**Arthur M. Phillips, III, Ph.D.**
***Botanical and Environmental Consulting***
**P.O. Box 201**
**Flagstaff, Arizona 86002**

**Tel. & Fax: 928 779-2288**
**email: nn7a@aol.com**

**23 March 2005**

# Part I:
# Comments on FWS Final Ruling on Peirson's milkvetch delisting
# 69 FR 31523-31531, 04 June 04, FR Doc. 04-12659

**Bold** quotes are taken from the FR document. Page numbers are cited. Responses follow each quote. Additional comments on the complete Finding document, Memorandum issued by FWS California/Nevada Operations Office signed 5-28-04, follow (p. 7).

**1. "In the 13 days of ground surveys, approximately, 71,926 plants were reported (TOA 2001), but this single census does not provide any information on population trend." (p. 31526)**

True, that's why we have carried out surveys for the succeeding four years, tracking life history of the 2001 plants and succeeding germination events from 2002-2005. Reports documenting trends in the ensuing two years were available to FWS, as shown by their inclusion in the Literature Cited section of the complete document and citation in the FR and complete versions (Phillips and Kennedy 2002, 2003).

**2. "Only 5 of these 71,926 plants encountered were considered to be more than one season old (TOA 2001). The observation that only 5 plants of the 71,926 individuals were censussed (sic.) more than 1 season old suggests that the seedlings for this species suffered a high degree of mortality, or that the age classes were misidentified during the survey. In contrast, a study prepared for the ASA (Phillips and Kennedy 2002) estimated that 26 percent of the plants counted in the spring 2001 survey survived to the winter of 2001 through 2002." (p. 31526)**

This paragraph incorrectly combines information from different reports. The 5 perennial plants probably germinated in 1997, were all at one site, and were obviously perennial (thicker root, evidence of stems near the base from previous years, many-branched plants). The charge persists that we "might" have misidentified age classes, and I addressed this in detail in Phillips and Kennedy (2003) p. 12. This charge is pure conjecture based upon someone's preconceptions with no field data to back them up. As far as I can tell, the suggestion originated in 2003 in Porter (2003), whose study did not begin until late 2001 when these plants were in their second season. In spite of my efforts to correct the misconception, it has repeatedly appeared in subsequent FWS documents (Critical Habitat proposal, 68 FR 46143, Aug. 5, 2003; Status Review, 68 FR 52782,

Sept. 5, 2003; this document). Unless someone has contrary *data* from 2001, this charge should be dismissed as without merit.

Does the fact that there were only 5 perennial plants "suggests that there is a high degree of seedling mortality" mean that the writer assumes there are 72,000 plants germinating every year? This assumption shows a lack of basic understanding of PMV and dunes ecology, which is based on greatly variable rainfall from season to season.

Omitted here is the fact that 45% of the first-year plants censused in 2001 flowered and set seed during their first year. That gives 32,400 fertile plants producing 5 pods each with 11-16 seeds, or 1,782,000 to 2,592,000 seeds produced. So the contribution of seeds by plants *that germinate in early fall* can be substantial in their first season. Twenty-six percent survived to 2002, and 0.03% survived to 2003. The 26% survival (actually 21%, after a recalculation [Phillips and Kennedy 2003, p. 12]) was described as "high" due to unusual rainfall in the summer of 2001 (Phillips and Kennedy 2002). If the 5 perennial plants noted in 2001 had indeed germinated in 1998, this would be a comparable survival rate to our counts of 2000 cohort plants remaining in 2004 (8 remaining individuals).

Actually, the whole argument over plant age is peripheral to the central (and undisputed) fact that there were 32,400 fertile plants present in 2001, irrespective of age, producing 1-2 million seeds.

**3. "The TOA (2001) survey reported finding 667 OHV-impacted plants during 13 survey days. Phillips and Kennedy (2003) reported finding 430 impacted plants during 6 survey days. But in neither study were plants marked to determine survival or reproductive success at a later date." (p. 31527)**

Omitted here is that the 667 OHV-impacted plants found in 2001 were 0.93% of the 72,000 counted, and the 430 noted in 2003 represent 1.3% of 33,119 plants counted. Certainly this is more relevant that the number of survey days. This appears to be documentation of successful co-existence of PMV and OHVs. Using just the number of OHV-affected plants and omitting the percent or total counts takes the data out of context to draw a conclusion exactly opposite of that in the original study.

