

Evaluation of Communication Strategies to Mitigate Visitor Use Impacts On Marbled Murrelets

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EXECUTIVE SUMMARY

Background

Marbled murrelet and corvid interpretation effectiveness was studied in Redwood National and State Parks (RNSP). The Park is located along the northern coast of California, and it attracts visitors from all over the United States and the world. The summer months are the busiest time of year.

The National Park Service and California State Parks have put a great deal of effort into their murrelet messaging. The study objectives are to evaluate the murrelet interpretive materials using best practices in the field of interpretation and to gather information from visitors about what messages they remember and their attitudes toward murrelets.

On-site data collection occurred from May through July 2010. Three instruments were used to collect data from visitors -- a survey was completed by 650 visitors, interviews were conducted with 179 visitors, and observations were made of 596 visitors.

Data was collected at Prairie Creek Redwoods State Park, Del Norte Coast Redwoods State Park, and Jedediah Smith Redwood State Park. There were several sampling sites within each of these parks.

Visitor Characteristics

According to results from the written survey, approximately 52% of visitors were male. Most visitors (25.1%) were between the ages of 18 and 29 years. Not surprisingly, a majority of the visitors were white (87.4%), highly educated (over 63% had completed college or graduate school), and most visitors were financially well off (a median household income of between \$60,000 and \$80,000). Over half of visitors (54.3%) had never been to RNSP before. Family groups were the most common (62.3%) visitor group type.

Visitor Attitudes toward Murrelets and Corvids

Most visitors have attitudes toward wildlife that are in line with the messages promoted by management. The question that had most visitors in agreement was “Marbled murrelets are important to protect.” There was also strong group disagreement that “The Parks think it’s ok to feed jays, ravens, or crows.”

Interpretive Messaging

This study focuses on two different types of marbled murrelet messaging in Redwood National and State Parks (RNSP), and how effective those mediums and messages are at meeting targeted goals. First is the written messaging that visitors receive in the form of signs, rack cards, visitor guide articles, children’s coloring pages, magnets, buttons and postcards. Second is the oral messaging that visitors receive in visitor centers, campground check-in kiosks, campfire programs, guided hikes, and from roving rangers. This report summarizes what is being done well and what improvements can be made to make murrelet messaging in RNSP more effective.

Written Interpretive Messaging

All written messages provided to the researchers were analyzed for technical aspects as well as message type. Detailed analyses for each item can be found toward the end of this report. Overall, the written materials did a good job at conveying a sense of what the problem is (feeding corvids that then eat murrelet eggs and chicks). Messaging could be improved by shortening the overall length, stating the targeted message earlier in the text, including a very specific targeted behavioral message regarding the care that should be taken with any food in the park, providing a picture of the corvids and placing messages in closer proximity to where visitors would have to encounter them.

Oral Interpretive Messaging

For oral messaging, campfire programs were evaluated using a similar method as the written messaging and were found to be of wide ranging effectiveness depending on presenter. There were some programs that gave great thematic messages about marbled murrelets that were woven carefully into the program. There were other programs where a main message regarding marbled murrelets could not be identified. The best murrelet messages were those that were incorporated

into the larger program. Roving interpretive messages were not consistently provided, and when they were seemed to be very impactful. Oral messaging could be improved by providing consistent messages with very specific behavioral targeted requests that are integrated into programs seamlessly.

Overall Effectiveness at Impacting Visitors

The survey and interview data show that many visitors are attending to and remembering the target messages regarding murrelets. The effectiveness can be improved by simplifying the messages, providing them first and with frequency, ensuring that all personnel are trained in and capable of delivering targeted messages, and making behavioral requests specific and clear. Given that the majority of visitors were first time users and most could answer messaging questions correctly, the Parks are generally doing a good job at communicating the target messages.

Other Observations Made by Researchers

The researchers made a few observations about jays, ravens and crows throughout the course of the project. It was observed that jays that get the most food wait at a campsite while a group is eating. Then, as soon as the group leaves, the jays swoop in. Children are also responsible for quite a few incidents where food is deliberately thrown at the birds. Big Tree at Prairie Creek has the most aggressive corvids of all the survey locations.

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Introduction

This project assesses the effectiveness of the Redwood National and State Parks (RNSP) corvid/marbled murrelet education program. Studies at RNSP and other protected areas have shown that federally threatened and California state endangered marbled murrelets are being heavily preyed upon by corvids (Steller's jays and common ravens), particularly in areas of nesting habitat located adjacent to high use park visitor areas. Corvids are attracted to high use visitor areas by the abundance of anthropogenic food and, in turn, prey on murrelets nesting in these areas at elevated rates. The RNSP corvid/marbled murrelet education program seeks to change visitor behavior to lessen the amount of anthropogenic food available to corvids, and thus lower predation rates of murrelets.

National and state parks create personal and non-personal interpretive services to meet certain goals such as educating the public. However, the interpretive services are often designed and completed without consulting the visitors themselves regarding what messages or information they seek while on-site. These can be considered "behavioral-targeted" messages. Managers know the behavior that needs addressing, and therefore target salient messages to that behavior. However, messages that actually target the visitors' belief about the behavior are much more effective (Moscardo, 1999; Ward & Wilkinson, 2006). In this case, telling visitors that they should monitor all food and ensure that corvids are not allowed to forage from human food sources because of the impacts to the murrelets, does not specifically target the reason that the visitors may be allowing for food access by corvids in the first place (belief-targeted messages). In addition, although there has been some research regarding the effectiveness of programs, techniques, and theories of communication to substantiate long-held intuitive impressions of interpretation, most of the interpretive services provided have never been evaluated (Absher & Graefe, 1997; Picard, 1997; Johnson & VandeKamp, 1994; Roggenbuck, 1992; Ward & Wilkinson, 2006; Widner & Roggenbuck, 2000). Without knowing what works, when and for whom, interpreters cannot effectively communicate with visitors and hope to meet any program goals, least of all a goal of behavior modification.

This assessment provides a unique opportunity to examine the entire picture of behavior modification using communication and interpretation toward a protected and critical resource. Do the programs, messages and outreach work as intended? What behavioral impacts result from the interpretation? The dual mandate of the National Park Service and California Department of Parks and Recreation suggests that protection of the marbled murrelet be managed primarily through the use of light-handed techniques such as education and interpretation. Since it is the behavior of humans that seems to be causing the most negative impact to the murrelets, this assessment will, in effect, allow for the creation of baseline data regarding the effectiveness of a communication strategy regarding a natural resource management issue that the public has received relatively little information about. Both park visitors and park messages have been analyzed.

Park visitors: Data has been collected on who they are, where they go, and what they do relative to marbled murrelets, as well as what they know and how they feel (salient beliefs, values) about marbled murrelets. Visitor behavior has been observed and visitors have been surveyed and interviewed on-site to determine their knowledge about murrelets, their behaviors that might potentially impact murrelets, and what park messages they can remember having been exposed to relative to murrelets. Interviews and surveys were used to test knowledge about and interest in murrelets, and elicit some basic beliefs and values about murrelets.

Park messages: An inventory has been conducted of the various park messages, in various forms and sources, which the park makes available to the public about murrelets. Things such as message source, frequency and content have been recorded. A content and graphic analysis of each message has been conducted based on current best practices. These findings were then related to the information learned from our visitor analysis to determine the type, source and content of park murrelet messages that visitors are most likely to recall. We are able to analyze relationships between visitors (behaviors, knowledge, interest, beliefs, values) and park messages.

Study Goals and Objectives

The project specifically determines visitor behavior, beliefs and knowledge relative to the marbled murrelet issue, surveys the parks' current interpretive materials and presentations, and then assesses whether the parks' current messaging is effectively altering park visitor wildlife feeding behavior (intentional and unintentional). The project occurred in the three California State Parks (Jedediah Smith Redwoods State Park, Del Norte Coast Redwoods State Park, Prairie Creek Redwoods State Park) located within the boundaries of Redwood National Park.

Methods

Sites selected for this study include parking lots, campgrounds, campfire centers, and trailheads in Prairie Creek Redwoods State Park, Del Norte Coast Redwoods State Park, and Jedediah Smith Redwoods State Park. Three data collection methods were used -- survey, interview, and observation. A sampling plan guided the type of data collection being conducted at each site on each day.

