighborhood.org/Grave_Cr_Trail_Project_073012.pdf

On a couple of field trips, August 2, 2012 & August 22, 2012, the HETC explained the supporting evidence, especially the GLO and DLC surveys. The difference between the early Trail location (between 1855 JA-17B , 1857 JA-17C, & 1857 JA-17D) and its later evolution to today's Sunny Valley Road (SVR) is consistent with many other road segments (e.g., Oxyoke Road, Highland Avenue at Harris Creek, Donaldson Road, Monument Drive away from Schoolhouse Creek, etc.) which moved from the wet, muddy, winter bottom lands to the drier toe of slopes.

August 2, 2012 & August 22, 2012 Minutes of Field Trips to JA-17B and Photos
Final Minutes of Field Trips to JA-17B Grave Creek Road General Land Office (GLO) Field Survey
Sub-Committee Inventory Trips, August 2, 2012 & August 22, 2012
Field Trips
Applegate Trail Inventory
Hugo Neighborhood Association & Historical Society
<http://www.hugoneighborhood.org/fieldtrips.htm>

No minority reports were filed by members of the HETC.

(2) Not Mutually Supporting Evidence Larry McLane is a noted local Josephine County, Oregon author; he wrote *First There Was Twogood*.^{III.B.1.c)} After much thoughtful research his conclusion was that the original *Trail* route was at the site of the covered bridge and/or the wide gravel bar. 1 - .2 miles upstream of the bridge. This was quite a quandary for the HETC to be in conflict with McLane, especially member Mike Walker as McLane was his history mentor.

A high water crossing is identified on McLane's old Fort Leland's plot plan .4 miles upstream of trail.^{III.B.1.c)} A wide gravel bar is also identified .1 - .2 miles upstream of the covered bridge (from county GIS aerial photo). A smaller gravel bar is identified downstream of the bridge. The Josephine County tax lot map shows the width of Grave Creek wider upstream and downstream of the bridge location.

There was also community pressure to locate the original *Trail* on Sunny Valley Loop Road in front of the Applegate Trail Interpretive Center Museum.

Applegate Trail Interpretive Center Museum
Applegate Trail Inventory
Hugo Neighborhood Association & Historical Society
http://www.hugoneighborhood.org/BROCHURE_8_Museum_042505.pdf

On a HETC field trip McLane was exposed to the GLO and DLC surveys. He acknowledged he had not used them in his research.

Footnote III.B.1.c). McLane, Larry L. 1995. *First There Was Twogood*. Sexton Enterprises. Sunny Valley, OR).

2. Formulation of Research Questions In Locating And Verifying Emigrant Trails

Formulation of questions when trying to research and locate emigrant wagon trails usually arise from mutually supporting or conflicting evidence (Section III.B.1). This process is a normal element of the scientific method in investigating phenomena, acquiring new knowledge, or correcting and integrating previous knowledge. Initial ideas are often vague and general. Questions can refer to the explanation of a specific *Trail* observation, as in "Why was the *Trail* located on Penny Ridge?", but can also be open-ended, as in "How can I design field location and verification procedures to rank the reliability of different types of evidence used to verify the *Trail* location?" This stage also involves reconsidering and evaluating previous evidence identified by the HETC, and from other sources.

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|----------------------|---|
| MET CS 1. | Examine and Document All the Relevant Written, Cartographic, Physical, and Artifact Evidence (MET, p. 5). |
| MET Guidelines | (MET, p. 8). |
| MET Other Guidelines | (MET, p. 10). |

Research questions come from the relevant research evidence and are statements that identify the phenomenon to be studied. Problem statements can come from conflicting evidence. Research questions lead directly into the development of multiple hypotheses. Research questions and hypotheses become signposts for explaining the purpose of study and guiding the research.

a) JA-13 Penny Ridge

- Why was the *Trail* located on Penny Ridge?
- What topography would best match the 1846 and 1847 diary entries of bad roads (rough, hilly and sidling)?
- Is Penny Ridge JA-13 part of the North Oxbow of the Applegate Trail?
- Did the GLO surveyors make a mistake by flipping the survey notes?
- Is there is a surveying error in the field notes describing the topography along the section line, including JA-13?
- Is the Jacksonville Road misrepresented as being on the Penny Ridge?

b) Applegate Trail I For North Sexton Pass I-5 East (1,060')

- Where was the physical evidence of the *Trail* over the Sexton Mt. Summit?
- Where was the *Trail* route located from south of JA-15 and north of the Sexton Mt. Summit?

c) JA-17, JR Of Applegate Trail: Grave Creek Road (JA-17B)

- What evidence supports the *Trail's* location along Sunny Valley Loop Road and over the location of the covered bridge at Grave Creek?
- What evidence supports the *Trail's* location west of Sunny Valley Loop Road 350' - 400' into the pasture field?
- What evidence supports the *Trail's* location over Grave Creek 350' - 400' downstream of today's covered bridge?

- What evidence supports the GLO surveyors?
- Did the GLO surveyors make a surveying mistake?

