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THE INFLUENCE OF VALUATIONAL AND ORGANIZATIONAL CONSIDERATIONS ON THE SUCCESS OF RARE SPECIES TRANSLOCATIONS

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Abstract

Translocations of rare and endangered species face significant valuational and organizational challenges; however, these dimensions are rarely discussed in the translocation literature. We employed a 98 question sample mail survey to assess these variables and received 131 responses from 110 individuals in 10 nations. In contrast to the literature which suggests that most translocations fail, a large proportion of the programs surveyed were perceived as being successful and most respondents identified relatively few valuational or organizational problems or difficulties in their translocation programs. While perceived local support was correlated with perceived translocation success, the presence of public relations/education programs was not. Therefore, simply having a public relations/education program is no guarantee that public support will increase or that a translocation will be more successful. Organizationally, translocations which established special groups or teams were perceived as increasing innovation, but not in improving program organization, nor decreasing conflict. Further, the presence of special groups or teams was not correlated with translocation success. Finally, translocations with the objective of augmenting populations were perceived to suffer from more problems, including greater local opposition, poorer public understanding, less money, and poorer leadership, than were translocations aimed at establishing or re-establishing populations. The results illustrated the difficulty of analyzing valuational and organizational aspects of conservation programs using questionnaires. Copyright © 1996 Elsevier Science Limited

Keywords: translocation, valuation, organization, endangered species, sample survey, public relations, working group.

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INTRODUCTION

Species translocation programs face significant valuational and organizational challenges in addition to biological/technical ones (Reading *et al.*, 1991; Tear & Forester, 1992; Reading, 1993; Reading & Miller, 1994; Clark, in press; Reading & Clark, in press). The influence of valuational and organizational factors on program effectiveness differs from program to program, as does the degree to which each program addresses these factors. This variation provides an opportunity to examine the importance of non-biological/technical factors to translocation success.

Hundreds of translocations using dozens of species have already taken place (Berg, 1982; Garcelon & Roemer, 1988; Griffith *et al.*, 1989; Ounsted, 1991; Short *et al.*, 1992; Yalden, 1993; Reading & Clark, in press). Griffith *et al.* (1989) assessed the successful and unsuccessful biological and technical aspects of translocations using a sample mail survey. However, they did not examine valuational and organizational dimensions. Similarly, literature on past translocation programs largely omits discussion of non-biological/technical considerations (Reading, 1993). This study was undertaken to fill that void. We were particularly interested in assessing the extent to which percieved reintroduction program effectiveness was affected by the inclusion of mechanisms for addressing valuational and organizational concerns, such as public relations/education programs and special working groups or teams.

Assessing these aspects of translocations is difficult, especially given the inadequate training of most translocation participants (Kellert, 1985; Clark, 1986*a*, 1988; Clark & Kellert, 1988; Clark *et al.*, 1994). This constrains the ability of participants to recognize social science variables, let alone assess their impact and importance (Clark & Harvey, 1988; Clark, 1992, 1993). Without several in-depth, time-intensive case studies, the only way to acquire data on a large number of past translocations is from program participants (Clark, 1986*b*).

METHODS

The valuational and organizational aspects of past translocation programs were assessed using a forced-response sample mail survey. The survey consisted of 98 questions, including several questions with many parts (a copy of the survey instrument is available from the authors). Of these, 29 questions addressed valuational issues, 42 organizational issues, and 27 questions requested information about the program, the species, or the respondent. A five-point Likert format of response options was used for attitude, opinion, and perception questions.

A mailing list was obtained and updated from the subsample of Griffith *et al.* (1989) survey respondents who participated in translocations of rare, threatened, or endangered vertebrate species. A few additional, non-targeted respondents also replied. An advance letter informed individuals about the purpose of the survey, asked them to look for the survey, and requested their assistance in its completion and prompt reply. The survey, along with an explanatory cover letter, a question and answer sheet, a self-addressed and stamped return envelope, was mailed one week following the advance letter. A reminder postcard was mailed after an additional two weeks. A second survey was mailed to non-respondents one month after the initial mailing.

A total of 190 surveys were mailed to 131 individuals in seven nations. Up to three surveys were sent to individuals who participated in more than one translocation. Of these, surveys to three individuals were undeliverable and 130 responses were received from 109 individuals. Three surveys were returned too late to be incorporated in the analyses, but four were obtained from individuals not originally targeted. The information analysed, therefore, consisted of 131 surveys from 110 individuals representing translocation programs in 10 nations. The overall response rate to deliverable surveys mailed to targeted individuals was 68·4% of mailed surveys from 83·2% of the targeted individuals.

Three scales—a conflict scale (the degree to which programs were characterized by individual and inter-organizational conflict), an organization scale (the degree to which programs were well organized, cohesive, and cooperative), and a local support scale (the degree to which local publics were knowledgeable about and supported the species and the translocation program)—were constructed based on principle component, cluster, and factor analyses of the individual attitude questions. The scales included seven questions each. Scale reliability was tested with Cronbach's Coefficient Alpha. Alpha values, which examine internal consistency based on correlations of items on a single scale, varied from 0·779 to 0·884 (see Appendix I) (Cronbach, 1951). Interpretation is similar to that for a correlation coefficient ranging from 0 to 1. Specific questions and scale procedures are described in Appendix I.