During survey and interview sampling periods, all visitors to study sites were approached by a researcher and asked to complete a questionnaire, or participate in an interview, about their visit. If there was more than one person in the group, the person with the closest approaching birthday was selected. Visitors were asked to provide information about what activities they were participating in during their visit, and about their knowledge and attitudes regarding marbled murrelets and corvids. This required a time commitment of no more than ten minutes. Only visitors who were 18 years of age or older were able to participate.

During observation sampling periods, all visitors to a study site were unobtrusively (surreptitiously) observed by the researchers for information such as length of visit, what activities they conducted during their visit, their behavior relative to corvids and food security, and corvid behavior during that time. This required no time commitment from participants and did not affect the visitor experience in any way.

Table 1 shows the number of days spent in the parks interviewing, observing or surveying visitors. Three researchers conducted the data collection between May and July 2010. No two researchers were in the same place at the same time. The Prairie Creek numbers are higher because that park had more individual research sites than the other parks.

Table 1. Sampling Plan

Site and Sampling Method	Number of Days Sampling
Prairie Creek	
Interview	12
Observation	23
Survey	12
Del Norte	
Interview	7
Observation	9
Survey	5
Jedediah Smith	
Interview	7
Observation	9
Survey	6
<i>Total</i>	<i>90</i>

Table 2 shows the number of surveys, interviews, and observations collected at each site throughout the entire sampling period. As anticipated, Prairie Creek had the most data collected since the researchers were there more often. Overall, the sample sizes are great enough to conduct a very sound analysis.

Table 2. Sample Sizes (number of visitors contacted or observed)

	Survey	Interview	Observation	<i>Total</i>
Prairie Creek	366	100	377	844
Del Norte	84	10	97	191
Jedediah Smith	200	69	122	391
<i>Total</i>	650	179	596	1426

Analysis of Survey Data

Table 3 shows that the highest number of surveys were collected at Big Tree (146 surveys) and at the Prairie Creek Visitor Center (124 surveys.) The fewest surveys were collected at the Jedediah Smith Campfire Center. A total of 192 people completed surveys at campgrounds.

Table 3. Surveys Collected by Site

Site	Number of Surveys
Prairie Creek- Visitor Center	124
Prairie Creek- Campground	58
Prairie Creek- Big Tree	146
Prairie Creek- Gold Bluffs	15
Prairie Creek- Fern Canyon	23
Del Norte- Campground	73
Del Norte- Campfire Center	11
Jedediah Smith- Visitor Center	30
Jedediah Smith- Campground	61
Jedediah Smith- Campfire Center	5
Jedediah Smith- Simpson Reed Grove	38
Jedediah Smith- Stout Grove	66
<i>Total</i>	<i>650</i>

Visitor Characteristics

Most visitors sampled were Male (52%), under the age of 40 (46%), white (87%), highly educated with 63% holding at least one college degree and 42% with an income over \$80,000. Most visitors were from the United States (89%) and the majority of those were from California (36%), Oregon (18%) and Washington (9%).

Gender

Table 4 shows that the gender of visitors is split fairly evenly, with slightly more males than females.

Table 4. Gender of Respondents

Gender	Percent of Respondents (n=609)
Male	52.4%
Female	47.6%
Total	100.0%

Age

Table 5 shows that many of the respondents were young. Out of all the respondents, 45.6% were under the age of 40 years.

Table 5. Age of Respondents

Age	Percent of Respondents (n=590)
18-29 years	25.1%
30-39 years	20.5%
40-49 years	14.9%
50-59 years	18.0%
60-69 years	16.1%
70+ years	5.4%
Total	100.0%

Ethnicity

Table 6 shows that the majority of respondents were white (87.4%) with each Hispanic/Latino and Asian respondents representing approximately 4% of the population.

Table 6. Cultural/Ethnic Identity of Respondents

Cultural/Ethnic Group	Percent of Respondents (n=635)
White	87.4%
Hispanic/ Latino	4.4%
Asian	4.3%
American Indian/ Alaska Native	1.9%
Black/ African American	0.8%
Native Hawaiian/ Pacific Islander	0.6%
Other	2.2%

Education

Respondents were highly educated with approximately 63% of respondents had at least one college degree.

Table 7. Education Level of Respondents

Education Level	Percent of Respondents (n=540)
Postgraduate	33.7%
College Graduate	29.4%
Some College	23.3%
High school or less	13.5%
Total	100.0%

Income Level

Respondents' income was fairly evenly distributed among income levels. The income level with the highest percent of respondents was \$120,000 or more (16.5%)

Table 8. Annual Income Reported by Respondents

Annual Household Income	Percent of Respondents (n=492)
Less than \$20,000	13.0%
\$20,000-\$39,999	15.2%
\$40,000- \$59,999	15.0%
\$60,000- \$79,999	14.8%
\$80,000- \$99,999	14.6%
\$100,000- \$119,999	10.8%
\$120,000 or more	16.5%
Total	100.0%

Residence

Surveys were completed from visitors from a variety of countries. Visitors from other countries accounted for nearly 11% of visitation. Other than the United States, Canada had the most visitors (4.0%).

Table 9. Surveys Collected by Country

Country	Percent of Respondents (n=601)
Australia	0.8%
Austria	0.3%
Bermuda	0.2%
Canada	4.0%
Denmark	0.5%
Germany	1.3%
Holland	0.2%
Israel	0.2%
Netherlands	0.7%
New Zealand	0.3%
Norway	0.2%
Slovakia	0.2%
Switzerland	0.3%
United Kingdom	1.7%
United States	89.2%

Visitors came to the park units sampled from all across the United States with California (36%), Oregon (18%) and Washington (9%) representing the highest visitation levels.

Table 10. Surveys Collected by State

State	Percent of Respondents (n=536)
Alabama	0.2%
Alaska	0.4%
Arizona	0.9%
Arkansas	0.4%
California	36.2%
Colorado	1.7%
Connecticut	0.4%
Florida	1.3%
Georgia	0.7%
Idaho	0.6%
Illinois	1.7%
Indiana	0.9%
Kentucky	0.7%
Maryland	0.4%
Massachusetts	1.1%
Michigan	1.7%
Minnesota	0.9%
Mississippi	0.2%
Missouri	1.3%
Montana	0.4%
Nebraska	0.2%
Nevada	2.2%
New Jersey	0.6%
New Mexico	0.7%
New York	2.4%
North Carolina	1.7%
Ohio	0.9%
Oklahoma	0.6%
Oregon	18.1%

Pennsylvania	1.3%
South Carolina	0.2%
South Dakota	0.2%
Tennessee	0.9%
Texas	2.8%
Utah	2.1%
Vermont	0.2%
Virginia	1.1%
Washington	8.6%
Washington, D.C.	0.6%
West Virginia	0.2%
Wisconsin	1.3%
Wyoming	0.9%

Group Characteristics

Most visitors came in groups of two (47%) with family (62%), no children (75%) or seniors (78%). The majority of visitors has not been to the park before (54%), and of those that had, most (49%) had only been once or twice before.

Group Size

Table 11 shows that the most common group size was two people (47.3%).

Table 11. Visitor Group Size

Number in Group	Percent of Respondents (n=639)
1 person	5.8%
2 people	47.3%
3 to 5 people	35.2%
6 + people	11.7%
Total	100.0%

Group Type

Table 12 shows most visitors traveled in family groups (62.3%).

Table 12. Visitor Group Type

Group Type	Percent of Respondents (n=647)
Alone	7.7%
Family Only	62.3%
Friends Only	12.5%
Family and Friends	11.0%
Organized Club	0.3%
Other	6.2%
Total	100.0%

Group Composition by Age Group

Most people did not visit with children.

Table 13. Number of Children in Visitor Group

Number of Children	Percent of Respondents (n=650)
0 children	74.6%
1 child	8.0%
2 children	10.0%
3 – 5 children	6.0%
6 or more children	1.4%
Total	100.0%

Table 14 shows that most people who visited the parks were not seniors, but 22.3% of all visitor group did contain at least one senior.

Table 14. Number of Seniors in Visitor Group

Number of Seniors	Percent of Respondents (n=650)
0 seniors	77.7%
1 senior	10.5%
2 seniors	8.9%
3 – 5 seniors	1.8%
6 or more seniors	1.1%
Total	100.0%

Past Experience

Table 15 shows that the majority (54.3%) of visitors have not been to RNSP.

