SUBMITTED BY:
Company Name: 7Q10, Inc.
Address: 401 Court Street, McCarran Mansion, 2nd Floor, Reno, Nevada 89501
Phone Number: 775-828-1991 and/or 775-287-9038
Email Address: lcarpenter@7q10.com
Web Site Address: www.7q10.com
Fax Number: 775-828-2302
Contact Person: Lori Carpenter, PWS, CPESC, Hydrologist
Executive Summary Detailing Proposed Concepts Is Due By: 5:00 pm on May 24, 2013

EXECUTIVE SUMMARY

The 7Q10 framework would meet the state's objective of no net loss of sage-grouse habitat. The conservation credit system would also integrate with the habitat suitability modeling because it's GIS based making it flexible to accommodate scientific studies, public transparency and regulatory objectives. The conservation credit system would provide methodology on suitable methods that could be expanded from sage grouse habitat to the Nevada sagebrush ecosystem. As directed, data would be provided on a GIS web-based environment to provide a high degree of transparency during the public process.

Additional information not specifically requested and which 7Q10 deems important and relevant is provided on our website for your use. In July of 2012, 7Q10, Inc., prepared and offered for public use a *Draft Proposed Sage Brush Habitat Mitigation Banking Strategy-One Potential Solution to Increase Sage Brush Ecosystems for Lands within Nevada - Revision 2* and posted it on our website. The draft document above was an initial draft and since 2012 other sections have been filled in. That draft has not been made publically available as yet. We also created an interactive website with the various agency GIS data for public use for the non-GIS User. Try it out at: http://gisweb.unr.edu/sagegrouse_24B/. From the beginning 7Q10's philosophy has been to present the scientific information so the public could be informed when making decisions.

In the draft document we explained that the definition of mitigation or, conservation credits should be quantifiable in order to meet federal standards with respect to the proposed T&E listing of the sage-grouse. In the draft document we also explained potential metrics for a mitigation credit system consistent with federal law and agency policies. The RFI stated that the system should be consistent with on-going efforts by the USGS and specifically Dr. Peter Coates. Dr. Coates research seeks to develop a broader understanding of how human-caused landscape changes affect communities and aims to identify restoration practices that preserve natural ecological processes. The initial work developed by 7Q10 in the Draft Plan defined methodologies that are scientifically and legally defensible in changing environments and would be consistent with Dr. Coats' research in behavioral traits of sage-grouse that affect population establishment and persistence in the face of environmental challenges.

7Q10 has been in contact with State and Federal agencies and has not had the benefit of speaking with Dr. Coats yet. 7Q10 has an excellent reputation for working with multiple agencies and scientists on complex projects and believes that working with Dr. Coats would not present any issues or concerns.

7Q10 has worked with, developed and utilized habitat suitability indexes in GIS and other software packages such as ERDAS Imagine on many other projects over large areas. In fact, we're developing a computer processing technique with a Beowulf cluster to further analyze the state and federal agency GIS data quicker and more efficiently.

Initially, 7Q10 reviewed the BLM/NDOW GIS database and after initial analysis found anomalies within the data. Utilizing different federal and private GIS databases[1] and life cycle requirements of the Sage Grouse, we initially took the winter habitat data (Category 2) and created a database with mapping layers within the PMUs. We isolated winter habitat polygons against ownership with appurtenant data layers to better understand the continuous and contiguous polygon patterns. Results are very interesting with respect to the location of winter habitat and whether there is enough to support recovery efforts. A basic question could be is there enough winter habitat to support sage-grouse recovery? This type of analysis is cost efficient and allows for refined efforts that will focus on crucial issues related to the sage grouse that are important to Nevada and will easily adapt to a Nevada sagebrush ecosystem because the vegetation data is a layer within the model. This same technique can be utilize by Biologists to ask other important questions related to what habitat's out there and how best to preserve, enhance and mitigate.

7Q10 also developed a method to better understand control conditions utilizing the databases above. We compared both the BLM and NDOW categories and polygons against the Southwest Regional Gap Analysis Project (SWReGAP) to assess if the classificaitons were the same or, similar. We were able to isolate the polygons that are consistent with respect to vegetation and would conduct remote sensing analysis to further refine the baseline conditions. Because ground-truthing hasn't been completed for the initial GIS data it is important to assess how accurate the data set is or isn't. We hope to conduct ground truthing on an initial set of 100 polygons to assess the remote sensing accuracy utilizing a small unmanned aerial vehicle. Based on the results, we would continue to ground truth subsets until the remote sensing is accurate enough to define the base line conditions at a watershed or, statewide level. This methodology would also be available for pubic use. Without a baseline condition methodology it would be very difficult to establish criteria that will predict outcomes in the habitat suitability modeling.