3. Hypotheses Developed In Locating And Verifying Emigrant Trails A hypothesis (plural *hypotheses*) is a proposed explanation for a phenomenon. For a hypothesis to be a scientific hypothesis, the scientific method requires that one can test it. Scientists generally base scientific hypotheses on previous observations that cannot satisfactorily be explained with the available scientific theories. Even though the words "hypothesis" and "theory" are often used synonymously, a *scientific hypothesis* is not the same as a scientific theory. A *scientific hypothesis* is a proposed explanation of a phenomenon which still has to be rigorously tested. In contrast, a *scientific theory* has undergone extensive testing and is generally accepted to be the accurate explanation behind an observation. A working hypothesis is a provisionally accepted hypothesis proposed for further research (i.e., based on the 1940 ODOT strip map and the old road viewed on the ground, the working hypothesis is that the old road is the evolution of the *Trail*).

A conjecture is a proposition that is unproven. Conjecture is contrasted by hypothesis (hence theory, axiom, principle), which is a testable statement based on accepted grounds. A conjecture is a guess. A conjecture is a statement for which someone thinks that there is evidence that the statement is true. The main thing about a conjecture is that there is no proof. A hypothesis is an explanation, tentative and unsure of itself, for specific phenomena about which there are questions. A well-crafted hypothesis very often suggests the best way to perform the research and gives clues to research design.

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| MET CS 1. | Examine and Document All the Relevant Written, Cartographic, Physical, and Artifact Evidence (MET, p. 5). |
| MET Guidelines | (MET, p. 8). |
| MET Other Guidelines | (MET, p. 10). |
| MET CS 2 Principles | (Met, p. 4). |
| MET Multiple Hypotheses | MET Method when different kinds of evidence conflict (MET, p. 5). Ranking the reliability of different types of evidence used to verify trail location. |

The *MET Multiple Hypotheses Method* is used to determine the authenticity of a trail segment.

1. The first step is identifying the range of multiple hypotheses.
2. The second step is rigorously analyzing each one hypotheses.
 - a) against the cardinal rules (MET, p. 5),
 - b) against the available supporting and conflicting evidence (MET, p. 5), and
 - c) ranking the reliability of different types of evidence with the eight MET identified types of evidence used to verify trail location with their rank order reflecting the relative reliability of available evidence (MET 5 - 8). The eight types of evidence are 1 - 8 with ranking number 1 having the highest relative probability of reliability and ranking 8 having the lowest probability of reliability (Appendix A).
3. The final step is interpreting the analyses for the hypothesis that has the highest probability of being correct. It is possible that several hypotheses could remain viable pending future evidence.

The potential hypotheses for the example *Trail* sites that had conflicting evidence, or not mutually supporting evidence follow.

- JA-13 Penny Ridge
- Applegate Trail I For North Sexton Pass I-5 East (1,060')
- JA-17 JR Of Applegate Trail: Grave Creek Road

a) JA-13 Penny Ridge

- Hypothesis: GLO JA-13 Penny Ridge existed ca., 1846 through 1855 - 1856.
- Hypothesis: GLO JA-13 Penny Ridge existed ca., 1846 through a least 1895.
- Hypothesis: The GLO surveyors were documented to be credible and did not make a surveying mistake.
- Hypothesis: The GLO Oxbow *Trail* Route is from JA-12 to JA-13 to JA-14.
- Hypothesis: The 1846 and 1847 diaries identified bad roads (rough, hilly and sidling), which matches the topography of the north oxbow.
- Hypothesis: The topography analysis of three ridges and slope matches the diaries.
- Hypothesis: The wet land analysis supports a high Indian trail above it.
- Hypothesis: There is a surveying error in the field notes describing the topography along the section line.
- Hypothesis: The Jacksonville Road is misrepresented as being on the Penny Ridge
- Hypothesis: GLO JA-13 survey is in error and route is the Hasis Drive Corridor from JA-12 to JA-14
- Hypothesis: 1895 Official Map of Josephine County is in error.
- Hypothesis: 1895 Official Map of Josephine County is correct.

b) Applegate Trail I For North Sexton Pass I-5 East (1,060')

- Hypothesis: Applegate Trail I (ATI) For North Sexton Pass I-5 East (1,060') was under the later auto roads and 1940 highway construction and access roads.
- Hypothesis: The ATI For North Sexton Pass I-5 East not the evolution of *Trail*.

c) JA-17, JR Of Applegate Trail: Grave Creek Road (JA-17B)

- Hypothesis: GLO JA-17, JR Of Applegate Trail: Grave Creek Road existed ca., 1846 - 1874?
- Hypothesis: There is confirming evidence of the accuracy of the GLO survey in the DLC survey (Corroborative Rule).
- Hypothesis: The GLO surveyors did not make a surveying mistake.
- Hypothesis: JA-17 GLO survey is in error.

4. Predictions Made In Locating And Verifying Emigrant Trails This step involves determining the logical consequences of the hypothesis. One or more predictions are then selected for further testing. The less likely that the prediction would be correct simply by coincidence, the stronger evidence it would be if the prediction were fulfilled; evidence is also stronger if the answer to the prediction is not already known, due to the effects of hindsight bias (see also postdiction). Ideally, the prediction must also distinguish the hypothesis from likely alternatives; if two hypotheses make the same prediction, observing the prediction to be correct is not evidence for either one over the other.