Multiple means were compared using analysis of variance. Variables were checked for homogeneity of group variance using Bartlett's test and examined for normality. Pairwise comparisons were performed using Tukey's studentized range HSD test. The Tukey–Kramer adjustment (harmonic mean adjustment) was performed for comparisons between groups with unequal sample sizes. Functional relationships between variables were analyzed using step-wise multiple regressions and simple linear regressions. Count and percent response data were compared using log likelihood ratio tests (Sokal & Rohlf, 1981). To recognize trends in the attitude scale data more fully to account for sample sizes that were often small, the less rigorous $p < 0{\cdot}10$ was used to indicate statistical significance for that data only; $p < 0{\cdot}05$ was used to indicate statistical significance throughout the rest of the study.

RESULTS

Space limitations preclude display and discussion of all data. We therefore present only key results in a few data tables here. For a more detailed and comprehensive display of the data, as well as statistical evidence, refer to Reading (1993).

Description of respondents and their programs

A description of survey respondents and the programs in which they participated is important to facilitate accurate interpretation of results. For example, the demographic characteristics of the respondents undoubtedly influenced their responses to the questionnaire. In addition, it is important to assess the range of translocation programs surveyed with respect to success rates, species involved, complexity, etc.

Most respondents were over 35 years old (87·8%), were male (87·7%), and had been employed as wildlife professionals for over 10 years (84·8%). Most respondents (72·6%) possessed a graduate degree, of which 48·4% were Master's degrees. Respondents were most commonly mid-level managers (41·5%) working for government agencies (78·6%), especially state or provincial agencies (50·8%). About half (50·4%) of the respondents had been involved in at least one other translocation program.

Several features characterize the translocation programs covered by the survey. Most programs were initiated to re-establish an extirpated population ($n = 75$; 57% of surveyed programs); other programs attempted to augment an existing population ($n = 31$; 23·8%) or establish a new population ($n = 24$; 18·5%). The species was still present on the translocation site in 24% ($n = 31$) of the programs and at least locally extinct in the other 76% ($n = 94$) of the programs; for over 20 years in most cases ($n = 79$; 61·2%). Fifty-five percent ($n = 70$) of surveyed programs used wild source animals,

32·8% (n = 43) used animals from captivity, and 12·2% (n = 16) used both wild and captive animals. The vast majority of programs covered by this survey involved birds (62·6%; n = 82) and, to a lesser extent, mammals (29·0%; n = 38). Only 8·4% (n = 11) programs used other species.

A large proportion of the programs surveyed were perceived as being successful. A majority of respondents indicated that the size of the translocated population had increased (50·8%; n = 64) or remained stable (5·6%; n = 7). Only 16·7% (n = 21) reported decreasing population sizes. Respondents from the remaining programs did not census the translocated population (9·5%; n = 12) or stated that it was too soon to assess program success or failure (17·5%; n = 22). Similarly, when asked about the program's outcome, only 14·8% indicated that the animals had disappeared (7·0%; n = 9) or declined (7·8%; n = 10). Alternatively, 38·8% (n = 50) believed their programs successfully established self-sustaining populations and 10·1% (n = 13) of the programs were able to maintain the population with additional releases. The success or failure of the program could not be determined for 36·4% (n = 47) of the translocations.

Valuational considerations

The valuational portion of the study was analyzed with respect to characteristics of respondents, characteristics of the translocation programs, the effectiveness of public relations/education programs, and perceived translocation success or failure. Seventy-one percent (n = 93) of the translocation programs surveyed included some form of public relations or education program. However, most of these programs appeared to be small in scale. For example, the vast majority (91·4%) of public relations/education programs were undertaken only 1 year or less prior to initiating the translocation, and over two-thirds (69·9%) were begun only 6 months prior to release of the animals. In addition, only 38·7% of the public relations/education programs spent more than US $500 and a mere 14% spent over US $2500.

Perceived support of local people varied depending upon some of the characteristics of the respondent, but did not vary significantly with respect to the type of translocation program, the program's objective, nor program success or failure. Females ($\bar{X} = 2{\cdot}31 \pm 1{\cdot}25$), respondents under 35 years old ($\bar{X} = 2{\cdot}75 \pm 1{\cdot}34$), and respondents with less than 10 years of experience as wildlife professionals ($\bar{X} = 2{\cdot}30 \pm 1{\cdot}26$) viewed the local public as significantly less supportive than did males ($\bar{X} = 1{\cdot}74 \pm 0{\cdot}90$), respondents aged 36–45 ($\bar{X} = 1{\cdot}70 \pm 0{\cdot}94$) or over 45 ($\bar{X} = 1{\cdot}70 \pm 0{\cdot}80$) years old, and respondents with 10–20 ($\bar{X}1{\cdot}67 \pm 0{\cdot}89$) or over 20 ($\bar{X} = 1{\cdot}85 \pm 0{\cdot}97$) years of experience ($t$ = 2·28, p = 0·02; F = 8·63, p < 0·001; and F = 3·09, p = 0·049, respectively). Local support scale score results supported these findings (Table 1). Similar trends were evident for several other questions (Reading, 1993).