Table 15. Prior Site Experience

Response	Percent of Respondents (n=644)
Previous visits	45.7%
No previous visits	54.3%
Total	100.0%

Table 16 shows that of those who have visited RNSP before, almost half (48.9%) have visited just once or twice before.

Table 16. Number of Prior Visits of Repeat Visitors

Number of Visits	Percent of Respondents (n=307)
1-2 visits	48.9%
3-5 visits	24.1%
6-9 visits	9.4%
10 or more visits	17.6%
Total	100.0%

Visit Characteristics

As of the time visitors took the survey, most had been in RNSP between twelve and twenty four hours. It is interesting to note that 6.3% of respondents had only been in RNSP for a half hour or less.

Table 17. Length of Visit So Far

Length of Visit (Hours: Minutes)	Percent of Respondents (n=638)
0:01-0:30	6.3%
0:31-0:59	0.2%
1:00-3:00	17.4%
3:01-12:00	9.2%
12:01-24:00	30.0%
24:01-48:00	21.6%
48:01-72:00	8.5%
72:01-96:00	3.6%
96:01 or more	3.3%
Total	100.0%

Prairie Creek is the most visited park, but researchers also spent twice as much time collecting surveys in Prairie Creek as in the other parks.

Table 18. Sites Visited During Visit to Redwood National and State Parks

Sites	Percent of Respondents (n=650)
Prairie Creek	64.5%
Jedediah Smith	49.8%
Redwood National Park	49.5%
Del Norte	29.8%

By far, the most popular reason cited for visiting was enjoying the scenery (80.8%). The least popular reason was horseback riding. Responses in the other category include “photography,” “motorcycling,” and “swimming.”

Table 19. Reasons for Visiting

Reason	Percent of Respondents (n=650)
Enjoying the scenery	80.8%
Hiking or walking	68.6%
Camping	47.4%
Wildlife viewing	40.2%
Getting information from the visitor center	21.5%
Bird watching	19.5%
Picnic	16.5%
Tidepool exploration	10.6%
Attending interpretive program or guided walk	7.2%
Biking	6.0%
Fishing	4.2%
Horseback riding	0.6%
Other	12.0%

A majority of visitors (66.9%) visited at least one of the Visitor Centers in RNSP and a majority (53%) viewed information or education signs while in the park. Only 3.8% participated in a ranger led walk. Responses in the other category include “National Park website” and “flower guides.”

Table 20. Interpretive Services Used

Interpretive Service	Percent of Respondents (n=650)
Visited the Visitor Center	66.9%
Viewed informational or educational signs	53.7%
Read Visitor Guide	43.2%
Walked a self-guided interpretive trail (brochure or sign)	34.2%
Talked with a ranger on a trail, in a campground, or in a parking area	23.7%
Shopped in a Visitor Center bookstore	22.5%
Attended a ranger led campfire program	12.0%
Had your children participate in a Junior Ranger program	5.5%
Participated in a ranger led walk	3.8%
Other	2.2%

Knowledge of Marbled Murrelet and Corvids

Out of 650 participants, 345 participants (53.1%) stated that they could not name one main threat to marbled murrelet eggs and chicks. Table 21 shows that of the visitors who could answer the question, most (41.9%) thought jays were the main threat. Many visitors could not identify the local Steller's jay and instead thought they were blue jays or scrub jays. Responses in the other category include "falling from trees," "DDT," "lizards," "dogs," "magpies," and "squirrels."

Table 21. Can you name one main threat to marbled murrelet eggs and chicks?

Response	First Response (n=286)	Additional Responses (n=124)	Total Responses
Jays (Steller's, Blue, Scrub)	38.1%	3.8%	41.9%
Habitat disruption	16.8%	11.5%	28.3%
Humans	9.4%	2.8%	12.2%
People feeding jays, leaving food out	7.0%	5.6%	12.6%
Corvids	6.6%	1.4%	8.0%
Jays, ravens, crows eat murrelet eggs and chicks	6.3%	1.0%	7.3%
Crows	5.9%	7.7%	13.6%
Birds of prey (owls, hawks, eagles)	3.5%	2.4%	5.9%
Ravens	2.4%	4.9%	7.3%
Predators (raccoons, foxes)	2.4%	1.0%	3.4%
Other	1.4%	1.0%	2.4%

Out of 650 participants, 336 participants (51.7%) stated that they could not name one thing to help keep marbled murrelets safe. Table 22 shows that of the visitors who could answer the question, most (28.1%) thought they should not feed jays, ravens, and crows. Just for the 48% of visitors who answered the question, all appropriate food related responses together, including “don’t feed jays,” “keep food stored away,” and “don’t feed wildlife” totaled 60.3% of respondents mentioning a relevant food related message. Responses in the other category include “recycle” and “place murrelets in a safe environment.”

Table 22. What is one thing you can do to help keep marbled murrelets safe?

Response	First Response (n=274)	Additional Responses (n=59)	Total Responses
Don’t feed jays, ravens, crows	25.2%	2.9%	28.1%
Keep food stored away	20.1%	4.4%	24.5%
Don’t leave garbage out	15.3%	6.6%	21.9%
Habitat protection	13.5%	2.6%	16.1%
Don’t feed wildlife	6.6%	1.1%	7.7%
Don’t feed murrelets	5.5%	0.4%	5.9%
Support park preservation	4.7%	1.8%	6.5%
Don’t harass murrelets	4.7%	0.7%	5.4%
Get rid of jays, ravens, crows	1.5%	1.1%	2.6%
Watch for eggs	1.5%	0.0%	1.5%
Obey rules	0.7%	0.0%	0.7%
Other	0.7%	0.0%	0.7%

Visitors were asked if they had heard or seen any messages about marbled murrelets. Table 23a shows that a majority (60.4%) of all visitors had not heard or seen any messages. Table 23b indicates that of those visitors surveyed in campgrounds a majority (54.2%) had heard or seen a marbled murrelet message and Table 23c indicates that of those contacted in Visitor Centers or on trails, a majority (68.4%) had not received a target message.

Table 23a. Heard or seen messages about marbled murrelets

Response	Percent of Respondents (n=611)
Have heard or seen	39.6%
Have not heard or seen	60.4%
Total	100.0%

Table 23b. (Campgrounds) Heard or seen messages about marbled murrelets

Response	Percent of Respondents (n=216)
Have heard or seen	54.2%
Have not heard or seen	45.8%
Total	100.0%

Table 23c. (Trails and Visitor Centers) Heard or seen messages about marbled murrelets

Response	Percent of Respondents (n=395)
Have heard or seen	31.6%
Have not heard or seen	68.4%
Total	100.0%

Table 24a shows that of the 213 respondents who remembered a message about marbled murrelets, most (57.7%) had heard that murrelets “are endangered or threatened.” Responses in the other category included “don’t camp on beach,” “murrelets have only one offspring at a time,” and “sensitive to noise.” Taken together, a total of only 26.8% of the responses involved a targeted food related message including “don’t feed jays,” “feed a jay, kill a murrelet,” “keep food stored away,” and “don’t feed animals.”

Table 24b indicates that visitors in campgrounds were slightly more successfully receiving and recalling the targeted messages, with 35.1% recalling one the message listed above.

Table 24a. What was the message you received about marbled murrelets?

Message	First Response (n=213)	Additional Responses (n=98)	Total Responses
Murrelets are endangered/threatened	48.8%	8.9%	57.7%
Don’t feed jays, ravens, crows	12.2%	3.3%	15.5%
Dependence on redwoods	9.9%	11.7%	21.6%
Jays, ravens, crows eat murrelet eggs and chicks	5.2%	8.0%	13.2%
Don’t leave garbage out	5.2%	5.6%	10.8%
Don’t feed murrelets	4.2%	0.0%	4.2%
Feed a jay, kill a murrelet	3.8%	0.9%	4.7%
Need to protect murrelets	3.3%	3.8%	7.1%
Keep food stored away	3.3%	1.4%	4.7%
Don’t feed animals	1.9%	0.0%	1.9%
Beautiful bird	0.9%	0.5%	1.4%
Too many corvids	0.5%	0.9%	1.4%
Don’t make a good bird go bad	0.5%	0.0%	0.5%
Other	0.5%	0.9%	1.4%

Table 24b. (Campgrounds) What was the message you received about marbled murrelets?