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| MET CS 1. | Examine and Document All the Relevant Written, Cartographic, Physical, and Artifact Evidence (MET, p. 5). |
| MET Multiple Hypotheses | MET Method when different kinds of evidence conflict (MET, p. 5). Ranking the reliability of different types of evidence used to verify trail location. |

A significant difference between the scientific method and the MET procedures is the weaker objective of the MET predictions. One of the basic general principles governing research in locating and verifying emigrant trail segments is probability, not scientific predictions.

Probability. All too often the exact location of an emigrant trail segment cannot be verified with absolute certainty. In most situations, however, the trail researcher can strive for a higher degree of probability by utilizing all the available evidence and following correct procedures. Verifying the extent to which a trail is an authentic emigrant trail may pose a problem. What appears as an emigrant trail may have originated as a later period freighting, mining, military, or stage road. In such cases, the researcher must determine the degree of probability that the trail in question did in fact originate as an emigrant trail (MET, p. 4).

a) JA-13 Penny Ridge: Scientific Prediction/MET Interpretations of Probability

- Prediction 1: Diaries are direct observations and have the highest reliability ranking as evidence to verify an emigrant trail. The 1846 and 1847 diaries' identified bad roads (rough, hilly and sidling) which match the topography of the north oxbow.
- Prediction 2: A GLO survey close in time to the 1846 and 1847 diaries has a medium reliability ranking as evidence to verify an emigrant trail (i.e., oxbow existed).
- Prediction 3: JA-13 Penny Ridge existed ca., 1846 through 1855 - 1856 and relocated to the Hasis Drive corridor soon after the Native Americans were removed from the Rogue Valley.
- Prediction 4: JA-13 Penny Ridge existed ca., 1846 through a least 1895 (i.e., 1895 Official Map of Josephine County).
- Prediction 5: The GLO surveyors were very credible did not make a mistake, and the accuracy of the GLO surveys can be trusted.
- Prediction 6: The Oxbow *Trail* Route is from JA-12 to JA-13 to JA-14.
- Prediction 7: JA-13 Penny Ridge does not exist and there is no Oxbow of the Applegate Trail.
- Prediction 8: There is a surveying error in the field notes describing the topography along the section line (i.e., the topography is reversed from Penny Ridge to Maple Creek).
- Prediction 9: The Jacksonville Road is misrepresented on the 1855 GLO survey and 1856 GLO map as being on the Penny Ridge; the road is up Maple Creek, resulting in no Oxbow.
- Prediction 10: JA-13 GLO Survey in Error and Route is the Hasis Drive Corridor from JA-12 to JA-14.
- Prediction 11: JA-13 GLO Survey in error and accuracy of the GLO surveys can not be trusted.
- Prediction 12: 1895 Official Map of Josephine County is in error and can not be trusted.
- Prediction 13: 1895 Official Map of Josephine County is correct and can be trusted.

b) Applegate Trail I For North Sexton Pass I-5 East (1,060'): Scientific Prediction/MET Interpretations of Probability

- Prediction 1: Applegate Trail I For North Sexton Pass I-5 East (1,060') was under the later auto roads and 1940 highway construction and access roads and 1940 Oregon Highway Department strip maps can be trusted.
- Prediction 2: The ATI For North Sexton Pass I-5 East not the evolution of *Trail* and 1940 Oregon Highway Department strip maps can not be trusted.

c) JA-17, JR Of Applegate Trail: Grave Creek Road (JA-17B): Scientific Prediction/MET Interpretations of Probability

- Prediction 1: JA-17 existed ca., 1846 - 1874? and covered bridge location was developed later.
- Prediction 2: JA-17 existed and there is confirming evidence of the accuracy of the GLO survey (Corroborative Rule).
- Prediction 3: The GLO surveyors did not make a mistake and accuracy of the GLO surveys can be trusted.
- Prediction 4: JA-17 GLO Survey in error and accuracy of the GLO surveys can not be trusted.

5. Testing Done In Locating And Verifying Emigrant Trails This is an investigation of whether the real world behaves as predicted by the hypothesis. Scientists (and other people) test hypotheses by conducting experiments. The purpose of an experiment is to determine whether observations of the real world agree with or conflict with the predictions derived from an hypothesis. If they agree, confidence in the hypothesis increases; otherwise, it decreases. Agreement does not assure that the hypothesis is true; future experiments may reveal problems.

Failure of an experiment does not necessarily mean the hypothesis is false. Experiments always depend on several hypotheses, e.g., that the test equipment is working properly, and a failure may be a failure of one of the auxiliary hypotheses. Experiments can be conducted in a college lab, in a neighbor's livingroom, at the bottom of an ocean, on Mars (using one of the working rovers), and so on.

Both the scientific method and met manual method follow the evidence.