Category 2 polygons once coupled with lek and other avian data are potentially the first cut of the best most suitable habitat that should potentially be preserved via land agreements or purchase and limiting inconsistent land use activities because they represent the preservation core that may yet define other restoration and mitigation activities. As stated, we would be utilizing a Beowulf cluster computer modeling technique because the ESRI software modeling is somewhat slow with large data such as these.

7Q10 has all of the above capabilities.

[1] NRCS Soils, National Wetland Inventory, National Hydrography Database, Nevada State Engineer's Well Data, BLM LR2000 Claim Data, BLM Fire GIS Data, Nevada National Heritage T&E GIS Data, Land Ownership, Vegetation data from the Southwest Regional Gap Analysis Project, geologic and geomorphic data, NDOW/BLM GIS and PMU databases, invasive species data and other data sets. 7Q10 will be requesting the NDOW sage grouse data.

REQUEST OF RESPONDENTS TO PROVIDE CONCEPTS FOR THE FOLLOWING	
Request	**Conceptual Response**
Metrics to be developed to determine fair market values for specific sage-grouse habitat, including different seasonal uses. **Fast Answer:** Metrics are typically developed using physical or biological variables which can be measured and therefore quantified with respect to price, and a fair market value assessment. Many models are currently utilized for wildlife purposes and are adapted to insure regulatory and policy compliance. Metrics typically involve an understanding of the baseline condition. Use of the existing GIS data would establish a baseline condition and metrics would be developed with appropriate scientists, planners and economists to achieve the fair market value that a proposed applicant would either pay for or individually implement and monitored until success criteria was achieved.	**Long Answer:** First it's important to define the terms. For the purpose of this discussion a *credit* is defined as that natural resource value placed that is translated into a monetary value or "credit". A credit can then be assessed for its value to the habitat for a specific wildlife species, vegetation community or the landscape position that a specific site lends to the entire habitat mosaic. In turn a *metric* is generally defined as the variable(s) that will be utilized to determine if that natural resource meets the *credit* criteria. A metric is generally a functional measurable scientifically and legally defensible variable utilized to make that assessment. The basis for determining fair market value would depend on the number of metrics a particular site meets. Therefore, credits are the quantification of a site's habitat value to the overall sage grouse recovery effort and the metrics established will be a gage utilized to assess metric success and ultimately compliance. With respect to the sage grouse, metrics should include both measurable variables which have a financial basis for cost such as land acquisition, water rights purchase and long term maintenance considerations and those variables that do not have a financial basis for cost such as biological criterion that contribute to habitat quality and quality. The metrics must include key biological criteria for the sage grouse life cycle and food web at important seasonal junctures, such as nesting, brooding or wintering needs. Generally, there is a known control group of quality habitat which includes those life cycle requirements that are measurable and then compared against the control situations and field studies or remote sensing analysis would be compared against the quality habitat criteria/metrics. The individual metrics must be developed with a qualified biologist who understands the sage grouse like Dr. Coats or other UNR scientists who are also experts so that variables like a sage grouse active lek or quality winter habitat can be ranked and then assessed for the fair market value.

	In this case the control group would be developed utilizing further GIS and remote sensing analysis with the addition of the sage grouse biological data (not available to the generally public). From this analysis, GIS polygons would be created to for use by Dr. Coats in the Habitat Suitability Modeling or others experts and other models as explained below.
Metrics to value types of habitat disturbances and impacts. **Short Answer:** The key to developing metrics is understanding the existing site condition and its watershed function (and therefore its contribution to the sage grouse recovery efforts).	**Long Answer:** An important aspect of developing metrics to assess value is an assessment of the project site before impacts occur or, pre-project habitat conditions at a landscape or watershed level. An adequate assessment of site functions and values is important for determining the relative importance of the existing resources on the site and to the region or watershed. Assessment results can provide a basis for modifying pre-disturbance plans to avoid and/or minimize impacts to these resources. The GIS analysis described in the paragraphs above this table would define the initial habitat type and its relative abundance within the watershed and potentially statewide. This would allow for a scientific basis for developing a value based habitat credit and would assist with how impacts to that peculiar habitat effect the overall recovery strategy. With respect to Dr. Coats and the metrics to value for various types of habitat disturbances and impacts, there may be value in a discussion to first, establish a series of Habitat Disturbance Indices (HDI) if there is not existing HDI widely used in research and practice. Archive research, interview with experts, or questionnaires could be used to identify those habitat disturbances and impacts. Based on experts' knowledge, or statistics, those important disturbances and impacts would be selected to be developed into HDI. For example, grazing is an important factor that affects the habitat, then number of cattle per acre, number of days used for grazing per season or per year, etc. may be two HDI in the metrics to be developed. The same applies to the road, width of road, area of road per acre may be other two HDI in the system. Secondly, classify every HDI. For example, number of days used for grazing may have five groups, zero days, less than a week, a week to two weeks, a month, two months to a season. The classification is must in order to further quantify the analysis.