In general, females, younger respondents, and respondents with fewer years' experience were significantly more likely to view the local people and land owners as not supportive and obstacles to a successful translocation. Younger respondents and respondents with fewer years' experience believed local people were more antagonistic toward wildlife agencies and environmentalists. Respondents from translocation programs using captive-reared animals or from programs whose objectives were to augment existing populations generally perceived greater local public opposition toward, and poorer knowledge and understanding of, the translocation than did respondents from programs using at least some wild-caught animals, and programs attempting to establish or re-establish populations. People who worked on translocations of mammals perceived greater local opposition and poorer local understanding than did people who worked on translocations of birds. Similarly, respondents from translocations involving birds received greater local support scale scores than respondents from translocations of other species (Table 2).

The perceived effectiveness of public relations/education programs was analyzed by comparing the answers of respondents from translocations with public relations/education programs to the responses of respondents without such programs (Fig. 1, Table 3). Participants in translocations with public relations/education programs scored significantly higher on the local support scale than did participant in translocations without such programs (Fig. 1). Respondents from translocations with public relations/education programs expressed significantly greater (as indicated by lower scores) perceived support among the local public, conservation groups, and hunters than did respondents from translocations without such programs (Fig. 1). These results may have partially been a result of the effectiveness of the public relations/education programs. For example, respondents from translocations with public relations/education programs believed that their programs were better publicized and that they understood the views, attitudes, and opinions of local people toward both the species and the translocation programs better than respondents involved in translocations without public relations/education programs (Table 3). Alternatively, there were no significant differences between participants in translocations with public relations/education programs and participants in translocations without such programs in response to other questions, such as the value people placed on the species or opposition to wildlife programs in general (Table 3).

Finally, questions were analyzed with respect to perceived translocation success. Perceived translocation success, measured by population increase or decrease and by population persistence (i.e. outcome of the translocation program), was not correlated with the presence or absence of public relations/education programs (F = 2·03, p = 0·16, adjusted R^2 = 0·008 and

$F = 2{\cdot}88$, $p = 0{\cdot}09$, adjusted $R^2 = 0{\cdot}014$, respectively). Respondents from translocations assessed as failures (i.e. the released animals disappeared) obtained significantly lower local support scale scores than respondents from more successful translocations (Table 2). Respondents who assessed the outcome of their translocation program as successful also viewed their program as significantly better publicized ($F = 4{\cdot}14$, $p < 0{\cdot}01$, d.f. $= 4$). They further believed that the local people were more knowledgeable about the program and that local views, attitudes and opinions were better understood (Reading, 1993).

Organizational considerations

Translocation programs surveyed varied in the number of people and organizations involved. Twenty-eight programs (21%) included five or fewer people, 6–10 people were involved in 32 (24·6%) programs, 11–25 people in 38 (29·2%) programs, and over 25 people participated in 32 (24·6%) programs. There was only one organization in 24 (18·5%) programs surveyed, whereas the majority ($n = 49$; 65·4%) included 2–5 organizations, and 16 (16·2%) programs involved over five organizations.

A little more than half (53·1%; $n = 69$) of the translocation programs surveyed established a special team or group. Of programs with teams or groups, the majority (78·6%) included 10 or fewer people. The frequency with which teams or groups met varied considerably, with attendance mostly good (33·3%) or excellent (56·7%). Team or group membership was very rarely open to all interested parties (4·2%). The majority of teams or groups included agency field workers (74·3%) and agency management personnel (61·4%). Membership also commonly included invited specialists (49·3%), conservation group members (43·7%) and university affiliates (40·8%).

Organizational aspects of translocations were analyzed with respect to the characteristics of the respondent, the characteristics of the translocation program, the effectiveness of special teams or groups, and program success. Certain characteristics of respondents appear to influence program assessment. Males, older respondents, and respondents with more experience in the wildlife profession more strongly agreed that their programs were well organized than did females, younger respondents, and those with fewer year experience ($t = 2{\cdot}77$, $p < 0{\cdot}01$; $F = 9{\cdot}53$, $p < 0{\cdot}01$; and $F = 4{\cdot}43$, $p < 0{\cdot}05$, respectively). This same pattern held for several other questions, including those addressing conflict in the program, program flexibility, funding, cooperation among program participants, and, to a lesser extent, leadership (Reading, 1993). Males, older respondents, and respondents with more experience assessed each of these aspects of the program more favorably than did females, younger respondents, and respondents with less experience.