- MET CS 1. Examine and Document All the Relevant Written, Cartographic, Physical, and Artifact Evidence (MET, p. 5).
- MET CS 2. Evaluate General Principles of Trail Location & Verification (MET, p. 4).
- MET CS 3. Apply Cardinal Rules of Trail Verification for Conformance (MET, p. 5).
 - . Coherence Rule. Linear Uniformity.
 - . Corroborative Rule. Confirming Evidence.
 - . Collateral Rule. Physical/Topo Evidence.
 - . Correlation Rule. Overall Agreement.
- MET CS 4. Rank Reliability of Different Types of Evidence Used to Verify Trail Location (MET, pps. 5 - 8).
- MET CS 5. Evaluate Applicability of Guidelines for Locating Wagon Trails (MET, pps. 8 - 11).
- MET CS 6. Classify Trail Location with the Classification Categories (MET, p. 13 - 16).
- MET CS 1. Document All the Relevant Evidence

a) JA-13 Penny Ridge: Testing/Investigation The HETC's conflicting evidence for JA-13 made it difficult verifying the *Trail* location. In the best of situations, the *Trail* researcher examines all the relevant written, cartographic, physical, and artifact evidence, and finds them mutually supporting. What does the researcher do when different kinds of evidence conflict? How does one determine the relative reliability of different types of evidence? The JA-13 Penny Ridge Predictions for testing follow.

- Prediction 5: The Oxbow *Trail* Route is from JA-12 to JA-13 to JA-14.
- Prediction 6: JA-13 GLO Survey in Error and Route is the Hasis Drive Corridor from JA-12 to JA-14.

(1) MET CS 3 Apply Cardinal Rules of Trail Verification for Conformance

(a) Mutually Supporting Evidence There is a large amount of interpretive information and maps dated later than 1855 supporting the existence of JA-13 (see Section III.B.1.a)).

(b) Not Mutually Supporting Evidence Later conflicting evidence for JA-13 would make it necessary to consider the ranking the reliability of different types of evidence used to verify the *Trail* site (see Section III.B.1.a)).

(c) Apply Cardinal Rules of Trail Verification for Conformance Applying the cardinal rules involves compliance with MET CS 1, 2, 3, & 5.

- MET CS 1. Examine and Document All the Relevant Written, Cartographic, Physical, and Artifact Evidence (MET, p. 5).
- MET CS 2. Evaluate General Principles of Trail Location & Verification (MET, p. 4).
- MET CS 5. Evaluate Applicability of Guidelines for Locating Wagon Trails (MET, pps. 8 - 11).
- MET CS 3. Apply Cardinal Rules of Trail Verification for Conformance (MET, p. 5).
 - . Coherence Rule. Linear Uniformity.
 - . Corroborative Rule. Confirming Evidence.
 - . Collateral Rule. Physical/Topo Evidence.
 - . Correlation Rule. Overall Agreement.

The cardinal rules can be, and were, interpreted to support both: 1. the GLO JA-13 Penny Ridge emigrant trail site (i.e., mutually supporting evidence), and 2. the Jacksonville Road was misrepresented as being on the Penny Ridge.

1. Hypothesis: There is a surveying error in the field notes describing the topography along the section line.
2. Hypothesis: The Jacksonville Road is misrepresented as being on the Penny Ridge
3. Hypothesis: GLO JA-13 survey is in error and route is the Hasis Drive Corridor from JA-12 to JA-14

(2) MET CS 4. Rank Reliability of Different Types of Evidence Used to Verify Trail Location

The following tables, for the three “Conflicting Evidence Trail Sites” (Section III.B.1.), are one example how to document MET CS 4 (i.e., Rank Reliability of Different Types of Evidence Used to Verify Trail Location). These three tables are not intended to be comprehensive, and do not represent a MET CS 4 analysis. They are for illustration only.

- Table 1: JA-13 MET CS 4 Reliability Ranking
- Table 2: Applegate Trail I For North Sexton Pass MET CS 4 Reliability Ranking
- Table 3: JA-17 MET CS 4 Reliability Ranking

(a) JA-13 Penny Ridge

In a nut shell the significant mutually supporting evidence are the 1846 and 1847 diaries, the 1855 GLO survey and 1856 GLO survey map, and recent evidence and documentation. The conflicting evidence is all recent evidence and documentation. On the reliability scale of 1 - 8, 1 has the highest level of reliability (Section I.A.2; Table 1; Appendix B).

- 1846 and 1847 diaries rank No. 1 for reliability.
- 1855 GLO Survey & 1856 GLO survey map rank No. 8 for reliability.
- All other supporting evidence ranks No. 8 for reliability.
- All conflicting evidence ranks No. 8 for reliability.

(b) Applegate Trail I For North Sexton Pass I-5 East

The significant mutually supporting evidence are the written eyewitness descriptions of Francis Johnson of the 1846 - 1855 summit of Sexton Pass, 1855 GLO survey and 1856 survey for South Rat Creek JA-15A, and 1940 Oregon Highway Sheet Map, and other recent evidence and documentation. The conflicting evidence is all recent evidence and documentation. On the reliability scale of 1 - 8, 1 has the highest level of reliability (Section I.A.2; Table 2; Appendix B).