**4. "Significant impacts from OHV use on Astragalus magdalenae var. peirsonii habitat have been observed at or near the OHV staging areas (Willoughby 2000). The TOA (2001) report supports the BLM findings (Willoughby 2000, 2001) regarding limited occurrence of dune plants associated with heavy OHV activity: 'The occurrence of dune plants and heavy use areas for vehicles is to a large extent mutually exclusive.'" (p. 31527 & repeated on p. 31528)**

This is a true statement *in its original context,* which takes on a totally different meaning in the context it is used in the document. The fact that drivers avoid vegetated areas is never mentioned. Dead wood from perennial woody shrubs causes potentially severe damage to tires on sand vehicles, and vehicles can sustain other damage if they run over sticks scattered on the ground where plants grow. There is therefore a *de facto* separation of OHVs and vegetated areas where PMV grows. Staging areas and camping areas, at the

edges of the dunes, are generally not within suitable habitat. The "high dunes" which are the destination of most riders are largely unvegetated due to unsuitable habitat, not OHV impact. Intermediate areas where PMV and other species grow are used mainly as pass-through areas en route to the higher dunes.

**5. "One of the mechanisms of survival for this species is a seed-setting strategy for producing large numbers of seeds per plant, particularly by older plants. Additionally, as is the nature of seed banks, not all of the seeds in the soil germinate the following year, as a safety measure against population failure." (p. 31528)**

We carried out a seed bank study in 2002, which provided substantial information on the seed bank of PMV (Phillips and Kennedy 2002). Although various portions of this report that related to survival are cited in the FWS document, it completely ignores the results of our seed bank study. This report was peer reviewed and was available to FWS.

**6. "Because of the transient nature of sand dunes, impacts from OHVs are usually reported in terms of plant numbers impacted or the condition of the impacted plants. In their report, TOA (2001) found 667 plants impacted by OHVs over the course of 13 survey days. A seedling's roots are especially sensitive to drying out if the plants or sand surface are disturbed." (p. 31529)**

See comments above; document again ignores the fact that the percentage of plants involved is from 1-1.5%. Also, seedlings are actually less susceptible to damage, as they frequently pop back up apparently unaffected when run over (TOA 2001). Not only does available data not support the FWS contention about "heavy OHV impacts to PMV" (p. 31528), it refutes it.

**7. "Although the range-wide impact is difficult to assess, there has been an increase in reports of vandalism to the habitat and individuals of A. m. var. peirsonii. This was a specific concern expressed in the critical habitat discussion of the final listing rule (63 FR 53596). There has been no monitoring specifically for the distribution, extent, and impact of vandalism to the plant across its range. Porter (in litt. 2002) describes both tracks and incursions of OHVs into areas outside of the Wilderness Area that were closed to OHV traffic. Three of the 20 plants in one of Porter's monitored plots (Porter in litt. 2002) were destroyed by vandals. There have been other reported incidents of vandalism, some by our staff, and others, but because of the time, lack of knowledge of intent, precision of the description of the location, frequency of occurrence, and percentage of the plant's range involved, it is difficult to assess the cumulative impact to the species." (pp. 31529-31530)**

Vandalism of a listed species is a serious crime. There is no direct evidence that it has occurred. Plants may be inadvertently run over, or even not avoided, but this does not necessarily constitute intentional vandalism. FWS should have documented evidence of intentional vandalism before using this as criteria for sustaining the listing.