Conflict and organization scale scores supported findings from individual questions (Table 2). Males, older respondents, and respondents involved in a greater number of translocations received higher organization scale scores than did females, younger respondents, and respondents with less experience.

Table 1. Comparison of the mean (± SD) scale scores of respondents with different characteristics using ANOVA
Paired categories with the same symbol are statistically different at $p < 0{\cdot}05$ using Tukey's HSD test.

Variable	Scale		
	Local support	Conflict	Organization
Gender	*		**
Male	41·8 (±20·1)	12·4 (±21·2)	63·5 (±24·4)
Female	31·7 (±28·2)	11·8 (±19·9)	47·1 (±21·9)
Age	*		***
< 35 years	29·2 (±15·4)†	13·9 (±21·0)	43·3 (±18·4)†
36–45 years	40·2 (±21·8)	12·2 (±19·1)	58·6 (±25·1)‡
> 45 years	43·8 (±21·7)†	11·9 (±22·9)	69·2 (±22·6)†‡
Number of translocation efforts	*		***
0	41·4 (±22·4)	9·3 (±16·0)	55·4 (±21·8)†‡
1–2	30·3 (±19·4)†	16·6 (±24·5)	56·7 (±30·9)
3–5	40·4 (±20·7)	14·2 (±24·9)	70·5 (±24·6)†
> 5	48·2 (±18·5)†	15·0 (±25·7)	73·3 (±19·8)‡
Education		**	
Bachelor's degree or less	39·5 (±21·7)	9·7 (±18·9)	65·8 (±25·5)
Master's degree	41·5 (±21·0)	9·3 (±16·0)†	59·9 (±24·0)
Doctorate degree	39·7 (±22·9)	20·4 (±28·45)†	59·9 (±25·2)
Position		**	
Field worker	36·7 (±19·0)	21·1 (±28·9)	55·6 (±26·8)
Middle management	42·2 (±21·7)	10·5 (±20·4)	63·9 (±22·4)
Upper management	44·7 (±25·5)	9·8 (±15·8)	70·1 (±18·1)†
Consultant	33·7 (±19·7)	11·5 (±16·5)	40·4 (±35·1)†
Other	39·7 (±21·9)	6·3 (±9·0)	62·9 (±24·2)

*$p < 0{\cdot}10$; **$p < 0{\cdot}05$; ***$p < 0{\cdot}01$.

Respondents with doctorates obtained significantly greater conflict scale scores than did those with a Master's degree or less, and upper-level managers rated the organization of translocation programs higher than did lower-level participants, and especially outside consultants.

Responses often varied significantly with respect to several characteristics of the program (Reading, 1993). For example, respondents from translocation programs with more people and organizations scored significantly higher on the conflict scale than did respondents from programs with fewer people and organizations (Table 2). Conflict scale scores were also significantly higher for respondents from programs with special groups or teams than those without special groups or teams (Table 2); however, programs with special groups or teams also had significantly more individuals ($t = 2{\cdot}23$, d.f. $= 128$, $p < 0{\cdot}05$) and organizations ($t = 2{\cdot}91$, d.f. $= 127$, $p < 0{\cdot}01$) than did programs without groups or teams. Respondents working on translocations of birds believed their programs were better organized and characterized by less conflict and more cooperation than translocations of other species (Reading, 1993). They also received greater organization scale scores than translocations of other species (Table 2). Zoos and aquariums were significantly more likely to initiate translocations of species other than birds and mammals (Reading, 1993). Respondents from programs using wild as opposed to captive animals were assessed as better organized, more flexible, more cooperative, and less influenced by zoos and aquariums (Reading, 1993).

People from translocation programs with different objectives varied in their responses to only a few questions (Reading, 1993). Respondents from translocation programs which were augmenting populations perceived lack of both money and leadership as a greater problem than did respondents from translocation programs attempting to establish or re-establish a population. Zoos and aquariums were less likely to initiate translocations if the objective was to augment a population.

Responses from people in translocation programs with and without special teams or groups were rarely different with respect to organizational aspects (Table 4). Exceptions included the perceived use of novel, more risky approaches to translocations, the importance of being a 'team player', an increasingly 'political' program, and clearer lines of authority among translocation programs with special teams or groups. Respondents involved in programs with and without special teams or groups did not significantly differ in their assessments of the amount of conflict, the degree of organization, the quality of leadership, or several other organizational aspects which characterized their translocation programs.