	Thirdly, establish the system to assess/rate the HDIs. A quantitative assess value will be calculated and assigned to every class of every HDI. The calculation and assignation process will integrate with Habitat Suitability Modeling. That is, the higher the HDI, it will decrease the HSI more. If the HSM doesn't come up with such correlations as result analysis and statistics will be used to make a determination.
Structures and mechanisms for potential conservation credit systems. **Short Answer:** This may be sightly different based on whether the Conservation Credit System is a public or a private entity, or, if the restoration-preservation-enhancement is conducted on public or private properties. Every system should be consistent and should specify the methods for determining credits, setting performance standards to calculate credit availability, and devising accounting procedures to track the creation and use of such credits. Typically, a credit system is based on biological values or, structure and the mechanism is either compensatory mitigation, or voluntary mitigation in the form of a financial incentives and there is generally a phased establishment until conditions warrant. Key to this system is what happens over time (long term habitat scenarios), the length of time an area is monitored (if any), contingency measures (if any).	**Long Answer:** Structures and mechanisms for potential conservation credit should reflect an assessment of the degree of beneficial impacts (due to implementation) for the sage grouse recovery efforts. A chief consideration is compensatory mitigation ratios, or ratios, land ownership and long term maintenance endowments (if any). In theory, population viability analyses could be used to quantify the degree of impact on survival prospects. In practice, however, the information needed for rigorous population viability analyses is often unavailable and therefore field vegetation surveys, GIS and/or remote sensing analysis directly compared against control pre-project sage brush habitat areas, or, HSI could be made. Flexibility in the Conservation Credit System should allow for an independent analysis to be developed and utilized as long as the rationale for any differential weighting schemes is clearly articulated and can demonstrate regulatory compliance and be used within the habitat suitability model selected. It is recommended that the SEC consider several habitat models if they achieve the functional equivalent and meet compliance and recovery objective. This would allow for the implementation of future scientific developments and public-private partnerships. One consideration, if a set of criteria were given to the private sector they have the incentive to develop performance based methods that would achieve the compliance objectives for sage grouse recovery efforts. For example, a Toronto Canada Mining Company held a contest with a one-million dollar prize to an entity that could develop a means to economically mine a particular deposit that had significant value but with no current mining method at which to get to the ore. They put out the contest and reported that the Company got so many answers that they had a value of more than 10 million in new methodologies and did successfully mine the ore body.

A system of issuing credits over time as mitigation projects mature.	Generally a phased approach is utilized for issuing credits. During the establishment period after milestones are achieved a percentage of the credit is issued. There are many good examples in the scientific literature we'd like to discuss with you. One Example is included below: Credits are released as follows: a. 15% of the total anticipated Habitat Credits upon the Conservation or In-Lieu Fee Establishment Date. b. 25% of the total anticipated Habitat Credits upon submission of the as-built drawings and plans. c. 15% of the total anticipated Habitat Credits upon attainment of year two Performance Standards. d. 15% of the total anticipated Habitat Credits upon attainment of year three Performance Standards and a verified Habitat. determination. e. 15% of the total anticipated Habitat Credits upon attainment of year four Performance Standards. f. All remaining Habitat Credits upon attainment of year five Performance Standards and a verified Habitat determination.
Metrics to be developed for mitigation actions that address and reduce the risks to greater sage-grouse and their habitat in Nevada. Concepts should include, but not be limited to: **Short Answer:** Metrics would also take the form of abating the threats to habitat such as: • fire suppression, • invasive weed abatement, • vegetation management, • purchase of water rights, • water resources management, • seed base protection/farming, etc.	**Long Answer:** The purpose of a mitigation metric is to demonstrate compliance. Therefore, metrics could follow a hierarchical approach of: (1) avoiding impacts where possible (by seeking alternative sites); (2) minimizing impacts that cannot be avoided (through alternative project configurations or other means); and (3) providing appropriate compensation (mitigation) for those impacts that can neither be avoided nor minimized to a non-significant level. Metrics should be consistent with the final habitat suitability model that is ultimately selected and not so limiting that the metrics can't be applied to other publically available methods. The system should consider actions that are temporary impacts. Temporary impacts could be defined as adverse impacts to sagebrush habitat that are rectified within 24 to 36 months from the date the impact occurred. Applicants for projects that involve temporary impacts to sagebrush habitats could provide a rehabilitation plan for rectification of temporary impacts. Rectification must include re-establishment of pre-existing contours and replacement of pre-existing vegetation. A monitoring plan to confirm the reestablishment of vegetation may also be required along with continency measures, adaptive management and financial surety bonds.