**8. "The BLM (Willoughby 2001) reported a total of only 86 plants throughout its transect areas in the 2000 survey. TOA (2001) found only**

**five plants more than a year old in their survey of all of the areas open to OHV use. This would be an extremely important fact requiring explanation and assessment if only five plants of an herbaceous perennial taxon had persisted from the previous season, especially in light of seed production as mentioned before. The older, larger plants contribute more to the seed bank than younger flowering juveniles (Romspert and Burk 1979; Phillips and Kennedy 2002). Random events may have a significant detrimental effect on the species when so few individuals are present or when the habitat requirements are so narrow that random environmental conditions can result in the demise of an entire cohort. This was apparently the case with the loss of the entire 2003 cohort of seedlings (Phillips and Kennedy 2003; Porter in litt 2003). The ecological impact of any cyclic depletion and restoration of the seed bank is unknown." (p. 31530)**

Again, the five perennial plants found in 2001 were growing with 72,000 first-year plants, 45% of which (32,400) flowered and set seeds. If these five perennial plants produced between 9,405 and 13,680 seeds (5 plants, 171 pods each, 11-16 seeds per pod), their output *that particular year (2001)* is dwarfed by the potential output of the 32,400 plants, calculated above as 1,782,000 to 2,592,000 seeds. The actual production of seeds that year is completely ignored by the FWS document. As stated above, the *age* of plants producing the seeds is trivial; the important fact, documented by our studies, is the number of seeds produced during a given year.

Another factor of importance is genetic diversity. The 32,400 first-year plants that produced seeds in 2001 have a much greater genetic diversity than the 5 perennial plants. For a rare species, maintaining genetic diversity is very important. In this regard, the importance to the species of the first-year plants is greater than the perennials. This is another reason why ignoring first-year reproduction is erroneous.

Let's assume that the "five perennial plants" were all that were alive in the spring of 2000. We don't know that, because no one surveyed that year, but that would match the assumption made above by FWS. The cyclical nature of PMV populations would still be clearly illustrated by the explosive germination event of October 2000 (TOA 2001) and the subsequent spring reproductive event involving 32,400 flowering, pod-producing plants. The February 2003 germination event taught us an important fact about PMV ecology: in contrast to fall-germinating plants, which are able to reproduce during their first season, seedlings which germinate in late winter or spring do *not* flower the first year, and suffer substantial losses due to summer drought conditions. However, the loss of 72,000 non-reproducing plants, or seeds from the seed bank, is minor as it could be made up by only 38 perennial plants producing 171 pods with 11 seeds each. Ecologically, the risk of the loss of 99.8% of a cohort of seedlings is one the plant can probably afford, with a seed bank as large as it possesses. These subtleties of PMV ecology, *which we have documented,* were ignored by FWS. They again refer to the PMV seed bank in the last sentence, ignoring Phillips and Kennedy (2002), the only study available on the subject.

**9. "Astragalus magdalenae var. peirsonii, like some other narrow endemic dune taxa, is subject to debilitating or lethal environmental conditions, such as drought or excessive unseasonal winds, across its**

**entire range that can affect an entire cohort of plants ... Environmental conditions unsuitable for this plant can occur at irregular intervals or can persist for several years. Low numbers combined with periodic, range-wide, debilitating environmental conditions pose an ongoing potential threat to this plant." (p. 31530)**

How true this is. It has existed for centuries under conditions of sparse, unreliable rainfall, searing summer heat, and harsh conditions caused by blowing sand. This is among the harshest environments in North America, and all of the plants growing in these habitats are tough critters. This only increases their ability to tolerate and co-exist with OHVs. Again, the importance of the seed bank, as stressed by Phillips and Kennedy (2002), is not mentioned.

**10. "However, assertions that the reproductive success of Peirson's milk-vetch is not dependent on the longevity of individual plants but on each plant's ability to produce and drop seeds in their first year is not supported by the available documentation. First year plants produce substantially less seeds than older plants (5 fruits per plant as opposed to 171 fruits per plant) (Phillips and Kennedy 2002). TOA (2001) reported plants produce seeds their first year, however those age classes may have been misidentified." (p. 31530)**

The document has oversimplified the relative value of first-year and perennial plants and their contribution to the seed bank. As stated above, this can vary greatly from year to year. Again, they assert that we may have misidentified age classes, even more strongly here. There is no evidence for this assertion. In any event, it is trivial because the *data* show that there were 32,400 fertile plants producing 1-2 million seeds in the spring of 2001, regardless of their age.