Finally, responses varied depending on the success or failure of the translocation (Reading, 1993). Perceived

Table 2. Comparison of the mean (± SD) scale scores for programs with different characteristics using ANOVA
Paired categories with the same symbol are statistically different at $p < 0{\cdot}05$ using Tukey's HSD test

Variable	Scale		
	Local support	Conflict	Organization
Public relations/education program?	***		*
Yes	45·8 (± 19·4)	13·7 (± 22·4)	63·6 (± 21·4)
No	26·1 (± 20·3)	8·2 (± 15·9)	55·2 (± 31·5)
Special team or group?		*	
Yes	38·8 (± 21·1)	15·4 (± 23·6)	62·3 (± 26·3)
No	42·7 (± 21·9)	8·4 (± 16·4)	60·1 (± 22·5)
Number of people	***	**	
1–5	32·1 (± 24·5)†‡	2·5 (± 4·4)†‡	68·9 (± 21·8)
6–10	32·5 (± 18·6)§¶	7·7 (± 15·1)	58·7 (± 30·1)
11–25	47·6 (± 19·0)†§	17·2 (± 22·7)†	59·9 (± 24·8)
> 25	47·2 (± 19·9)‡¶	17·8 (± 27·1)‡	60·6 (± 19·8)
Number of organizations		**	
1	40·0 (± 24·4)	9·2 (± 20·2)	63·1 (± 27·3)
2–3	37·8 (± 19·8)	8·2 (± 15·3)†	67·9 (± 24·1)
4–5	41·5 (± 20·4)	15·4 (± 23·3)†	53·0 (± 24·7)
> 5	46·9 (± 23·7)	15·4 (± 22·6)	62·3 (± 16·5)
Order of translocated species	*		*
Bird	44·0 (± 22·3)	9·6 (± 16·9)	64·8 (± 22·1)
Mammal	35·7 (± 20·2)	15·6 (± 25·8)	57·2 (± 27·8)
Other	31·5 (± 12·8)	22·2 (± 27·9)	50·0 (± 26·9)
Program outcome	***		*
Self-sustaining population	44·6 (± 22·3)†	10·0 (± 19·8)	66·3 (± 22·4)
Animals disappeared	17·9 (± 12·8)†‡	5·8 (± 8·0)	53·9 (± 31·9)
Declined, but still present	32·5 (± 18·8)	1·9 (± 3·6)	76·9 (± 24·0)
Maintained with releases	40·2 (± 18·9)	18·3 (± 25·2)	55·0 (± 22·2)
Cannot yet determine	42·3 (± 20·8)‡	15·4 (± 23·2)	56·3 (± 25·2)

*$p < 0{\cdot}10$; **$p < 0{\cdot}05$; ***$p < 0{\cdot}01$.

success was not correlated with the presence or absence of a special group or team as measured by population increase or decrease ($F = 1{\cdot}08$, $p = 0{\cdot}30$, adjusted $R^2 = 0{\cdot}001$) or by population persistence (i.e. outcome of the translocation program; $F = 1{\cdot}27$, $p = 0{\cdot}20$, adjusted $R^2 = 0{\cdot}002$). However, respondents from translocation programs assessed as failures (i.e. the released animals disappeared) received significantly lower Organization scale scores than did respondents from more successful programs (Table 2). In addition, programs perceived as successful were assessed as better organized, with less conflict, greater consensus, more flexibility, and better leadership than other programs, especially those for which success or failure could not yet be determined (Reading, 1993). Respondents from more successful programs also rated relations between local people and participating agencies and conservation groups better than did respondents from less successful programs.

DISCUSSION

Methodology

The difficulty of analyzing the valuational and organizational aspects of translocation programs, or wildlife programs in general, using questionnaires lies, in part, with their reliance on program participants. Usually these are biologists or ecologists with little training in the social sciences (Kellert, 1985; Clark, 1986*a*, 1993; Clark & Kellert, 1988; Clark & Cragun, 1994). This can preclude noticing, recognizing, and understanding valuational and organizational problems. In addition, participants may have a vested interest in the responses to certain questions. Still, questionnaires represent the only effective way to survey relatively large numbers of programs in a relatively short time. However, where possible, case studies should supplement questionnaires to provide more in depth analyses (see Reading, 1993; Reading & Clark, in press). Participants in translocation programs should evaluate and keep detailed records of all aspects of the program, including non-biological and non-technical consideration, to facilitate case study analyses.

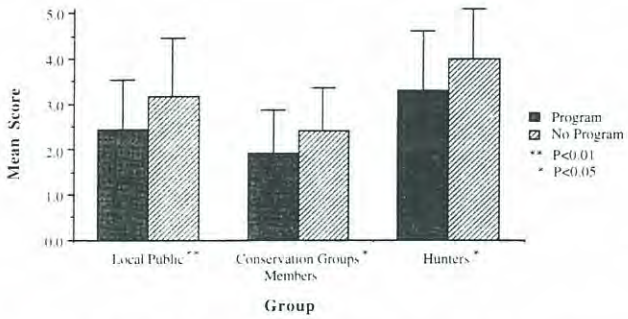

Fig. 1. Perceived Support of Selected Groups for Translocation Programs With and Without Public Relations/Education Programs. Mean scores (± S.D.) from a scale of 1 to 5, where a 1 indicated the strongest support and a 5 the least support. Significance tested using a simple *t*-test.