Message	First Response (n=105)	Additional Responses (n=51)	Total Responses
Murrelets are endangered/threatened	45.7%	4.8%	50.5%
Don't feed jays, ravens, crows	13.3%	5.7%	19.0%
Dependence on redwoods	9.5%	8.6%	18.1%
Jays, ravens, crows eat murrelet eggs and chicks	5.7%	31.4%	37.1%
Don't leave garbage out	2.9%	6.7%	9.6%
Don't feed murrelets	0.0%	0.0%	0.0%
Feed a jay, kill a murrelet	3.8%	0.9%	4.7%
Need to protect murrelets	3.8%	3.8%	7.6%
Keep food stored away	4.8%	0.9%	5.7%
Don't feed animals	5.7%	0.0%	5.7%
Beautiful bird	1.9%	0.0%	1.9%
Too many corvids	0.9%	1.9%	2.8%
Don't make a good bird go bad	0.0%	0.0%	0.0%
Other	1.9%	0.0%	1.9%

Table 24c. (Trails and Visitor Centers) What was the message you received about marbled murrelets?

Message	First Response (n=108)	Additional Responses (n=47)	Total Responses
Murrelets are endangered/threatened	49.1%	5.6%	54.7%
Don't feed jays, ravens, crows	11.1%	0.0%	11.1%
Dependence on redwoods	7.4%	14.8%	22.2%
Jays, ravens, crows eat murrelet eggs and chicks	6.5%	5.6%	12.1%
Don't leave garbage out	3.7%	3.7%	7.4%
Don't feed murrelets	6.5%	0.0%	6.5%
Feed a jay, kill a murrelet	3.7%	0.9%	4.8%
Need to protect murrelets	2.8%	3.7%	6.5%
Keep food stored away	2.8%	2.8%	5.6%
Don't feed animals	2.8%	0.9%	3.7%
Beautiful bird	0.0%	0.9%	0.9%
Too many corvids	0.0%	0.0%	0.0%
Don't make a good bird go bad	0.9%	0.0%	0.9%
Other	2.8%	5.6%	8.4%

Visitors were then asked where they heard or saw the message they remembered about murrelets. Table 25a shows that a majority of all visitors (64.5%) received their information about marbled murrelets from informational or educational signs. The results from visitors surveyed in campgrounds, Visitor Centers and trails were not significantly different.

Table 25a. Where heard or seen message about marbled murrelet

Interpretive Service	Percent of Respondents (n=242)
Informational or educational signs	64.5%
Visitor Center	41.3%
Printed Visitor Guide	27.7%
Ranger led campfire program	19.4%
Self-guided interpretive trail (brochure or sign)	16.5%
Talked with a ranger on a trail, in a campground, or in a parking area	14.5%
Child's participation in a Junior Ranger program	6.2%
Ranger led walk	4.5%
Visitor Center bookstore	4.1%
Other	16.9%

Table 25b. (Campgrounds) Where heard or seen message about marbled murrelet

Interpretive Service	Percent of Respondents (n=117)
Informational or educational signs	61.5%
Visitor Center	35.9%
Printed Visitor Guide	27.4%
Ranger led campfire program	30.0%
Self-guided interpretive trail (brochure or sign)	12.8%
Talked with a ranger on a trail, in a campground, or in a parking area	17.1%
Child's participation in a Junior Ranger program	8.5%
Ranger led walk	6.0%
Visitor Center bookstore	5.1%
Other	17.1%

Table 25c. (Trails and Visitor Centers) Where heard or seen message about marbled murrelet

Interpretive Service	Percent of Respondents (n=125)
Informational or educational signs	67.6%
Visitor Center	46.4%
Printed Visitor Guide	28.8%
Ranger led campfire program	9.6%
Self-guided interpretive trail (brochure or sign)	20.0%
Talked with a ranger on a trail, in a campground, or in a parking area	12.0%
Child's participation in a Junior Ranger program	4.0%
Ranger led walk	3.2%
Visitor Center bookstore	3.2%
Other	16.8%

Visitors were then asked if they had heard or seen any messages about corvids (jays, ravens, or crows.) Table 26a shows that a majority (61.9%) did not recall having heard or seen any messages. When examining the responses from visitors in the campgrounds that number drops to 50% (Table 26b). Visitors sampled on trails or Visitor Centers had the lowest level of message retention--only 32% recalled having seen or heard a message related to corvids (Table 26c).

Table 26a. Heard or seen messages about corvids (jays, ravens, crows)

Response	Percent of Respondents (n=604)
Have heard or seen	38.1%
Have not heard or seen	61.9%
Total	100.0%

Table 26b. (Campgrounds) Heard or seen messages about corvids (jays, ravens, crows)

Response	Percent of Respondents (n=210)
Have heard or seen	49.5%
Have not heard or seen	50.5%
Total	100.0%

Table 26c. (Trails and Visitor Centers) Heard or seen messages about corvids (jays, ravens, crows)

Response	Percent of Respondents (n=394)
Have heard or seen	32.0%
Have not heard or seen	68.0%
Total	100.0%

Table 27a shows that of the 209 respondents (32%) who remembered a message about corvids, most (48.4%) had heard that they are not supposed to feed jays, ravens, or crows. Responses in the other category included “you can watch them,” “don’t encourage them,” “jays banded in campground,” and “they chase other birds away.”

Table 27a. What was the message you received about corvids?

Response	First Response (n=209)	Additional Responses (n=51)	Total Responses
Don’t feed jays, ravens, crows	45.5%	2.9%	48.4%
Corvids eat eggs and chicks of murrelet	18.2%	6.7%	24.9%
They follow humans and find eggs and chicks	8.1%	4.3%	12.4%
Jays threaten murrelets	6.7%	1.4%	8.1%
Keep food stored away	4.3%	3.3%	7.6%
Too many corvids	3.8%	1.9%	5.7%
Don’t make a good bird go bad	3.3%	0.0%	3.3%
They are a nuisance	1.9%	0.0%	1.9%
Corvids encroach on murrelet habitat	1.4%	1.4%	2.8%
Don’t leave garbage out	1.4%	1.0%	2.4%
Feed a jay, kill a murrelet	1.4%	0.5%	1.9%
They’re endangered	1.0%	0.0%	1.0%
Respect them	0.5%	0.0%	0.5%
Other	2.4%	1.0%	3.4%

Table 27b. (Campgrounds) What was the message you received about corvids?

Response	First Response (n=104)	Additional Responses (n=31)	Total Responses
Don't feed jays, ravens, crows	37.5%	2.9%	40.4%
Corvids eat eggs and chicks of murrelet	17.3%	10.6%	27.9%
They follow humans and find eggs and chicks	11.5%	3.8%	15.3%
Jays threaten murrelets	5.8%	1.9%	7.7%
Keep food stored away	6.7%	4.8%	11.5%
Too many corvids	5.8%	1.9%	7.7%
Don't make a good bird go bad	2.9%	0.0%	2.9%
They are a nuisance	1.0%	0.0%	1.0%
Corvids encroach on murrelet habitat	2.9%	2.9%	5.8%
Don't leave garbage out	1.9%	1.0%	2.9%
Feed a jay, kill a murrelet	2.9%	0.0%	2.9%
They're endangered	1.0%	0.0%	1.0%
Respect them	0.0%	0.0%	0.0%
Other	2.9%	0.0%	2.9%

Table 27c. (Trails and Visitor Centers) What was the message you received about corvids?

Response	First Response (n=105)	Additional Responses (n=20)	Total Responses
Don't feed jays, ravens, crows	51.4%	1.9%	53.3%
Corvids eat eggs and chicks of murrelet	18.1%	2.9%	21.0%
They follow humans and find eggs and chicks	4.8%	4.8%	9.6%
Jays threaten murrelets	7.6%	1.0%	8.6%
Keep food stored away	1.9%	1.9%	3.8%
Too many corvids	1.9%	1.9%	3.8%
Don't make a good bird go bad	3.8%	0.0%	3.8%
They are a nuisance	2.9%	0.0%	2.9%
Corvids encroach on murrelet habitat	0.0%	0.0%	0.0%
Don't leave garbage out	1.0%	1.0%	2.0%
Feed a jay, kill a murrelet	0.0%	1.0%	1.0%
They're endangered	1.0%	0.0%	1.0%
Respect them	1.0%	0.0%	1.0%
Other	4.8%	2.9%	7.7%

Visitors were then asked where they heard or saw the message they remembered about corvids. Table 28a shows that a majority of visitors (62.6%) again received their information about corvids from informational or educational signs. These percentages did not significantly change depending on where visitors were surveyed (Tables 28 b and c).