**11. "Therefore, the key to survival and recovery is having a large seed bank. The available information on the rate of seed deposition to the seed bank and the longevity of seeds in the seed bank does not support claims of a healthy seed bank." (p. 31530)**

The "available information," Phillips and Kennedy (2002), is entirely ignored by this document. The seed bank and its potential size are discussed and documented in detail in this peer-reviewed study. Longevity of seeds is not known, but Porter (2002) found that seeds 4 years old had a germination rate of 98% under laboratory conditions. The "conventional wisdom" is that seeds of desert plants persist for at least 10-15 years (Shreve 1964). Pavlik and Barbour (1988) found a germination rate of 76% for another species of *Astragalus* in the Eureka Dunes, CA after 8 years. The conclusion that the seed bank is unhealthy is entirely without foundation; in fact, the available evidence leads to the exact opposite conclusion.

**12. "Peirson's milk-vetch also exhibits a wide variation in numbers of standing individuals found in any given year." (p. 31530)**

One of the paradigms in studying desert annuals and short-lived perennials is that an assessment of "status" cannot be made from standing live individuals only; the seed bank must be included as an integral, perhaps even more important, part of the assessment (Phillips and Kennedy 2002).

**"Plant count data between years is often not directly comparable due to differences in rainfall amounts and methodologies. Long-term studies need to be undertaken to show the population trends for the species." (p. 31530)**

Census data reported by Willoughby (2000, 2001) is not comparable to ours because the survey methodologies used by BLM are completely different from ours. We contend that ours are more reliable and complete because the methodology better reflects the natural distribution of the plants. Population trends for short-lived desert species are notoriously difficult to correctly ascertain, but our studies have now completed a fourth year using methodologies that are comparable from year to year and capable of elucidating trends over the time period of the study. Such studies should have been undertaken prior to listing to document whether listing was warranted in the first place.

## Part II:
## Comments on FWS Memorandum signed 5-28-2004:
## 12-month Finding on the Petition to Delist
## *Astragalus magdalenae* var. *peirsonii*

**Bold** quotes are taken from the Memorandum of 5-28-04. Page numbers are cited. Responses follow each quote.

1. **(p. 6): "Peirson's milkvetch plants have been reported to flower in their first year. However, this has not been shown to be true by field studies nor has the importance of such individuals been shown."**

This has been discussed above in par. 2, 8, and 10. Our continuing field studies in 2004-05 have shown conclusively that plants that germinated in Oct. and Nov. 2004 were reproductive in March 2005. Although these data were not available to the authors of this document, they prove that our 2001 assertions about first-year plants were correct and speculation to the contrary was without merit.

2. **(p. 6): "The onset of germination may occur anytime (sic) between the beginning of January and the end of February. . . . plants survive for about a year before flowering can occur." [based on Porter]**

   **(p. 7) "Based on current understanding of the species' life history, sufficient rain in conjunction with wetter-than-average fall weather appears to trigger germination events … As one of the peer reviewers noted, this species has a complex life history and while it can act as a perennial it is more apt to behave as an annual (McCue 2003)." [citation not in lit. cited]**

The document contradicts itself on two consecutive pages. McCue's statement that the species "is more apt to behave as an annual" would seem to corroborate our findings, assuming he includes successful reproduction in his "annual behavior." Porter's field

work was carried out during the 2001-02 and 2002-03 growing seasons, both of which lacked rainfall to trigger fall germination. A February 2003 series of storms led to late-winter germination which resulted in no reproduction (Phillips and Kennedy 2003); this may have influenced his conclusions on the age of plants at first flowering. Porter's study commenced after the 2000-01 seedling cohort flowered in the spring of 2001. His conclusions about germination and age at first flowering are based on greenhouse studies, not field studies. It is unfortunate that the citation for McCue's information was omitted.