Coupled with the problems of surveying biologists untrained in social sciences, several real or potential biases were associated with this study. First, the high proportion of reportedly successful programs contrasts sharply with the literature, which suggests that most translocations, especially those involving rare species, fail (Griffith *et al.*, 1989; Ounsted, 1991; Short *et al.*, 1992; Yalden, 1993; Reading & Clark, in press). Thus, either a higher percentage of translocations, especially more recent ones, are successful than previously reported or the survey results are significantly biased by an over-representation of successful programs. Participants in more successful programs may be more likely to respond to a survey, they may be overly optimistic in their assessments of program success, or their programs may be better publicized and thus more likely to be surveyed. Second, results may be biased by demographic factors. Respondents to the survey were primarily male, older, and employed as wildlife professionals for several years. While this may be an accurate cross-section of translocation participants, these groups were significantly less likely to identify valuational and organizational problems than were respondents who were female, were younger, and had fewer years' experience. Finally, there have been relatively few translocations of

Table 3. Comparison of the mean scores (±SD) on selective questions for programs with and without public relations/education programs using a simple *t*-test

Scores on a scale of 1–5, where a 1 indicated the strongest agreement with each statement and a 5 the strongest disagreement.

Question	Program	No program	*t*-score	*n*
Local people were generally supportive of the translocation attempt.	1·66 (±0·93)	2·28 (±1·03)	3·27**	127
Private land owners were not an obstacle to program success.	1·64 (±0·94)	2·03 (±1·07)	2·02*	126
The program was well publicized.	1·92 (±0·95)	3·35 (±1·36)	6·77**	129
The views, attitudes, and opinions of local people toward the species being translocated were well understood.	2·52 (±0·94)	3·06 (±1·00)	2·81**	127
The views, attitudes, and opinions of local people toward the translocation program were well understood.	2·67 (±0·99)	3·14 (±1·03)	2·37*	127
People just don't understand the value of translocating this animal.	3·74 (±1·07)	3·13 (±0·99)	–1·70	126
The local people oppose any program wildlife agencies try to implement.	4·03 (±1·01)	4·00 (±0·86)	–0·171	128

*$p < 0{\cdot}05$; **$p < 0{\cdot}01$.

rare, threatened and endangered species. Thus, sample sizes tended to be small, possibly precluding trends from becoming apparent.

Valuational and organizational considerations

Despite the potential sampling and bias problems, several important results were obtained in this study. First, most respondents identified relatively few valuational or organizational problems in their translocation programs. It is difficult to assess whether or not these results are real or an artifact of the biases discussed above. For example, the high program success rates reported in this study may be a result of the few valuational and organizational problems reported. Alternatively, valuational and organizational problems may have existed, but were not perceived by survey respondents (Clark & Cragun, 1994).

Second, the results highlight the importance of public support and effective public relations/education programs to translocation success. Translocations with public relations/education programs were characterized by a more supportive and more knowledgeable public, although no causality could be implied (i.e. the public relations/education program did not necessarily increase public support and knowledge). Indeed, although perceived local support was correlated with translocation success, the presence of public relations/education programs was not. Therefore, simply having a public relations/education program is no guarantee public support will increase or that a translocation will be more successful. Most of the public relations programs were probably too small (based on expenditures), initiated too late, and too limited in scope to significantly increase local support.

Public relations/education programs must do more than just provide information to increase support because knowledge is only one of several factors influencing attitudes (Rokeach, 1972; Sinden & Worrell, 1979; Brown, 1984; Brown & Manfredo, 1987; Reading & Kellert, 1993). Cutlip and Center (1964) suggest three basic methods of increasing support and decreasing or neutralizing opposition: pressure, purchase, and persuasion. Ideally, all three methods should be employed in a coordinated, carefully planned public relations program. First, power and authority, in the form of laws, control of resources, etc., can be used to apply pressure. But to be truly successful, public relations programs will require 'carrots' as well as 'sticks'. Therefore, programs should also attempt to entice, or purchase, support using financial or other incentives. Finally, public relations programs should seek to persuade people to support the reintroduction, or at least not actively oppose it.

A third important result was that translocations which established special groups or teams increased perceived innovation, but did not improve perceived program organization, nor decrease perceived conflict. Further, the presence of special groups or teams was not correlated with translocation success, and their structure and composition may have contributed to their inability to improve perceived performance. Groups and teams were dominated by agency field workers and managers. While this is a common practice in wildlife recovery programs, such groups may not be ideal (Clark *et al.*, 1994). Gordon (1983), Clark and Westrum (1989), and Clark *et al.* (1989) recommend staffing special groups and teams with well-trained specialists who are experienced, professional, and dedicated to the task goal (e.g. species recovery). They go on to caution against simply including members who represent certain agencies or interested parties. While input from these latter sources is important, it should be considered secondary to the recovery focus of the special group. Indeed, programs may require the formation of two special groups or teams; a task group to address optimal biological/technical approaches to recovery, and an advisory group to incorporate the socioeconomic and political desires, needs, concerns, limitations, and legal considerations of all interested parties.