Table 28a. Where heard or seen message about corvids (jays, ravens, crows)

Interpretive Service	Percent of Respondents (n=230)
Informational or educational signs	62.6%
Visitor Center	36.1%
Printed Visitor Guide	22.6%
Ranger led campfire program	19.6%
Self-guided interpretive trail (brochure or sign)	16.1%
Talked with a ranger on a trail, in a campground, or in a parking area	11.7%
Child's participation in a Junior Ranger program	5.2%
Visitor Center bookstore	5.2%
Ranger led walk	3.9%
Other	10.0%

Table 28b. (Campgrounds) Where heard or seen message about corvids (jays, ravens, crows)

Interpretive Service	Percent of Respondents (n=104)
Informational or educational signs	63.5%
Visitor Center	36.5%
Printed Visitor Guide	26.9%
Ranger led campfire program	32.7%
Self-guided interpretive trail (brochure or sign)	12.5%
Talked with a ranger on a trail, in a campground, or in a parking area	14.4%
Child's participation in a Junior Ranger program	6.7%
Visitor Center bookstore	5.8%
Ranger led walk	3.8%

Table 28c. (Trails and Visitor Centers) Where heard or seen message about corvids (jays, ravens, crows)

Interpretive Service	Percent of Respondents (n=126)
Informational or educational signs	61.9%
Visitor Center	35.7%
Printed Visitor Guide	19.0%
Ranger led campfire program	8.7%
Self-guided interpretive trail (brochure or sign)	19.0%
Talked with a ranger on a trail, in a campground, or in a parking area	9.5%
Child's participation in a Junior Ranger program	4.0%
Visitor Center bookstore	4.8%
Ranger led walk	4.0%
Other	7.1%

Table 29 shows that most visitors (62.1%) noticed corvids during their visit to the Parks.

Table 29. Have you noticed any jays, ravens, or crows at this site during your visit today?

Response	Percent of Respondents (n=623)
Have noticed	62.1%
Have not noticed	29.1%
Don't Know	8.8%
Total	100.0%

However, Table 30 shows that most visitors (77.1%) did not see corvids eating their food or other people's food during their visit.

Table 30. Have you observed jays, ravens, or crows eating human food (yours or others) during your visit?

Response	Percent of Respondents (n=620)
Have seen	15.2%
Have not seen	77.1%
Don't Know	7.7%
Total	100.0%

Visitors were asked to assess their knowledge of the interaction between marbled murrelets and corvids, as well as their interest in learning more about the interaction. Table 31a shows that visitors do not consider themselves very knowledgeable about it. Table 32b shows that visitors sampled in the campgrounds have some, though not a lot, of interest in learning more.

Table 31a. Visitor self-assessment of knowledge of the interaction between marbled murrelets and corvids (1= not very knowledgeable, 6= very knowledgeable)

Mean (n=599)	Median (n=599)	Mode (n=599)
2.04	1.00	1

Table 31b. (Campgrounds) Visitor self-assessment of knowledge of the interaction between marbled murrelets and corvids (1= not very knowledgeable, 6= very knowledgeable)

Mean (n=210)	Median (n=210)	Mode (n=210)
2.50	2.00	1

Table 31c. (Trails and Visitor Centers) Visitor self-assessment of knowledge of the interaction between marbled murrelets and corvids (1= not very knowledgeable, 6= very knowledgeable)

Mean (n=389)	Median (n=389)	Mode (n=389)
1.79	1.00	1

Table 32a. Visitor interest in learning more about the interaction between marbled murrelets and corvids (1= not interested, 6= very interested)

Mean (n=590)	Median (n=590)	Mode (n=590)
3.28	3.00	3

Table 32b. (Campgrounds) Visitor interest in learning more about the interaction between marbled murrelets and corvids (1= not interested, 6= very interested)

Mean (n=206)	Median (n=206)	Mode (n=206)
3.64	4.00	3

Table 32c. (Trails and Visitor Centers) Visitor interest in learning more about the interaction between marbled murrelets and corvids (1= not interested, 6= very interested)

Mean (n=384)	Median (n=384)	Mode (n=384)
3.09	3.00	3

Table 33 shows visitor preferences for receiving information. A two-dimensional/ flat panel sign was most preferred.

Table 33. Visitor preference to receive information (1= least preferred, 6= most preferred)

Information Type	Mean	Median	Mode
Two dimensional/ flat panel signs (n= 461)	4.57	5.00	6
Brochures (n= 442)	3.88	4.00	6
Talking with park ranger (n= 419)	4.15	4.00	6
Audio/visual programs (n=394)	3.2	3.00	1

Table 34 shows that visitors spend more time reading information than looking at pictures on a sign.

Table 34. Visitor preference for pictures or text

Response	Percent of Respondents (n=525)
More time spent looking at pictures	34.5%
More time spent reading information	65.5%
Total	100.0%

Finally, visitors were asked to rate their agreement with certain statements intended to assess their attitudes toward marbled murrelets and jays, ravens, and crows. The statement with the highest degree (mean=5.04) of agreement was “Marbled murrelets are important to protect.” The statement with the greatest split between those who agree and disagree is “I want to know more about marbled murrelets.”

Table 35a. Visitor agreement with attitude statements (1= disagree, 6= agree)

Statement	Mean	Median	Mode
It is fun for me to feed jays, ravens, or crows (n= 570)	1.73	1.00	1
I like seeing jays, ravens, or crows around my campsite (n= 562)	3.16	3.00	1
I enjoy photographing jays, ravens, or crows up close (n= 563)	2.94	3.00	1
My children enjoy feeding jays, ravens, or crows (n= 440)	1.54	1.00	1
I can eat at my campsite without leaving crumbs (n= 538)	4.12	5.00	6
I have seen other visitors feed jays, ravens, or crows (n= 524)	1.95	1.00	1
I have seen other visitors accidentally drop food (n= 520)	2.52	2.00	1
The Parks think it's ok to feed jays, ravens, or crows (n= 534)	1.36	1.00	1
I think it's ok to feed jays, ravens, or crows (n= 545)	1.43	1.00	1
The Parks care if I feed jays, ravens, or crows (n= 529)	4.85	6.00	6
I want to know more about marbled murrelets (n= 534)	3.73	4.00	4
Other visitors should know more about marbled murrelets (n= 524)	4.37	4.50	6
Marbled murrelets are important to protect (n= 514)	5.04	6.00	6

Table 35b. (Campgrounds) Visitor agreement with attitude statements (1= disagree, 6= agree)

Statement	Mean	Median	Mode
It is fun for me to feed jays, ravens, or crows (n= 207)	1.71	1.00	1
I like seeing jays, ravens, or crows around my campsite (n= 209)	3.18	3.00	1
I enjoy photographing jays, ravens, or crows up close (n= 208)	2.63	2.00	1
My children enjoy feeding jays, ravens, or crows (n= 177)	1.54	1.00	1
I can eat at my campsite without leaving crumbs (n= 208)	4.30	5.00	6
I have seen other visitors feed jays, ravens, or crows (n= 201)	1.68	1.00	1
I have seen other visitors accidently drop food (n= 201)	2.33	1.00	1
The Parks think it's ok to feed jays, ravens, or crows (n= 201)	1.18	1.00	1
I think it's ok to feed jays, ravens, or crows (n= 204)	1.34	1.00	1
The Parks care if I feed jays, ravens, or crows (n= 201)	5.10	6.00	6
I want to know more about marbled murrelets (n= 202)	3.96	4.00	4
Other visitors should know more about marbled murrelets (n= 201)	4.55	5.00	6
Marbled murrelets are important to protect (n= 198)	5.30	6.00	6

Table 35c. (Trails and Visitor Centers) Visitor agreement with attitude statements (1= disagree, 6= agree)

Statement	Mean	Median	Mode
It is fun for me to feed jays, ravens, or crows (n= 363)	1.74	1.00	1
I like seeing jays, ravens, or crows around my campsite (n= 353)	3.16	3.00	1
I enjoy photographing jays, ravens, or crows up close (n= 355)	3.12	3.00	1
My children enjoy feeding jays, ravens, or crows (n= 263)	1.55	1.00	1
I can eat at my campsite without leaving crumbs (n= 330)	4.01	4.50	6
I have seen other visitors feed jays, ravens, or crows (n= 323)	2.11	1.00	1
I have seen other visitors accidently drop food (n= 319)	2.63	2.00	1
The Parks think it's ok to feed jays, ravens, or crows (n= 333)	1.46	1.00	1
I think it's ok to feed jays, ravens, or crows (n= 341)	1.48	1.00	1
The Parks care if I feed jays, ravens, or crows (n= 328)	4.70	6.00	6
I want to know more about marbled murrelets (n= 332)	3.59	4.00	4
Other visitors should know more about marbled murrelets (n= 323)	4.25	4.00	6
Marbled murrelets are important to protect (n= 316)	4.88	6.00	6

Analysis of Interview Data

Table 36 shows the distribution of interviews conducted. Of the 179 people interviewed, 46 were interviewed at campgrounds.