3. **(p. 8): "First, the relative contribution of first-year plants … to the seed bank and survival of the taxon is not fully understood …"**

This was addressed in par. 8 above. The relative contribution depends on the relative number of perennial and first-year plants. No one disputes the obvious assertion that larger perennial plants each produce more seeds than first-year plants. It is true that we did not follow plants noted as reproductive in the spring of 2001 to actual seed dispersal, but our seed bank study carried out the following year indicated the presence of a large seed bank (Phillips and Kennedy 2002). Numerous fresh pods on the surface still containing seeds in 2001-02 point to a fresh infusion of seeds in late spring 2001. It really does not matter what the age of the plants producing seeds in the spring of 2001 was; the important fact is that there were large numbers of reproductive plants, and the total contribution of "small" plants was much greater than the contribution of "large" plants. As stated above, our data from 2004-05, in which we follow a new fall-germinating cohort from germination to flowering, puts to rest the assertion that first-year plants do not reproduce.

4. **(p. 9): "The 'second' germination event in March 2001, reported and not analyzed by Phillips and Kennedy (2002), is coincident with the timing of the March 2003 germination event described by Phillips and Kennedy (2003). This is further indication that the 2000 germination event responsible for most of the spring 2001 cohort most likely occurred in February or March 2000 rather than October 2000 as stated."**

Again, there is no evidence or opposing data to support the assertions made in the document. Data from the 2004-05 season corroborate our original conclusions. In fact, however, this entire tangent is superfluous and diverts attention from the more important fact that a large number of plants reproduced in the spring of 2001, regardless of how old one believes they were.

5. **(p. 10) …. "apparent misidentification of the age classes …"**

Now we've progressed from "may" and "might" have been misidentified to "apparent" misidentification of cohort age. There is no evidence whatsoever to refute our assertions that first-year plants flower and contribute significantly to the seed bank, and our 2004-05 work shows that our original interpretation was indeed correct. The bottom line is that PMV may germinate in large numbers in the fall and reproduce the following spring, during their first season; and they may also germinate in February or March, remain

sterile during their first season, die in large numbers during the ensuing summer, and reproduce during their second year. They thus have a dual reproductive strategy. Which is most important? That depends entirely on the year, and the distribution of rainfall during a given growing season. The preoccupation of the document with the question of cohort age diverts attention from the essential question of whether it reproduces successfully often enough to maintain a seed bank sufficient to maintain the species in a healthy state.

6. **(p. 16): "Based on current understanding of the plant's life history, sufficient rain in conjunction with cooler fall weather appears to trigger germination events."**

Contradicts FWS assertions that plants only germinate in late winter on pp. 6 and 9. Now they're agreeing with us that fall germination occurs. The dispute was settled in Nov. and Dec. 2004 when we *actually observed* a fall germination event following rains in October and November (of 2004).

7. **(p. 16): "Thomas Olsen Associates (2001) counted 71,926 plants of PMV over an area of 35,000 acres (14,165 ha). That is about 2 plants per acre or 5 plants per hectare during what TOA considered an "explosive germination event."**

We said that we *surveyed* 35,000 acres, not that we found plants in the entire area. In fact, we emphasized the clustered distribution of the plants both within portions of the dunes and in microhabitats that were suitable for its growth. Taking the total number of plants and dividing by the number of acres surveyed is faulty, simplistic reasoning for a plant with a clustered distribution. Our largest site in 2001 had 3,994 plants in an area of 3.8 ha, or over 1000 plants per ha. In March 2005 this site had 8,039 plants, or 2,115 plants per ha. Our largest site in 2005 (so far) has 24,681 plants in an area of 6.6 ha, or 3,740 plants per ha. Most of the dunes do not have suitable habitat for, nor occurrences of, PMV. Our sites include all of the area within a single occurrence of favorable microhabitat, originally defined by the limits of distribution of the plants in 2001-02. This same area is surveyed at each site each year, using the boundaries defined in 2002. This differs from the BLM monitoring methodology, which utilizes randomly placed fixed-width belt transects that may or may not intersect our "sites" and in no event are the belts wide enough to define the site.

8. **(p. 20): "No description was provided of measures taken to avoid double-counting of areas during the 13 days of visits over the nearly 3 month survey period."**

We stated that we used a GPS to locate each of our sites and points. This prevented double-counting sites.