- Written eyewitness descriptions of Francis Johnson of the 1846 - 1855 summit of Sexton Pass ranks No. 1 for reliability.
- 1855 GLO survey and 1856 survey for South Rat Creek JA-15A survey map rank No. 5 for reliability.
- 1940 Oregon Highway Sheet Map ranks No. 6 for reliability.
- All other supporting evidence ranks No. 8 for reliability.
- All conflicting evidence ranks No. 8 for reliability.

(c) JA-17, JR Of Applegate Trail: Grave Creek Road

The significant mutually supporting evidence for the validity of JA-17, JR Of Applegate Trail Grave Creek Road are the 1855 GLO survey and 1856 survey, the 1857 DLC survey and map, and recent evidence and documentation. The conflicting evidence is all recent evidence and documentation. On the reliability scale of 1 - 8, 1 has the highest level of reliability (Section I.A.2; Table 3; Appendix B).

- 1855 GLO Survey & 1856 GLO survey map rank No. 5 for reliability.
- 1857 DLC survey and map rank No. 5 for reliability per Appendix B. However, one could argue that the DLC claimant's survey was his personal written eyewitness description and, therefore, ranked No. 1 for reliability (i.e., DLC claimant may not have actually completed the DLC survey, but he approved it as true because he was personally using it as evidence to file a claim).
- All other supporting evidence ranks No. 8 for reliability.
- All conflicting evidence ranks No. 8 for reliability.

6. Analysis/Verification Completed In Locating And Verifying Emigrant Trails This involves determining what the results of the experiment show and deciding on the next actions to take. The predictions of the hypothesis are compared to those of the null hypothesis, to determine which is better able to explain the data. In cases where an experiment is repeated many times, a statistical analysis such as a chi-squared test may be required. If the evidence has falsified the hypothesis, a new hypothesis is required; if the experiment supports the hypothesis but the evidence is not strong enough for high confidence, other predictions from the hypothesis must be tested. Once a hypothesis is strongly supported by evidence, a new question can be asked to provide further insight on the same topic. Evidence from other scientists and experience are frequently incorporated at any stage in the process. Many iterations may be required to gather sufficient evidence to answer a question with confidence, or to build up many answers to highly specific questions in order to answer a single broader question.

This model underlies the scientific revolution. One thousand years ago, Alhazen demonstrated the importance of forming questions and subsequently testing them, an approach which was advocated by Galileo in 1638 with the publication of *Two New Sciences*. The current method is based on a hypothetico-deductive model formulated in the 20th century, although it has undergone significant revision since first proposed.

The hypothetico-deductive model or method is a proposed description of scientific method. According to it, scientific inquiry proceeds by formulating a hypothesis in a form that could conceivably be falsified by a test on observable data. A test that could and does run contrary to predictions of the hypothesis is taken as a falsification of the hypothesis. A test that could but does not run contrary to the hypothesis corroborates the theory. It is then proposed to compare the explanatory value of competing hypotheses by testing how stringently they are corroborated by their predictions (http://en.wikipedia.org/wiki/Hypothetico-deductive_model. From Wikipedia, the free encyclopedia, Downloaded December 4, 2013).

The equivalent MET Manual process for the scientific method of “analysis” involves a final interpretation of MET CS 1, 3, 4, & 6 to verify, or not, an emigrant trail location. This includes deciding on the next actions to take.

- MET CS 1. Examine and Document All the Relevant Written, Cartographic, Physical, and Artifact Evidence
- MET CS 3. Apply Cardinal Rules of Trail Verification for Conformance.
- MET CS 4. Rank Reliability of Different Types of Evidence Used to Verify Trail Location
- MET CS 6. Classify Trail Location with Emigrant Trail Classification Categories.
- MET CS 1. Document All the Relevant Evidence

a) JA-13 Penny Ridge: Analysis/Verification Interpretive Opinion

- MET CS 1. A huge amount of supporting and conflicting evidence was examined and documented. However, the researchers for the supporting evidence did not document any analysis they might have conducted for the conflicting evidence, and the researchers for the conflicting evidence did not document any analysis they might have conducted for the supporting evidence. The researchers for both the supporting and conflicting evidence and not in compliance with the documentation requirements of MET CS 1.
- MET CS 3. The cardinal rules can be, and were, interpreted to support both the GLO JA-13 Penny Ridge emigrant trail site (i.e., mutually supporting evidence), and to support three conflicting evidence hypotheses. The same compliance problem occurred here as for MET CS 1. The researchers for both the supporting and conflicting evidence and not in compliance with the documentation requirements of MET CS 3.
- MET CS 4. The researchers for both the supporting and conflicting evidence did not rank the reliability of different types of evidence used to verify trail location in any systematic comprehensive way. Everything else being equal, the illustrative ranking of this paper would have given a higher reliability of the GLO JA-13 Penny Ridge site as verified.
- 1846 and 1847 diaries rank No. 1 for reliability.
 - 1855 GLO Survey & 1856 GLO survey map rank No. 8 for reliability.
 - All other supporting evidence ranks No. 8 for reliability.
 - All conflicting evidence ranks No. 8 for reliability.
- MET CS 6. If it exists the GLO JA-13 Penny Ridge site would have an emigrant trail classification category of Class ③ or Class ④ Verified Trail.
- MET CS 1. Document All the Relevant Evidence. The researchers for both the supporting and conflicting evidence and not in compliance with the documentation requirements of MET CS 1.

