FEASIBILITY STATEMENTS FOR CLAYTON'S COPPER GOALS & OBJECTIVES

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The desirability, feasibility, habitat capability, and possible consequences of the recommended Clayton's copper objectives are presented below. To achieve the stated objectives, survey and monitoring programs, habitat management activities, research, and outreach will all have to be increased significantly. The necessary financial and staff resources to meet these objectives are currently unavailable to MDIFW. Significant new funding will have to be generated, and outside expertise and short-term contract personnel will need to be hired. Over the next fifteen years, a minimum of $240,000 is needed to adequately address the proposed objectives.

Goal: Ensure the long-term viability of Clayton's copper and its habitat in Maine, and determine the criteria necessary for recovery of the species.

Population Objective 1: By 2002, develop and implement a monitoring plan to determine an approximate baseline population of Clayton's copper in Maine.

Desirability: Acquiring baseline population statistics for Clayton's copper in Maine is essential to understanding the species' current status and its potential for recovery; and to monitoring and documenting future trends and responses to management efforts. Currently, there are little to no population data available for any of Maine's Clayton's copper populations. At several sites, presence has not been reconfirmed in more than a decade. An understanding of the approximate baseline population will allow MDIFW to move forward with effective conservation and recovery measures.

Feasibility: Currently, there are nine known sites where Clayton's copper has been documented in Maine. At least eight of these sites potentially support populations or subpopulations that would require monitoring in order to estimate a statewide population, as well as understand baseline population statistics for each site. Developing and initiating a monitoring plan for each site is feasible by 2002, since many of the sites/populations are of small size and in close proximity to each other. However, the flight window for this species is restricted to only about one month each summer, and weather conditions often reduce the number of days available to effectively survey. Current staff resources (one person) are not adequate to implement and

conduct a simultaneous monitoring program during peak emergence – which may only last a few days - for all of the sites in one season. At least one additional person would be necessary to help set up survey transects at each site prior to any survey work. At least two additional people would be necessary during the actual surveys to enable concurrent coverage of all sites. Development of the monitoring plan would also require assistance from an outside expert knowledgeable about butterfly survey techniques. Approximately $10,000 would be required to contract the necessary resources to develop and implement a statewide Clayton's copper monitoring plan. Current MDIFW funding available for Clayton's copper research is not adequate to meet these needs.

Finally, an effective monitoring plan could determine that more than one season's survey data are necessary to address natural fluctuations in butterfly populations, as well as identify peak emergences at each site. In this case, the 2002 deadline would be unattainable, and the funding and staff resources would need to be available for additional years of survey work (~$6,000/year).

Capability of Habitat: Not applicable.

Possible Consequences: A reliable estimate of the Clayton's copper population statewide, and at each site, would provide MDIFW with a better understanding of this endangered species' status, and a baseline from which to monitor trends, success of conservation efforts, and progress of recovery.

Population Objective 2: By 2005, complete a statewide survey to identify all Clayton's copper populations in Maine.

Desirability: Currently, Clayton's copper has been documented at only nine sites in Maine. A number of additional locations where the host plant occurs have been searched, but the butterfly was not found. However, these surveys were not comprehensive, and it is possible additional populations of the butterfly may be discovered. It has also been 10-15 years since potential habitats have been surveyed and some extant populations revisited. Habitat changes at these sites could have occurred since then, and either increased or decreased the suitability for Clayton's copper. Completing a statewide survey would provide MDIFW with a thorough and up-to-date understanding of the occurrence, distribution, relative abundance, and status of both the butterfly and its host plant.

Feasibility: Clayton's copper is found only in association with its single larval host plant, the shrubby cinquefoil. Although not considered rare, and ranging throughout all but extreme southern Maine, shrubby cinquefoil has a scattered distribution in Maine and is restricted to limestone soils. It rarely occurs in stands large enough to support viable Clayton's copper populations;

and large, persistent stands are typically found only in association with circumneutral fens and other calcareous wetlands, which are very uncommon in Maine. The Maine Natural Areas Program and other information repositories track some occurrence data on extant, historic, and rumored shrubby cinquefoil stands. The use of GIS and other analytical mapping tools might also be applied to identify appropriate soil, vegetative, and hydrological characteristics where new cinquefoil stands might be found. Because the number and distribution of existing and potential occurrences are likely to be limited, a statewide survey of all potential Clayton's copper habitat is feasible by 2005. However, possible conflicts with the timing, funding needs, and research priorities of other Clayton's copper objectives may likely impede progress. Resources to hire a short-term, seasonal employee to assist with surveys would be needed to ensure meeting the 2005 deadline, and are estimated at $5000/year.

Capability of Habitat: Not applicable.

Possible Consequences: A comprehensive statewide survey for Clayton's copper would provide MDIFW with a complete and current understanding of this endangered species' occurrence, distribution, abundance, and status in Maine. It is possible that final results of the survey could affect the outcome of other objectives whose deadlines occur prior to 2005. Some landowners may object to surveys being conducted on their property.