9. **(p. 20): "The acreage of the Algodones Dunes covered by the census was not provided by TOA. It is difficult to associate the specific area covered by TOA**

**with the footprint of previous monitoring efforts. Neither the petition nor the TOA (2001) report provide discussion, interpretation, nor direct comparison of their data with those from previous monitoring efforts."**

The next paragraph of the document (p. 20) states "on p. 6 they state that 35,000 acres representing 59 percent of the open area was covered in the initial census study (TOA 2001)." We selected a survey, and subsequent monitoring, method which we felt more accurately described the distribution of PMV. The transect method is better suited to sampling evenly distributed plants. Our site methodology, in our opinion, is better suited to describing and monitoring plants with a clustered distribution, and provide more accurate year-to-year assessment of abundance within repeatable areas. Thus, the methodologies do not lend themselves to direct comparison; each must stand on its own merit.

10. **(p. 21) These data reflect a thriving plant species with more than 100,000 individuals … No explanation of how the plants were counted in aerial surveys was provided …"**

The estimate of 100,000 individuals was made by the attorney who prepared the petition, not in our reports. The aerial surveys allowed us to map occurrences (using a GPS unit) but did not allow for counting individuals. This was clearly stated in our report (TOA 2001). While the estimate of 100,000 individuals is reasonable and conservative, considering the distribution and size of sites in the closed areas, where the helicopter surveys were carried out, we stand only by our actual counts of 71,926 in the open areas.

11. **(p. 21): " … it is difficult to understand the definitions of sites and points. Eleven of the 61 sites had 50 or fewer PMV plants, including one with no plants, and 19 of the 66 points had 50 or more PMV plants, including one with 1,420 plants."**

These definitions were somewhat subjective, and were based upon the area involved rather than the number of plants. If the area was too small to be circumscribed accurately with the GPS, it was designated as a point. If it was large enough for accurate circumscription, it was called a site. This was explained in TOA (2001). Occurrences in the Glamis area were routinely less populated than in the Gordon's Well and Buttercup areas, so there are some sites at Glamis that had fewer plants than points elsewhere. The one site that had no PMV was established at an occurrence of another of the seven Special Status plants surveyed in 2001, *Astragalus lentiginosus* var. *borreganus,* Borrego milkvetch. There were no PMV at that site.

12. **(p.22) From the discussion above it is clear that TOA did not conduct a "census," a count of all members of the population, but rather conducted a survey of a portion of the population. As such, extrapolation to imply the range-wide condition of the population is unwarranted. Incorporation of helicopter surveys does not seem appropriate to fill out the ground surveys. Survey sites subjectively selected where plants were known to be located is**

**not an appropriate survey technique. Even considerations of abundance are questionable because measurement of plants per area surveyed was not a focus of the discussion.**

This summary shows a lack of understanding of what we did and what we concluded, and a lack of a grasp of the pattern of distribution of PMV. While we probably did not find every PMV location, that was the intent, and the surveys were wide-ranging, not just going to known sites. Indeed, specific sites and the distribution pattern of PMV were not documented prior to our survey. Our sites were located systematically throughout the range in open areas, and helicopter surveys were intended to fill in the distribution map in closed areas, not count plants. "Measurement of plants per survey area" implies that the writer does not comprehend the clustered distribution of PMV; this assumes some sort of even distribution within the survey area, which we explicitly stated was not the case.

13. **(p. 24): "The survey of TOA (2001) reported finding 667 OHV impacted plants during 13 survey days. Phillips and Kennedy (2003) reported finding 430 impacted plants during six survey days."**

As stated previously, this statement of impacted plants totally ignores the fact that the numbers represent less than 1% of total plants counted in the first case, and less than 1.5% in the second. The number of survey days is irrelevant. Use of the number of impacted plants while withholding the total number surveyed is a serious misrepresentation of the data.

14. **(p. 24): "Technological advances such as affordable GPS devices and cell phones, and OHVs with greater range, have allowed OHV use to penetrate further into the dunes."**

These assumptions are made without supporting data or citation of written reports or publications. If it is true that OHVs now "penetrate further into the dunes" the assertions should be documented.

15. **(p. 26; quote from ECOS report, 1990): … "Eventually the species will be eliminated from the area, as evidenced by our observations."**

This is a pretty sweeping statement to be included with no supporting data. Is this considered more valid than our report, with an abundance of data? Are we seeing here attempts to support a predetermined conclusion?