	There are many other publically available conservation credit systems and 7Q10 would review these for applicability to Nevada. One example is an In-lieu fee program which involves the restoration, establishment, enhancement, and/or preservation through funds paid to a governmental, private, or non-profit natural resources management program sponsor to satisfy compensatory mitigation requirements. Funds are often received by the in-lieu fee program sponsor prior to undertaking compensatory mitigation projects.
a. Actions on public and private lands; **Short Answer:** Identify the impacts with the greatest land disturbance and utilize this category with local, state or federal agencies that when an application comes in with this type of land disturbance it must also be reviewed under the Sage Grouse Recovery efforts.	**Long Answer:** Identify the areas of greatest importance and set them aside. Public Lands: Further identify criterial habitat areas as described herein and set them aside until further work can be conducted by an applicant or the State. In the text above this table it was identified that there are approximately four million polygons on BLM lands that meet the winter habitat classification. Would it be prudent to review these polygons for proposed land use and set them aside now until further individual work can be conducted? Private Lands: From the critical areas identified above, those parcels located on private lands could be identified as opportunities for private-public partnerships. Any metrics developed need to be consistent with present regulatory polices and permits. Also see the Proposed Draft Sage Brush Habitat Mitigation Banking Strategy: One Potential Solution to Increase Sage Brush Ecosystem for Lands Within Nevada (http://7q10.com/admin/admin/wp-content/uploads/2012/07/sagebrushr10.pdf).
b. Actions in seasonal habitats;	Seasonal habitat is sensitive to land use in late summer and winter. The quality of seasonal habitats are subject to climate and rainfall patterns in March or April. Therefore, metrics would be developed that consider impacts to and seasonal habitat requirements.
c. Actions that incorporate state and transition models to guide treatments that would maintain or enhance ecological resistance to invasive weeds and site resilience	Metrics that involve contingency measures would be developed. 7Q10 would development management strategics that anticipate likely challenges associated with habitat objectives and provide for the implementation of actions to address those challenges, as well as unforeseen changes to those projects. It requires

after disturbance; and,	consideration of the risk, uncertainty, and dynamic nature of proposed projects and guides modification of those projects to optimize performance. It includes the selection of appropriate measures that will ensure that the resource functions are provided and involves analysis of monitoring results to identify potential problems and the identification and implementation of measures to rectify those problems.
d. Actions that address wildfire and invasive species.	Metrics would be developed based on the proposed threat and the activity to mitigate the threat. These need to be in conformance with other national policy and the statewide sage grouse recovery planning efforts. Because the mitigation strategy is 'threat based' local communities can evaluate the threats to sagebrush habitat/ecosystems in their area and apply mitigation techniques and strategies most needed. For example, there are several GIS models that assess fire risk that could be incorporated. Drought is a good predictor of invasive species. Invasive species such as cheat grass have a tremendous amount of published literature and there are many groups both in Nevada and in neighboring states faced with cheat grass eradication and these proven methods would be incorporated.

Additional Random Thoughts About Metrics/Value & Modeling:

I) First, establish a series of Habitat Disturbance Indices (HDI) if there is not an existing HDI widely used in research and practice. Archive research, interview with experts, or questionnaires could be used to identify those habitat disturbances and impacts. Based on experts' knowledge, statistics, the important disturbances and impacts would be selected and developed into HDI. For example, grazing is an important factor that affects the habitat, then number of cattle per acre, number of days used for grazing per season or per year, etc. may be two HDI in the metrics to be developed. The same applies to the roads, Width of road, area of road per acre may be other two HDI in the system.

Secondly, classify every HDI. For example, number of days used for grazing may have five groups, zero days, less than a week, a week to two weeks, a month, two months to a season. The classification is must in order to further quantitative analysis.

Thirdly, establish the system to assess/rate the HDIs. A quantitative assess value would be calculated and assigned to every class of every HDI. The calculation and assignation process will integrate with Habitat Suitability Modeling. That is, the higher the HDI will decrease the HSI more. If the HSM doesn't come up with such correlations as result, additional analysis and statistics will be used to determine.

II) Metrics need to consider ecological time when considering value. One might ask, does the habitat credit equal the investment that is needed to develop, restore or 'upgrade-enhance' the land to be suitable for sage grouse species? For example, Land A, might be assessed at one-half million US dollars and is barely suitable (HSI = 1 or 10%) for Sage Grouse. However, after years (n-years) investment in restoration, Land A becomes very suitable (HSI =10 or 100%) for Sage Grouse. Taken into consideration of the market fluctuation, Land A's fair market value may have been increased or decreased by r% per year. Now Land A is worth one-half Million * (1 + f%)^n + the Years Investment. The years investment can be pre-calculated if we know the money needed per acre per 10% HSI change.