Population Objective 3: By 2006, determine a tentative, working minimum viable population (MVP) for Clayton's copper and establish population objectives.

Desirability: Determining a working minimum viable population (MVP) model is essential to understanding risk of extinction and establishing meaningful recovery goals. Developing specific population objectives based on the MVP will provide MDIFW with direction for management and recovery efforts.

Feasibility: Specific details of the life history, habitat requirements, and population dynamics of Clayton's copper are unknown at this time (see research objective). Likewise, the environmental variables and limiting factors affecting the butterfly's populations are also undocumented. A working MVP would have to be developed largely from existing invertebrate models for related species. Current literature and recovery plans would have to be reviewed for available models and their compatibility with Clayton's copper. These models could then be customized over time, as value inputs for Clayton's copper are determined. Within these limitations, developing a working MVP is feasible by 2006. It will be necessary to contract outside expertise to complete a literature search and develop the model (~$7,000).

Capability of Habitat: Not applicable.

Possible Consequences: Given the lack of specific life history information available for Clayton's copper, the accuracy and/or reliability of an MVP may be questionable. However, a working model could be used to help identify research and management priorities, and increase efficiency.

Habitat Objective 1: By 2006, determine the amount and quality of potential habitat for Clayton's copper in Maine.

Desirability: The status and recovery potential of Clayton's copper likely depends primarily on the availability, distribution, and long-term persistence of suitable stands of shrubby cinquefoil. Completing a statewide assessment of all potential habitats would provide MDIFW with a comprehensive understanding of the host plant's current distribution, abundance, and capacity to support viable populations of Clayton's copper. This information would be essential to developing Clayton's copper population and habitat management goals, as well as identifying sites for long-term conservation.

Feasibility: Clayton's copper habitat is characterized by the presence of its host plant, the shrubby cinquefoil. Although widespread and not considered rare in Maine (see population objective #2), this plant occurs in relatively few stands large enough to support viable populations of the butterfly. A search of existing botanical information sources (i.e. Natural Areas Program, historic literature, museum specimens, etc.), combined with a broadcast inquiry for field observations, should reveal a significant proportion of the extant cinquefoil stands to survey, as well as provide leads for possible new locations. The use of computer mapping tools to select for soils, hydrology, and other habitat parameters identified to be requisite to shrubby cinquefoil, could perhaps focus additional survey efforts. Field visits to potential habitats should be combined with efforts and funding to meet the statewide Clayton's copper survey in population objective #2. Some additional funding (~$2,500) would likely be necessary up front to summarize and predict potential cinquefoil sites. Helicopter surveys have been successfully used to search for cinquefoil stands in Maine in the past, and could greatly reduce survey time and effort. However, MDIFW does not currently have the funding resources to pay for flight survey time.

Assessing habitat quality will likely be more difficult than determining the occurrence, distribution, and abundance of cinquefoil. Clayton's copper is not found everywhere the host plant is found. It is probable there are other as yet unknown factors or habitat parameters that determine the suitability of a cinquefoil stand for the butterfly. Identifying these factors, and effective management tools to improve habitat quality, would require research and significant funding (see research objective). MDIFW does not currently have

funding to initiate these types of studies. Until then, determining the quality of potential habitat would have to rely on more subjective parameters such as proximity to existing butterfly populations, stand size and vigor, management and conservation potential, and likelihood of long-term persistence.

Capability of Habitat: Not applicable.

Possible Consequences: It may be discovered that there is inadequate quality habitat available to recover the Clayton's copper, and that long-term management efforts will be necessary to maintain or create habitat for the species. Until specific habitat parameters or limiting factors are identified, only the presence or absence of Clayton's copper can describe with any certainty the suitability of a site for the butterfly. The quality of a site could become altered – either positively or negatively - on a temporary, long-term, or even permanent basis by management actions or natural events, such as succession or flooding by beaver. The potential for a site to become degraded or improved should be considered when assessing potential habitat quality for Clayton's copper.

Habitat Objective 2: Protect and manage all habitats supporting Clayton's copper in Maine through 2016.

Desirability: Clayton's copper is currently known from only 10 sites worldwide – nine in Maine and one just over the border in New Brunswick. With nearly the entire world's population contained within its borders, Maine has a responsibility to conserve this rare subspecies and its habitat for the future. Providing long-term protection and management of the butterfly's limited habitat is likely the single most important recovery action for Clayton's copper. Without habitat protection and management efforts, recovery will be continuously jeopardized by both natural and human-induced events that may directly harm the butterfly or degrade its habitat.

Feasibility: Of the nine sites in Maine where Clayton's copper has been documented, at least eight have the potential of supporting significant populations or subpopulations where habitat should be protected. Of these eight, the three best sites are already in conservation ownership and have the greatest potential to be managed to maintain or enhance populations of the butterfly. The remaining sites are owned either by individual or industrial (i.e. forest products) private landowners, and ownership should be easy to determine. All of these privately owned sites are primarily wetland and relatively small in size. Procuring their long-term protection, either through fee acquisition, easement, cooperative management agreements, or regulatory protection (i.e. Essential or Significant Habitat designation) is feasible by 2016. The development and timber harvest potential of these sites is negligible, and therefore landowners may be quite willing to transfer

either ownership or management rights, or develop working management agreements to protect the butterfly and its habitat. Fee acquisition of sites would require funding that is not currently available to MDIFW. However, outside funding sources (i.e. OHF, LMFB, etc) could be sought to supplement limited MDIFW monies in those cases where cooperative management agreements or regulatory protection would not meet habitat protection needs.