Fourth, a far greater percentage of programs surveyed included public relations/education programs

Table 4. Comparison of the mean scores (±SD) on selective questions for programs with and without special teams or groups using a simple *t*-test

Scores on a scale of 1–5, where 1 indicated the strongest agreement with each statement and 5 the strongest disagreement.

Question	Team	No team	*t*-score	*n*
The field techniques used in the translocation program were very similar to those used in past programs.	2·59 (±1·35)	2·05 (±1·21)	–2·34*	128
Risky ventures were avoided.	2·88 (±1·23)	2·19 (±1·05)	–3·38**	127
Being a 'team player' was important.	1·83 (±0·94)	2·24 (±0·88)	2·48*	124
As the program progressed, it became increasingly political.	3·22 (±1·34)	3·86 (±1·33)	2·67**	125
It was clear where to turn with specific problems.	1·93 (±0·98)	2·27 (±0·94)	1·97†	125
The translocation program was noticeably free of conflict.	2·59 (±1·41)	2·22 (±0·99)	–1·65	128
The program was well organized.	1·87 (±0·87)	2·03 (±0·92)	1·03	130
If not for the program leader, the project would have been less successful.	2·58 (±1·26)	2·40 (±1·02)	–0·86	124
Some key agencies/organizations were not well integrated into the program.	3·55 (±1·28)	3·44 (±0·94)	–0·56	124
Agreement was reached on most aspects of the program.	2·06 (±1·11)	1·93 (±0·87)	–0·71	125

*$p < 0.05$; **$p < 0.01$; †$p = 0.051$.

than included special teams or groups. This may suggest that participants are more aware of the valuational challenges than the organizational challenges to translocation success. Reviews of the translocation literature support this assertion (Reading, 1993; Reading & Clark, in press). We assert that participants should be aware of all facets of the translocation challenge, including organizational considerations, and work actively to ensure the adequacy of each.

Finally, translocations with the objective of augmenting populations were perceived to suffer from more problems, including greater local opposition, poorer public understanding, less money, and poorer leadership, than were programs aimed at establishing or re-establishing populations. These results suggest that translocations which attempt to augment populations require special attention, possibly because they do not generate the excitement and enthusiasm of translocations establishing populations. Participants should therefore strive to insure long-term funding and commitments early in a program's development, when support, funding, and enthusiasm are greatest.

Translocations, and conservation programs in general, are interdisciplinary in nature; however, most participants focus primarily on biological and technical challenges to the exclusion of important valuational and organizational considerations. To increase efficiency and success rates, participants should explicitly recognize, understand, assess, and address the full array of factors influencing translocation programs.

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REFERENCES

Berg, W. E. (1982). Reintroduction of fisher, pine marten, and river otter. In *Midwest furbearer management*, ed. G. C. Sanderson. Kansas Chapter of The Wildlife Society, Witchita, KS, pp. 159–173.

Brown, T. C. (1984). The concept of value in resource allocation. *Land Economics*, **60**, 231–246.

Brown, P. J. & Manfredo, M. J. (1987). Social values defined. In *Valuing wildlife: economic and social perspectives*, eds B. J. Decker & G. R. Goff. Westview Press, Boulder, CO, pp. 12–23.

Clark, T. W. (1986*a*). Professional excellence in wildlife and natural resource organizations. *Renewable Resources J.*, Winter, 8–13.

Clark, T. W. (1986*b*). Case studies in wildife policy education. *Renewable Resources J.*, Summer, 11–16.

Clark, T. W. (1988). The identity and images of wildlife professionals. *Renewable Resources J.*, Summer, 12–16.

Clark, T. W. (1992). Practicing natural resource management with a policy orientation. *Environ. Manage.*, **16**, 423–433.

Clark, T. W. (1993). Creating and using knowledge for species and ecosystem conservation: science, organizations, and policy. *Perspectives in Biology and Medicine*, **36** + **appendices**, 497–525.

Clark, T. W. (in press). *Averting extinction: reconstructing the endangered species recovery process*. Yale University Press, New Haven, CT.

Clark, T. W. & Cragun, J. R. (1994). Organizational and managerial guidelines for endangered species restoration programs and recovery teams. In *Restoration of endangered species*, eds M. L. Bowles & C. J. Whelan. Cambridge University Press, New York, pp. 9–33.

Clark, T. W. & Harvey, A. H. (1988). Implementing endangered species recovery policy: learning as we go? *Endangered Species UPDATE*, **5**, 35–42.

Clark, T. W. & Kellert, S. R. (1988). Toward a policy paradigm of the wildlife sciences. *Renewable Resources J.*, **6**, 7–16.

Clark, T. W. & Westrum, R. (1989). High-performance teams in wildlife conservation: a species reintroduction and recovery example. *Environ. Manage.*, **13**, 663–670.

Clark, T. W., Crete, R. & Cada, J. (1989). Designing and managing successful endangered species recovery programs. *Environ. Manage.*, **13**, 159–170.

Clark, T. W., Reading, R. P. & Clarke, A. L. (1994). *Endangered species recovery: finding the lessons and improving the process*. Island Press, Washington, DC.