Table 36. Interviews Collected by Site

Site	Number of Interviews
Prairie Creek- Visitor Center	22
Prairie Creek- Campground	19
Prairie Creek- Big Tree	20
Prairie Creek- Gold Bluffs	16
Prairie Creek- Fern Canyon	23
Del Norte- Campground	10
Del Norte- Campfire Center	0
Jedediah Smith- Visitor Center	17
Jedediah Smith- Campground	17
Jedediah Smith- Campfire Center	0
Jedediah Smith- Simpson Reed Grove	18
Jedediah Smith- Stout Grove	17
<i>Total</i>	<i>179</i>

Past Experience

Most visitors interviewed (67.0%) had not been to RNSP before their current visit.

Table 37. Prior Site Experience

Response	Percent of Respondents (n=179)
Previous visits	33.0%
No previous visits	67.0%
Total	100.0%

Table 38 shows that of repeat visitors, they have either visited only once or twice (33.3%), or they have visited 10 or more times (40.7%).

Table 38. Number of Prior Visits of Repeat Visitors

Number of Visits	Percent of Respondents (n=54)
1-2 visits	33.3%
3-5 visits	24.1%
6-9 visits	1.9%
10 or more visits	40.7%
Total	100.0%

Table 39 shows that the most common reason for visiting the Parks is to see the redwoods. Other responses included “photography” and “spirituality.”

Table 39. Reasons for Visiting

Response	First Response (n=177)	Additional Responses (n=60)	Total Responses
Wanted to see redwoods	32.8%	8.5%	41.3%
Stumbled upon it	21.5%	5.1%	26.6%
Read/heard about it	11.3%	4.0%	15.3%
Family, friends vacation	10.2%	2.3%	12.5%
Scenic	6.8%	5.1%	11.9%
Trails- Hiking, biking	4.5%	2.3%	6.8%
Always come here	3.4%	0.0%	3.4%
Camping	2.8%	1.7%	4.5%
Enjoy nature	2.8%	1.1%	3.9%
Bookstore	1.7%	0.0%	1.7%
Rivers and coast	1.1%	2.3%	3.4%
Wildlife	0.0%	1.1%	1.1%
Other	1.1%	0.6%	1.7%

Table 40 shows the distribution of length of visit. There is no one category that is significantly larger than the others.

Table 40. Length of Visit So Far

Length of Visit (Hours: Minutes)	Percent of Respondents (n=170)
0:01-0:30	14.7%
0:31-0:59	0.6%
1:00-3:00	15.3%
3:01-12:00	15.3%
12:01-24:00	19.4%
24:01-48:00	17.1%
48:01-72:00	9.4%
72:01-96:00	2.9%
96:01 or more	5.3%
Total	100.0%

Table 41 shows the activities visitors participated in. Responses in the other category included “dog walking,” “work,” “playing cards,” and “reading.”

Table 41. Activities Participating In

Response	First Response (n=177)	Additional Responses (n=195)	Total Responses
Hiking	67.2%	22.0%	89.2%
Driving	7.3%	14.1%	21.4%
Beach, river	6.8%	19.8%	26.6%
Camping	6.2%	9.0%	15.2%
Enjoying scenery	4.0%	14.1%	18.1%
Interpretive program	3.4%	0.6%	4.0%
Relaxing	2.8%	2.8%	5.6%
Biking	1.1%	4.5%	6.6%
Photography	0.6%	8.5%	9.1%
Picnic	0.6%	6.8%	7.4%
Visitor Center/ Bookstore	0.0%	2.8%	2.8%
Other	0.0%	5.1%	5.1%

Table 42 shows that a majority of visitors (53.6%) said they went into a visitor center and 48.0% of visitors said they viewed informational or educational signs.

Table 42. Visitor Participation in Interpretive Services

Interpretive Service	Percent of Respondents (n=179)
Visitor Center	53.6%
Informational or educational signs	48.0%
Talked with a ranger on a trail, in a campground, or in a parking area	34.6%
Printed Visitor Guide	13.4%
Ranger led campfire program	8.4%
Entrance Station	7.3%
Map	5.0%
Ranger led walk	2.2%
Bookstore	1.7%
Internet	1.7%

Table 43 shows what visitors said they know about marbled murrelets. Sixty five visitors (36%) said they knew nothing about murrelets. When visitors said they thought a marbled murrelet looked like something else, they named the following animals they thought the marbled murrelet looked like: marmot, murcat, chipmunk, squirrel, weasel, deer, owl, cat, rodent, fox, duck, bear. Other responses included “it’s tufted,” and various colors.

Table 43. What Visitors Know About Marbled Murrelets

Response	First Response (n=113)	Additional Responses (n=99)	Total Responses
Endangered	38.9%	9.7%	48.6%
It’s a bird	24.8%	3.5%	28.3%
Looks like something else	12.4%	3.5%	15.9%
Jays kill murrelets	5.3%	17.7%	23.0%
Nests in old growth	4.4%	19.5%	23.9%
Murrelets threatened by corvids	3.5%	8.8%	12.3%
Feeds in ocean	2.7%	7.1%	9.8%
I’ve seen it	2.7%	1.8%	4.5%
Leave them alone	1.8%	0.9%	2.7%
Lay one egg per year	0.9%	0.9%	1.8%
Nest on the beach	0.9%	2.7%	3.6%
They’re fast	0.9%	1.8%	2.7%
Loss of habitat	0.0%	2.7%	2.7%
Robin sized	0.0%	2.7%	2.7%
Other	0.9%	4.4%	5.3%

Table 44 shows what visitors said they know about jays, ravens, and crows. Ten visitors said they knew nothing about jays, ravens, or crows. Other responses included “bad luck,” “mythology,” “comfortable around humans,” “friendly,” “social,” “endangered,” and “should leave them alone.”

Table 44. What Visitors Know About Jays, Ravens, and Crows

Response	First Response (n=162)	Additional Responses (n=125)	Total Responses
I've seen them	27.8%	10.5%	38.3%
Description of size, color, sound	8.0%	11.1%	19.1%
Threaten murrelets	8.0%	3.1%	11.1%
It's a bird	6.8%	1.2%	8.0%
Scavengers	6.2%	4.9%	11.1%
Don't feed them	6.2%	1.9%	8.1%
Annoying	5.6%	3.7%	9.3%
They want your food	4.9%	5.6%	10.5%
Smart	4.3%	3.7%	8.0%
They're everywhere	3.7%	0.6%	4.3%
Loud	3.1%	8.0%	11.1%
They're all related	3.1%	0.0%	3.1%
Aggressive	2.5%	6.8%	9.3%
They outcompete other species	2.5%	2.5%	5.0%
They kill other birds' eggs	1.9%	1.2%	3.1%
They live here	1.9%	0.6%	2.5%
Pretty	1.2%	3.1%	4.3%
Fun to watch/Like them	0.6%	3.1%	3.7%
We should kill them	0.6%	1.2%	1.8%
Other	1.2%	3.7%	4.9%

Tables 45a through 45c show that most visitors (74.1%) noticed corvids during their visit to the Parks, and especially in the campgrounds (91.8%).