Management actions are currently needed on at least two sites, where forest succession has compromised habitat quality for the host plant. Over time, management efforts may also be necessary on some or all of the other sites as natural succession, flooding by beaver, or other events potentially degrade habitat. Remediation for these events (i.e. thinning competing vegetation, breaching beaver dams) is feasible and expected to be relatively low in effort, time, and cost (<$1,000/event). Potential human-induced changes in habitat (i.e. via irrigation, impoundments, etc) also need to be monitored and prevented. MDIFW is currently researching the available data on life history, propagation, and management techniques for shrubby cinquefoil to better understand and facilitate management needs of the host plant. Once this information is acquired, management objectives, feasibility, and potential costs may be better understood. Efforts to create new habitat in upland sites may require additional funding, which is currently unavailable to MDIFW.

Capability of Habitat: It is possible that statewide surveys for Clayton's copper may discover additional sites that require protection and management – particularly in relation to existing populations and gaps in between. Given the rarity of large, persistent stands of the host plant, however, it is not likely additional large populations of the butterfly will be found.

Possible Consequences: It is possible some private landowners may not want to cooperate with MDIFW in protecting Clayton's copper on their lands. This may effect recovery efforts, and ultimately require habitat protection through regulation. Management practices in favor of shrubby cinquefoil could potentially alter habitat for other rare species. Long-term protection and management of Clayton's copper habitat might conflict with existing management plans for conservation lands (i.e. waterfowl impoundments, rare plant community management) or with current use and demand of public and recreational lands. Staff time and funding, particularly from MDIFW regional offices, may be diverted from competing priorities.

Research Objective: By 2002, identify strategies to determine limiting factors, population dynamics, genetic variability, dispersal capability, and habitat dynamics affecting Clayton's copper in Maine.

Desirability: Very little is currently known about the life history, population dynamics, and specific habitat requirements of Clayton's copper. Limiting

factors affecting its populations are also unknown. In addition, it's status as a viable subspecies has never been quantified. All of these factors are essential to determining the best management strategies and recovery potential for Clayton's copper.

Feasibility: Because Clayton's copper is endemic to Maine, answering the many unknowns about this butterfly will fall solely on MDIFW. Developing strategies to determine these unknowns is feasible by 2002, as there is likely a source of comparable information for other rare Lepidoptera species, including perhaps related species, from which MDIFW can draw to develop its own plan. This will require intensive literature search and contacts with other professionals, as the expertise is currently lacking at MDIFW. A series of 3-4 graduate studies at the University of Maine would be the most effective method of obtaining information to better understand the life requirements and management needs of the Clayton's copper. Funding to help support these types of research projects would require a minimum of $50,000 per project, and is currently unavailable to MDIFW.

Capability of Habitat: Not applicable.

Possible Consequences: A lack of existing information on closely related species could complicate development of effective strategies. It may be determined that implementing these strategies would require funds beyond the capability of MDIFW.

Outreach Objective: By 2002, and in conjunction with partners, develop and implement an outreach plan to increase awareness and understanding of the Clayton's copper and its habitat requirements in Maine. Outreach should be targeted at towns, landowners, and the general public.

Desirability: Prior to its listing as an endangered species in Maine, Clayton's copper – like most rare invertebrate species – had largely gone unnoticed by the general public. Even today, the butterfly is still unknown to most of Maine's citizens due to its extreme rarity and localized distribution. Support of Clayton's copper recovery by the general public, and by affected landowners and towns, in particular, is essential to a successful recovery program.

Feasibility: Developing an outreach program to increase awareness and appreciation of Clayton's copper on both a local and statewide level is essential to building support for habitat protection and management actions necessary to recover the species. The majority of Maine's nine documented occurrences of Clayton's copper are concentrated within a ten square mile area of five adjoining townships in eastern Penobscot County. Only three sites stand apart from this cluster – one in southern Aroostook County, and two adjoining sites in northern Piscataquis County. The number of

landowners (<12) and organized towns (6) directly linked to Clayton's copper occurrences is small. Some outreach materials for Clayton's copper are already being developed by MDIFW. Funding (~$10,000) would be necessary to develop and produce additional materials, and to contact and work with landowners and municipal officials. Partnerships (i.e. with industrial landowners, local watershed or civic groups) could be developed, where appropriate, to assist with outreach efforts.

Capability of Habitat: Not applicable.

Possible Consequences: Promoting awareness of this endangered butterfly could result in an increased use and demand for the species (i.e. butterfly collecting), which in turn could increase threats to its recovery.