The author's opinion is that the HETC is still in the process of examining and documenting all the supporting and conflicting evidence for compliance with MET CS 1 - 6.

b) Applegate Trail I For North Sexton Pass I-5 East (1,060'): Analysis/Verification Interpretive Opinion

- MET CS 1. A huge amount of supporting evidence was examined and documented.
- MET CS 3. The cardinal rules were interpreted to support Applegate Trail I For North Sexton Pass I-5 East as a verified site.
- MET CS 4. The researchers for both the supporting and conflicting evidence did not rank the reliability of different types of evidence used to verify trail location in any systematic comprehensive way. Everything else being equal, the illustrative ranking of this paper would have given a higher reliability of the Applegate Trail I site as verified.
- Written eyewitness descriptions of Francis Johnson of the 1846 - 1855 summit of Sexton Pass ranks No. 1 for reliability.
 - 1855 GLO survey and 1856 survey for South Rat Creek JA-15A survey map rank No. 5 for reliability.
 - 1940 Oregon Highway Sheet Map ranks No. 6 for reliability.
 - All other supporting evidence ranks No. 8 for reliability.
 - All conflicting evidence ranks No. 8 for reliability.
- MET CS 6. The Applegate Trail I site was verified as having emigrant trail classification category of Class ③ or Class ④ Verified Trail.
- MET CS 1. Document All the Relevant Evidence. The researchers for both the supporting evidence are not in compliance with the documentation requirements of MET CS 1.

While not strictly in compliance with MET CS 1 - 6, the HETC has a “Analysis/Verification Interpretive Opinion” it is comfortable with.

c) JA-17, JR Of Applegate Trail: Grave Creek Road (JA-17B): Analysis/Verification Interpretive Opinion

- MET CS 1. A huge amount of supporting evidence was examined and documented.
- MET CS 3. The cardinal rules were interpreted to support Grave Creek Road (JA-17B) as a verified site.
- MET CS 4. The researchers for both the supporting and conflicting evidence did not rank the reliability of different types of evidence used to verify trail location in any systematic comprehensive way. Everything else being equal, the illustrative ranking of this paper would have given a higher reliability of the Grave Creek Road (JA-17B) site as verified.
- 1855 GLO Survey & 1856 GLO survey map rank No. 5 for reliability.
 - 1857 DLC survey and map rank No. 5 for reliability per Appendix B. However, one could argue that the DLC claimant's survey was his personal written eyewitness description and, therefore, ranked No. 1 for reliability (i.e., DLC claimant may not have actually completed the DLC survey, but he approved it as true because he was personally using it as evidence to file a claim).
 - All other supporting evidence ranks No. 8 for reliability.
 - All conflicting evidence ranks No. 8 for reliability.
- MET CS 6. The Grave Creek Road (JA-17B) site was verified as having emigrant trail classification category of Class ③ Verified Trail.
- MET CS 1. Document All the Relevant Evidence. The researchers for both the supporting evidence are not in compliance with the documentation requirements of MET CS 1.

While not strictly in compliance with MET CS 1 - 6, the HETC has a "Analysis/Verification Interpretive Opinion" it is comfortable with.

IV. SUMMARY/CONCLUSIONS

The MET is not the scientific method, but the similarities are numerous. The author's evaluation of the MET Manual and the Scientific Method found the following similarities (Section III.A).

- Knowledge Improves Understanding
- Application Of Method Becomes More Effective Over
- Process Involves Testing Hypotheses
- Quality Control Must Replicate Results
- Open To Scrutiny Outside Primary Research Team
- Public Documentation

Though the scientific method is often presented as a fixed sequence of steps, they are better considered as general principles. Not all steps take place in every scientific inquiry (or to the same degree), and not always in the same order.

- Formulation of a Question
- Hypothesis
- Prediction
- Testing
- Analysis

The scientific method also includes other components required even when all the iterations of the steps above have been completed.

- Replication
- External review
- Data recording and sharing

The author is still enamored with the research, analyses, and public documentation similarities between the scientific method and the MET method. He is satisfied with the MET CS 4 table approach as an example of how to document MET CS 4 "Rank Reliability of Different Types of Evidence Used to Verify Trail Location." The table approach is not intended to be comprehensive, and does not represent a MET CS 4 analysis. For the author it represents the power of illustration for the purpose of supplementing the analysis.

The focus of this paper was on the similarities between scientific method and MET manual method in locating and verifying emigrant trails. It was not about the mutually supporting and conflicting evidence which was not complete. The evidence examples were included to make the paper real, and not just an explanation of another boring process.