Table 45a. Noticed any corvids (jays, ravens, crows) during visit

Response	Percent of Respondents (n=174)
Have noticed	74.1%
Have not noticed	25.9%
Total	100.0%

Table 45b. (Campgrounds) Noticed any corvids (jays, ravens, crows) during visit

Response	Percent of Respondents (n=61)
Have noticed	91.8%
Have not noticed	8.2%
Total	100.0%

Table 45c. (Trails and Visitor Centers) Noticed any corvids (jays, ravens, crows) during visit

Response	Percent of Respondents (n=113)
Have noticed	64.6%
Have not noticed	35.4%
Total	100.0%

Table 46 shows most visitors said that the presence of corvids made their experience in the Parks better. Visitors said “like to see wildlife,” “fun to watch,” “not aggressive,” “we try to take photos of them,” “don’t have them where we’re from,” and “they live here.” Some visitors said the corvids made their experience worse. They said “they’re obnoxious, loud” “we prefer they not be in the vicinity,” “I would have shot it,” and “they eat your food.”

Table 46. How corvids affected visitor experience

Response	Percent of Respondents (n=64)
Made experience better	56.3%
Made experience worse	17.2%
Indifferent	26.6%
Total	100.0%

Tables 47a through 47c show that 22% of visitors (overall) and 38% (in campgrounds) observed jays, ravens, or crows eating their food. Visitor comments ranged from “we didn’t give them a chance to,” “it’s not good for them,” and “people here are respectful” to “we know we’re not supposed to feed them but we did anyway,” “we left dog food out,” “they wait for you to leave and then check out the campsite,” “they pester you for food,” “they get trash,” and “it’s fun to feed them.”

Table 47a. Have visitors observed jays, ravens, crows eating their food

Response	Percent of Respondents (n=146)
Yes	21.9%
No	78.1%
Total	100.0%

Table 47b. (Campgrounds) Have visitors observed jays, ravens, crows eating their food

Response	Percent of Respondents (n=58)
Yes	37.9%
No	62.1%
Total	100.0%

Table 47c. (Trails and Visitor Centers) Have visitors observed jays, ravens, crows eating their food

Response	Percent of Respondents (n=88)
Yes	11.4%
No	88.6%
Total	100.0%

Table 48 shows the messages visitors remembered about the interaction between corvids and murrelets. Ninety nine visitors (60.0%) said they knew nothing about the interaction.

Table 48. What Visitors Know About the Interaction between Corvids and Murrelets

Response	First Response (n=66)	Additional Responses (n=9)	Total Responses
Jays, ravens, crows are killing murrelets and their eggs	56.1%	4.5%	60.6%
Competition for the same space	10.6%	1.5%	12.1%
Conflict	7.6%	0.0%	7.6%
Jays, ravens, crows circle food left by people along roads and find nests	6.1%	1.5%	7.6%
Jays, ravens, and crows are aggressive	6.1%	0.0%	6.1%
Jays, ravens, and crows are nest robbers	4.5%	3.0%	7.5%
Endangered birds	3.0%	0.0%	3.0%
Jays, ravens, and crows follow logging roads and highways into old growth	1.5%	1.5%	3.0%
Jays take over nests	1.5%	1.5%	3.0%
People feed them and the population expands	1.5%	0.0%	1.5%
Ravens steal babies of jays	1.5%	0.0%	1.5%

Tables 49a through 49c show that a majority of visitors (57.7% overall, and 75.8% in campgrounds) have heard or seen a message about corvids or marbled murrelets.

Table 49a. Have visitors heard or seen any message about murrelets or corvids in the Parks

Response	Percent of Respondents (n=175)
Yes	57.7%
No	42.3%
Total	100.0%

Table 49b. (Campgrounds) Have visitors heard or seen any message about murrelets or corvids in the Parks

Response	Percent of Respondents (n=62)
Yes	75.8%
No	24.2%
Total	100.0%

Table 49c. (Trails and Visitor Centers) Have visitors heard or seen any message about murrelets or corvids in the Parks

Response	Percent of Respondents (n=113)
Yes	47.8%
No	52.2%
Total	100.0%

Ninety one visitors (51%) were able to provide a message they remembered about marbled murrelets or jays, ravens, or crows. The most remembered message was not to feed them. Messages in the other category were “jays are endangered,” “feed it kill a jay,” and “don’t take dogs on trails.”

Table 50a. Message received about murrelets or corvids in the Parks

Response	First Response (n=91)	Additional Responses (n=15)	Total Responses
Don't feed them	30.8%	3.3%	34.1%
Feed a jay, kill a murrelet	17.6%	0.0%	17.6%
Description of murrelet	14.3%	1.1%	15.4%
Put food and garbage away	13.2%	2.2%	15.4%
Jays, ravens, crows find nests of murrelets and eat eggs, chicks	7.7%	4.4%	12.1%
Don't make a good bird go bad	4.4%	2.2%	6.6%
Impact of everything on everything else	3.3%	0.0%	3.3%
Corvids entering murrelet habitat due to people	2.2%	2.2%	4.4%
Protect murrelet habitat	2.2%	0.0%	2.2%
Don't take food on trails	2.2%	0.0%	2.2%
Other	2.2%	1.1%	3.3%

Table 50b. (Campgrounds) Message received about murrelets or corvids in the Parks

Response	First Response (n=43)	Additional Responses (n=3)	Total Responses
Don't feed them	27.9%	0.0%	27.9%
Feed a jay, kill a murrelet	16.3%	0.0%	16.3%
Description of murrelet	4.7%	0.0%	4.7%
Put food and garbage away	20.9%	2.3%	23.2%
Jays, ravens, crows find nests of murrelets and eat eggs, chicks	9.3%	2.3%	11.6%
Don't make a good bird go bad	0.0%	0.0%	0.0%
Impact of everything on everything else	2.3%	0.0%	2.3%
Corvids entering murrelet habitat due to people	0.0%	2.3%	2.3%
Protect murrelet habitat	4.7%	0.0%	4.7%
Don't take food on trails	2.3%	0.0%	2.3%
Other	11.6%	0.0%	11.6%

Table 50c. (Trails and Visitor Centers) Message received about murrelets or corvids in the Parks

Response	First Response (n=48)	Additional Responses (n=12)	Total Responses
Don't feed them	33.3%	6.3%	39.6%
Feed a jay, kill a murrelet	18.8%	0.0%	18.8%
Description of murrelet	14.6%	2.1%	16.7%
Don't make a good bird go bad	8.3%	4.2%	12.5%
Jays, ravens, crows find nests of murrelets and eat eggs, chicks	6.3%	6.3%	12.6%
Put food and garbage away	6.3%	2.1%	8.4%
Corvids entering murrelet habitat due to people	2.1%	2.1%	4.2%
Impact of everything on everything else	2.1%	0.0%	2.1%
Protect murrelet habitat	2.1%	0.0%	2.1%
Don't take food on trails	2.1%	0.0%	2.1%
Other	4.2%	2.1%	6.3%

Table 51a shows where visitors heard the messages about corvids and murrelets. Most visitors received their information from informational or educational signs. One person stated that he or she received information from family and friends.

Table 51a. Where heard or seen message about marbled murrelets and corvids

Interpretive Service	First Response (n=97)	Additional Responses (n=18)	Total Responses
Informational or educational signs	61.9%	2.1%	64.0%
Visitor Center	16.5%	2.1%	18.6%
Printed Visitor Guide	9.3%	3.1%	12.4%
Talked with a ranger on a trail, in a campground, or in a parking area	5.2%	5.2%	10.4%
Ranger led campfire program	5.2%	4.1%	9.3%
Child's participation in a Junior Ranger program	1.0%	1.0%	2.0%
Self-guided interpretive trail (brochure or sign)	1.0%	0.0%	1.0%
Other	0.0%	1.0%	1.0%

Table 51b. (Campgrounds) Where heard or seen message about marbled murrelets and corvids

Interpretive Service	First Response (n=43)	Additional Responses (n=10)	Total Responses
Informational or educational signs	65.1%	2.3%	67.4%
Visitor Center	2.3%	0.0%	2.3%
Printed Visitor Guide	9.3%	4.7%	14.0%
Talked with a ranger on a trail, in a campground, or in a parking area	11.6%	9.3%	20.9%
Ranger led campfire program	7.0%	4.7%	11.7%
Child's participation in a Junior Ranger program	0.0%	0.0%	0.0%
Self-guided interpretive trail (brochure or sign)	2.3%	0.0%	2.3%
Other	2.3%	2.3%	4.6%

Table 51c. (Trails and Visitor Centers) Where heard or seen message about marbled murrelets and corvids

Interpretive Service	First Response (n=54)	Additional Responses (n=6)	Total Responses
Informational or educational signs	57.4%	1.9%	59.3%
Visitor Center	25.9%	1.9%	27.8%
Printed Visitor Guide	9.3%	1.9%	11.2%
Ranger led campfire program	3.7%	1.9%	5.6%
Child's participation in a Junior Ranger program	3.7%	1.9%	5.6%
Talked with a ranger on a trail, in a campground, or in a parking area	0.0%	1.9%	1.9%
Self-guided interpretive trail (brochure or sign)	0.0%	0.0%	0.0%
Other	1.9%	0.0%	1.9%

Tables 52 through 55 show the results of visitors being shown pictures of birds at the end of the interview and asked to name the bird they see in the picture. The results show that visitors could identify the robin and duck fairly easily, but they had more difficulty identifying the Steller's jay and marbled murrelet. Table 52 shows that 76.8% of visitors could identify the robin while only 29.1% of visitors interviewed could identify a Steller's jay (Table 53). Table 55 shows that 29.8% of visitors could identify the marbled murrelet.