Cronbach, L. J. (1951). Coefficient alpha and the internal structure of tests. *Psychometrika*, **16**, 297–334.

Cutlip, S. M. & Center, A. H. (1964). *Effective public relations*, 3rd edn. Prentice-Hall, Englewood Cliffs, NJ.

Garcelon, D. K. & Roemer, G. W. (1988). *Proceedings of the International Symposium on Raptor Reintroduction, 1985*. Institute for Widlife Studies, Arcata, CA.

Gordon, J. R. (1983). *A diagnostic approach to organizational behavior*. Allyn and Bacon, Boston, MA.

Griffith, B., Scott, J. M., Carpenter, J. W. & Reed, C. (1989). Translocation as a species conservation tool: status and strategy. *Science*, **245**, 447–480.

Kellert, S. R. (1985). Social and perceptual factors in endangered species management. *J. Wildl. Manage.*, **49**, 528–536.

Ounsted, M. L. (1991). Re-introducing birds: lessons to be learned for mammals. In *Beyond captive breeding: re-introducing endangered mammals to the wild*, ed. J. H. W. Gipps. Clarendon Press, Oxford, pp. 75–85.

Reading, R. P. (1993). Toward an endangered species reintroduction paradigm: a case study of the black-footed ferret. PhD dissertation, Yale University, New Haven, CT.

Reading, R. P. & Clark, T. W. (in press). Carnivore reintroductions: an interdisciplinary examination. In *Carnivore behavior, ecology, and evolution*, Vol. 2, ed. J. L. Gittleman. Cornell University Press, Ithaca, NY.

Reading, R. P. & Kellert, S. R. (1993). Attitudes toward a proposed black-footed ferret (*Mustela nigripes*) reintroduction. *Conserv. Biol.*, **7**, 569–580.

Reading, R. P. & Miller, B. J. (1994). The black-footed ferret recovery program: unmasking professional and organizational weaknesses. In *Endangered species recovery: finding the lessons and improving the process*, eds T. W. Clark, R. P. Reading & A. L. Clarke. Island Press, Washington, DC, pp. 73–100.

Reading, R. P., Clark, T. W. & Kellert, S. R. (1991). Toward and endangered species reintroduction paradigm. *Endangered Species Update*, **8**(1), 1–4.

Rokeach, M. (1972). *Beliefs, attitudes, and values: a theory of organization and change*. Josey-Bass, San Francisco, CA.

Short, J., Bradshaw, S. D., Giles, J., Prince, R. I. T. & Wilson, G. R. (1992). Reintroduction of macropods (Marsupialia: Macropodoidea) in Australia—a review. *Biol. Conserv.*, **61**, 189–204.

Sinden, J. & Worrell, A. (1979). *Unpriced values: decisions without market values*. John Wiley, New York.

Sokal, R. R. & Rohlf, F. J. (1981). *Biometry*, 2nd edn. W. H. Freeman, New York.

Tear, T. H. & Forester, D. (1992). Role of social theory in reintroduction planning: a case study of the Arabian oryx in Oman. *Society and Natural Resources*, **5**, 359–374.

Yalden, D. W. (1993). The problems of reintroducing carnivores. *Symp. Zool. Soc. Lond.*, **65**, 289–306.

APPENDIX I. ATTITUDE SCALE COMPOSITION AND CONSTRUCTION

Attitude scales computed by summing the scores of the individual questions and standardizing on a 100 point scale, so scoring is on a scale of 0–100. Cronbach's a (Cronbach, 1951), which varies from 0 to 1, was used to measure the scale's internal consistency

Question	Scoring	
	Strongly agree	Moderately agree
Conflict scale: Cronbach's a = 0·884		
Field workers complained about the program frequently.	2	1
Some people seemed more concerned with advancing their careers than with program success.	2	1
The program leader did not get along with some of the group members.	2	1
It seemed like every time something went wrong a scapegoat was found.	2	1
Personality conflicts impeded more efficient operation.	2	2
I felt 'burned out' by the end of the program.	1	1
As the program progressed, it became increasingly political.	2	1
Organization scale: Cronbach's a = 0·801		
The translocation program was noticeably free of conflict.	2	1
The program was well organized.	2	2
The people involved in the translocation were well trained for this work.	1	1
There was continuity among personnel working on the program.	2	1
Everyone involved in the program had access to the program leader.	2	1
Credit for program successes was shared among all involved.	2	1
Agreement was easily reached on most aspects of the program.	2	1
Local support scale: Cronbach's a = 0·779		
Local people were generally supportive of the translocation attempt.	2	1
Private land owners were not an obstacle to program success.	2	1
The program was well publicized.	1	1
Local people were knowledgeable about the species being translocated.	2	1
The views, attitudes, and opinions of local people toward the species being translocated were well understood.	2	1
Local people were knowledgeable about the translocation program.	2	1
The views, attitudes, and opinions of local people toward the translocation program were well understood.	2	1