The paper is considered by the author as a working draft, and it will undoubtedly continue to evolve over time. He is interested in partners for any future update of this paper, especially with members of the HETC, and/or NWOCTA members.

Appendix A. Bibliographic Elements

What Are Bibliographic Elements?

Northwest State University of Louisiana

<http://libguides.nsula.edu/content.php?pid=232347&sid=1922498>

Bibliographic elements are the pieces of information you get from a book, journal/periodical/magazine, newspaper, or Internet resource that you will then use to do create your works cited or bibliography entry for your paper.

Why is this important? Proper citing of sources is essential to creating good scholarship and to preventing plagiarism, so utilize all the resources available to you.

Newspapers

- Article Author
- Article Title
- Newspaper Title
- Date
- Page(s)
- Format e.g. print or electronic

Books

- Author
- Title
- Publisher
- Place of Publication
- Date of Publication

The medium of publication for all “hard copy” books is Print.

Internet Resources

- Author and/or editor names (if available)
- Article name in quotation marks (if applicable)
- Title of the Website
- Any version numbers available, including revisions, posting dates, volumes, or issue numbers.
- Publisher information, including the publisher name and publishing date.
- Take note of any page numbers (if available).
- Medium of publication.
- Date you accessed the material.
- URL (if required, or for your own personal reference).

Journal Articles

- Article Author
- Article Title
- Journal Title
- Volume
- Issue
- Date
- Inclusive Pages

Periodicals (e.g. magazines, newspapers, and scholarly journals) that appear in print require the same medium of publication designator—Print—as books.

Appendix B. Ranking The Reliability of Different Types of Evidence

Ranking The Reliability Of Different Types Of Trail Evidence Used To Verify Trail Location (MET, pps. 5 - 8)

MET Manual. Trail Mapping Committee. July 2002, 4th edition. *Mapping Emigrant Trails MET Manual*. Office of National Trails Preservation & Oregon-California Trails Association. Independence, MO.

As nearly as possible, the following ranking reflects the relative reliability of available evidence.

1. Written eyewitness descriptions that locate the trail with reasonable accuracy or exactness, such as detailed diaries, journals, letters, newspaper accounts, and reports of the Army Topographical Engineers describing newly-opened trails.
2. Written eyewitness descriptions that locate the trail in a general way or direction, such as less detailed diaries, journals, letters, emigrant guides or logs, and the more detailed recollections/reminiscences.
3. Remaining physical, vegetation, or artifact evidence of wagon trails that correspond to either diary or plat evidence, such as traces, ruts, swales, wagon parts, differential vegetation, etc.
 - Archaeological reports and surveys either by universities, state, or federal agencies can assist in locating physical remains of emigrant trails.
 - Remote-sensing technology that detects subsurface ground anomalies, using computer-assisted image interpretation, show great potential for locating physical and artifact remains.
4. General Land Office (GLO) cadastral survey plats.
 - The earliest GLO surveys in the west were conducted only along township boundaries.
 - Later GLO surveys were conducted along section lines within each township.
5. Topographic features that serve to confine wagon travel can aid interpretation of sketchy diary accounts and GLO plats. However, emigrant trails often defy modern reasoning on the route these trails should have taken. Be cautious, therefore, of second guessing emigrant reasoning and practices.
6. Reports that describe the location of emigrant trails, such as federal, state, county, territorial, military, and railroad surveys undertaken in the 1850s and later. State highway/transportation department surveys at the beginning of the motor vehicle period, sometimes conducted along or across earlier emigrant trail routes, may prove useful.
7. Maps that show the location of either emigrant trails or possible emigrant trails.
 - The earliest mapping usually was the most general in that the maps covered large regions. Maps of this type include early surveys commissioned by state agencies and legislatures, maps of the Army Topographical Engineers and maps of the Pacific Wagon Road Office of the Department of the Interior.
 - An exception is T. H. Jefferson's large scale 1846 *Map of the Emigrant Road from Independence, Mo., to St. Francisco, California* which has proved very useful in determining the early emigrant route to California.
 - Late 19th century maps that may reveal emigrant routes, such as early USGS. topographic quadrangles and early county maps often located in county records or recorders offices..
8. Recent evidence and documentation (not necessarily in order of reliability).
 - Published trail descriptions and maps by historians and government agencies. Also trail studies/reports produced by consultants for government agency use.
 - Trail-location knowledge of trail buffs, local residents, ranchers, foresters, and government agency personnel.
 - USGS. Orthophoto Quadrangles (7.5 minute) may reveal the location of trail segments not readily visible on the ground.
 - Aerial photographs. (Refer to Fact Sheets on aerial photography and two pages on availability and use of aerial photography at the end of Appendix G.)

Appendix C. Outline of *Indian Trail Over Grave Creek Hills: 1855*

Maps For Use In Identifying & Mapping Indian Trails, Indian Trail Over Grave Creek Hills: 1855

Hugo Native American Program

Hugo Neighborhood Association & Historical Society

http://www.hugoneighborhood.org/Hugo_Native_American_Program.htm

Hugo Native American Team, Hugo Neighborhood Association & Historical Society. August 12, 2012. *Maps For Use In Identifying & Mapping Indian Trails, Indian Trail Over Grave Creek Hills: 1855*. Hugo, OR.