16. **(p. 26): "In their report TOA (2001) found 667 plants impacted by OHVs over the course of 13 survey days."**

See #13, above. Once again, the number of impacted plants is used out of context and the percentage of affected plants is ignored.

17. **(p. 28): "The second point in the petition is that OHV travel patterns rarely intrude into PMV colonies … " etc. etc.**

.

This paragraph is a lengthy discussion of OHV effects on PMV. It is entirely subjective, without any supporting data other than "observations." It ignores habitat variation and the fact that PMV is not equally distributed throughout the dunes. We have presented quantitative data on the number of affected PMV plants, and anecdotal data from dozens of OHV operators that they don't drive in areas with dense vegetation except to cross such areas on specific trails, in order to avoid damage to tires and vehicles. Again, this appears to be a case of using unsubstantiated data to support a predetermined conclusion.

18. **(p. 29): " … the petition's suggestion that PMV will continue to thrive in the open and closed areas of the Algodones Dunes 'regardless of OHV use in the area' seems speculative and incorrect."**

We have presented four years of supporting data for our conclusions. FWS has presented no data that refutes or disproves our conclusions. It would seem that it is the conclusions drawn by this document that are "speculative."

19. **(p.29): "Surveys that found hundreds of plants impacted in 2001 and 2003 were conducted between early March and mid May … after the period of plant sensitivity and higher levels of vehicular traffic …"**

Assumptions about the time of "plant sensitivity" made in this paragraph and the preceding paragraph are made with no supporting documentation. Our 2003 survey noting less than 1.5% affected plants was made shortly after the germination event that occurred in February of that year. The 2001 survey, noting less than 1% of plants affected by OHVs, was made 5-6 months after germination. Assumptions made in the document are not supported by the available data.

20. **(p. 33): The petitioner, without explanation, reported that TOA (2001) found only five plants more than a year old in their survey of all the areas open to OHV use. This would be an extremely important fact requiring explanation and assessment if only five plants of a herbaceous perennial taxon had persisted from the previous season, especially in light of seed production as mentioned before."**

It is not clear what explanation is required here. Left out of this discussion is the documented fact that in addition to the five perennial plants 32,400 other plants, whose age the document disputes, were also reproductive in 2001. These plants produced many times the number of seeds produced by any estimate of the five perennials. Survival, germination, flowering, and seed production are extremely variable PMV attributes from year to year. It is unfortunate for the credibility of the document that its authors have selected a year when overall reproduction was very high (compared with the subsequent three years) to attempt to dispute reproductive success, and in the process have failed to include data from available studies that refute their assumptions.

21. **(p. 34) First year plants produce substantially less seeds than older plants (5 fruits per plant as opposed to 171 fruits per plant) (Phillips and Kennedy 2002). TOA (2001) reported plants produce seeds their first year; however, those age classes may have been misidentified."**

Again, this statement does not take into account the number of reproductive plants, which varies greatly from year to year. In 2001, five perennials produced far fewer seeds than 32,400 first-year plants. Field work following the 2004-05 cohort of seedlings from germination to seed production confirms that first-year plants may reproduce in vast quantities, refuting the "misidentified" assertion that occurs throughout the document and forms a major part of its criticism of the work of TOA (2001) and Phillips and Kennedy (2002, 2003, 2004).

## Summary – Main Issues

1. Identification of different age classes; i.e., perennial vs. first-year plants: assertion that we cannot tell the difference (disproved in 2004-05)
2. Ability of first-year plants to flower and produce seeds: assertion that first-year plants do not flower or produce seeds (disproved in 2004-05)
3. Difference in phenology between first-year plants germinating in Oct.-Nov. vs. those germinating in Feb.-March is not recognized
4. OHV-impacted plants: using raw numbers without including total numbers of plants or percentage of affected plants
5. Document ignores results of our seed bank study
6. Charges of vandalism with no supporting data
7. Failure to recognize clustered pattern of distribution within the dunes in specific areas and habitats; PMV is not evenly distributed throughout the dunes
8. Incorrect interpretation of our use of helicopter surveys to determine distribution patterns, not plant counts