EXECUTIVE SUMMARY

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- A. Land Surveys Key In Western Oregon
- B. Takelma Indians Here First
- C. Its History When Written
- D. Summary

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- A. Applegate Trail In Hugo Region: 1846 - 1883
- B. Oxbow Of Applegate Trail Means Multiple Trails
- C. Early Land Grants Along Applegate Trail
- D. Working Trail Evolution Hypotheses
- E. Summary

III. 1856 GLO T.34S., R.6W., W.M. PLAT

- A. Reliability Of GLO Notes & Plats
 - 1. GLO Surveyors
 - a) Butler Ives & George Hyde - U.S. Deputy Surveyors
 - b) George Hyde & Wells Lake - U.S. Deputy Surveyors
 - 2. GLO Rough & Copies Field Notes & Draftsman Transcribed Field Notes
 - 3. GLO Section Line Surveys
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- B. GLO Surveyors Hyde & Lake Survey Notes For Indian Trails
- C. 1894 GLO Plat for T.34S., R.6W., W.M.
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- 4. Quartz Creek Indian Trail
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- VI. INDIAN TRAIL OVER GRAVE CREEK HILLS INTERPRETATIONS
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 - 1. Takelma Indians: 2002
 - 2. 1856 GLO Plat: 2005 - 2007
 - B. Frances Johnson, Takelma Indian
 - C. Takelma Indians Without Horses
 - D. Evolution Of The Oxbow Of Indian Trail
 - 1. Walking Trail: 10,000 Years - 1820s
 - a) Ridges of North Oxbow
 - b) Soils of Maple Creek Wetlands
 - 2. Walking and Pack Animal Trail: 1820s - 1846
 - 3. Walking, Pack Animal, and Wagon Trail: 1846 - 1883
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 - E. Trail Interpretations
 - 1. Grave Creek Hills Indian Trail Existed
 - 2. Oxbow In Indian Walking Trail Did Not Exist
 - 3. Oxbow Developed By Hudson Bay Trappers' Pack Trail
 - 4. Oxbow Pack Trail Used And Widened By Emigrants In Wagons
 - F. Summary Interpretations of Indian Trail Over GCHills
- VII. DOCUMENT VERIFICATION & RELIABILITY OF EVIDENCE
- VIII. CONCLUSIONS
- IX. FUTURE INVESTIGATIONS: APRIL 12, 2014
- A. Analysis Of Section Line 22 & 27, 1855 GLO T.34S., R.6W., W.M. Survey Notes
 - 1. Drake Email Analysis: December 7, 2013
 - 2. Black Analysis Paper: December 12, 2013
 - 3. Drake & Rarey Paper Analysis: December 21, 2013
 - 4. Nickerson Email Analysis: December 9, 2013 - January 7, 2014
 - a) December 9, 2013 Email
 - b) January 7, 2014 Email
 - a) January 20, 2014 Email. Applegate Field Notes And/or Map Hold the Defining Answer to the Questionable Oxbow
 - b) Maps Drawn by a Person Unknown Based on Information from Jesse Applegate's 1853 Military Road Survey
 - c) Roberts' February 14, 2014 Paper: 1846 Applegate Trail "Oxbow"
 - d) Vote By Hugo Emigrant Trails Committee
 - B. Alternate Jacksonville Road Routes Of Applegate Trail: 1855
 - C. Future Alternative Actions
 - 1. Future Work
 - 2. HNAT Position/Actions
 - 3. HETC Position/Actions
 - 4. HNA&HS Position/Actions

**Appendix D. Indian Trail Over Grave Creek Hills: 1855
Including Paper, Appendices, Footnotes, & Maps**

Maps For Use In Identifying & Mapping Indian Trails, Indian Trail Over Grave Creek Hills: 1855

Hugo Native American Program

Hugo Neighborhood Association & Historical Society

http://www.hugoneighborhood.org/Hugo_Native_American_Program.htm

Hugo Native American Team, Hugo Neighborhood Association & Historical Society. August 12, 2012. *Maps For Use In Identifying & Mapping Indian Trails, Indian Trail Over Grave Creek Hills: 1855*. Hugo, OR.

VI. PAPERS

FA. Indian Trail Over Grave Creek Hills: 1855 (Chapters I - V)

FB. Indian Trail Over Grave Creek Hills: 1855 (Chapters VI - IX)

Appendices

- Appx. A. NW Chapter, OCTA September 11, 2010 Applegate Trail Field Trip, Josephine County, Oregon.
- Appx. B. Hugo Native American Team
- Appx. C. Its History When Written
- Appx. D. Using General Land Office Notes And Maps To Relocate Trail Related Features
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- Map A6. Topographic Features & Roads North Of Garbers Pass: 1998
- Map A7. Alternate Jacksonville Road Routes Of Applegate Trail: 1855
- Map A8. No Oxbow In Indian Trail Over Grave Creek Hills: Interpretation