Table 52. Visitor Identification of Bird Pictures- American Robin

Response	Percent of Respondents (n=151)
Robin	76.8%
Marbled murrelet	4.6%
Oriole	1.3%
Jay	0.7%
Cardinal	0.7%
Tom-Tit	0.7%
Don't Know	15.2%

Table 53. Visitor Identification of Bird Pictures- Steller's Jay

Response	Percent of Respondents (n=151)
Steller's jay	29.1%
Blue jay	40.4%
Jay	19.9%
Blue bird	1.3%
Scrub jay	0.7%
Mountain jay	0.7%
Canadian jay	0.7%
Finch	0.7%
Sterling	0.7%
Don't Know	6.0%

Table 54. Visitor Identification of Bird Pictures- Mallard duck female

Response	Percent of Respondents (n=151)
Duck	97.4%
Don't Know	2.6%

Responses in the other category of Table 55 include: oriole, black turnstone, cliff dweller, purpled murrelet, snow bird, spotted wren, wood duck, osprey duck, finch, and chickadee.

Table 55. Visitor Identification of Bird Pictures- Marbled Murrelet

Response	Percent of Respondents (n=151)
Marbled murrelet	29.8%
Marbled murrelet (guess)	19.9%
The one you said earlier	9.9%
Warbler	2.0%
Owl	2.0%
Sparrow	1.3%
Speckled murrelet	1.3%
Swallow	1.3%
Other	7.0%
Don't Know	25.8%

Analysis of Observation Data

Table 56 shows the total number of observations made at each site. Out of a total of 596 observations, 260 were made at campgrounds.

Table 56. Observations by Site

Site	Number of Observations
Prairie Creek- Visitor Center	83
Prairie Creek- Campground	103
Prairie Creek- Big Tree	95
Prairie Creek- Gold Bluffs	40
Prairie Creek- Fern Canyon	56
Del Norte- Campground	97
Del Norte- Campfire Center	0
Jedediah Smith- Visitor Center	24
Jedediah Smith- Campground	60
Jedediah Smith- Campfire Center	0
Jedediah Smith- Simpson Reed Grove	21
Jedediah Smith- Stout Grove	17
<i>Total</i>	<i>596</i>

Group Characteristics

Group Size

Nearly half of groups visited in groups of two (49.4%).

Table 57. Visitor Group Size

Number in Group	Percent of Visitors (n=407)
1 person	12.0%
2 people	49.4%
3 to 5 people	33.0%
6 + people	5.5%
Total	100.0%

Visitor Food Patterns

Tables 58a through 58c show whether or not the researchers observed visitors eating food. Table 58a has the results of all sites combined together. Tables 58b and 58c break down the results by site type (campgrounds, trails and visitor centers)

Table 58a. Did Visitors Consume Food

Visitors Consume Food	Percent of Visitors (n=585)
Yes	21.7%
No	78.3%
Total	100.0%

Table 58b. (Campgrounds) Did Visitors Consume Food

Visitors Consume Food	Percent of Respondents (n=290)
Yes	27.2%
No	72.8%
Total	100.0%

Table 58c. (Trails and Visitor Centers) Did Visitors Consume Food

Visitors Consume Food	Percent of Respondents (n=295)
Yes	16.3%
No	83.7%
Total	100.0%

Tables 59a through and 59c show that 81.9% of visitors (overall) and 100.0% (in campgrounds) consumed food after an observed interpretive intervention. The interpretive interventions seen were picnic table signage, visitor center signage, trailhead signage, and trail guide.

Table 59a. Consume food before or after an observed interpretive intervention

Visitors Consume Food	Percent of Visitors (n=94)
Before	18.1%
After	81.9%
Total	100.0%

Table 59b. (Campgrounds) Consume food before or after an observed interpretive intervention

Visitors Consume Food	Percent of Visitors (n=55)
Before	0.0%
After	100.0%
Total	100.0%

Table 59c. (Trails and Visitor Centers) Consume food before or after an observed interpretive intervention

Visitors Consume Food	Percent of Visitors (n=39)
Before	43.6%
After	56.4%
Total	100.0%

Tables 60a through 60c show that about 6% of visitors were observed unintentionally dropping food.

Table 60a. Did Visitors Unintentionally Drop Food?

Response	Percent of Respondents (n=587)
Yes	5.6%
No	94.4%
Total	100.0%

Table 60b. (Campgrounds) Did Visitors Unintentionally Drop Food?

Response	Percent of Respondents (n=291)
Yes	6.5%
No	93.5%
Total	100.0%

Table 60c. (Trails and Visitor Centers) Did Visitors Unintentionally Drop Food?

Response	Percent of Respondents (n=296)
Yes	4.7%
No	95.3%
Total	100.0%

Tables 61a through 61c show that 7% of visitors (overall) and 12.7% (in campgrounds) were observed unintentionally leaving food out or in unattended packs.

Table 61a. Did Visitors Unintentionally Leave Food Out or in Unattended Packs?

Response	Percent of Respondents (n=587)
Yes	7.2%
No	92.8%
Total	100.0%

Table 61b. (Campgrounds) Did Visitors Unintentionally Leave Food Out or in Unattended Packs?

Response	Percent of Respondents (n=291)
Yes	12.7%
No	87.3%
Total	100.0%

Table 61c. (Trails and Visitor Centers) Did Visitors Unintentionally Leave Food Out or in Unattended Packs?

Response	Percent of Respondents (n=296)
Yes	1.7%
No	98.3%
Total	100.0%

Tables 62a through 62c show that in 15.0% of the observations overall, and 20% of the observations in campgrounds, researchers observed food on the ground or otherwise unattended. Many types of food were found present on the ground or unattended including seeds, trail mix, cheez-its, cherrios, cheetos, chips, granola bars, crackers, marshmallows, dog food, and other general food and crumbs.

Table 62a. Was Human Food Present on Ground or Otherwise Unattended?

Food Present	Percent of Visitors (n=594)
Yes	15.0%
No	85.0%
Total	100.0%

Table 62b. (Campgrounds) Was Human Food Present on Ground or Otherwise Unattended?

Food Present	Percent of Visitors (n=298)
Yes	20.1%
No	79.9%
Total	100.0%

Table 62c. (Trails and Visitor Centers) Was Human Food Present on Ground or Otherwise Unattended?

Food Present	Percent of Visitors (n=296)
Yes	9.8%
No	90.2%
Total	100.0%

Corvid Behavior

Table 63 shows that 43.1% of visitors observed had one or more corvids within seeing distance of them. The corvids appeared to be waiting for the visitors to drop or leave food.

Table 63. Number of Corvids in Sight of Visitors

Number of Corvids	Percent of Visitors (n=594)
0	56.9%
1	19.9%
2	13.1%
3	5.4%
4 or more	4.7%
Total	100.0%

Table 64 shows that corvids will approach very close in search of food. Nearly 10% of the time, corvids would land right next to the visitor.

Table 64. Closest Distance a Corvid Approached to Visitors

Distance (feet)	Percent of Visitors (n=246)
<1	9.8%
1 to 5	11.3%
6 to 10	13.0%
11 to 20	12.2%
21 to 50	30.8%
51 to 100	21.2%
101 or more	1.6%
Total	100.0%

Tables 65a through 65c show that researchers observed corvids eating unattended food from about 6% to 8% of visitors.

Table 65a. Were Corvids Eating Unattended Food?

Corvids Eating	Percent of Visitors (n=594)
Yes	7.1%
No	92.9%
Total	100.0%

Table 65b. (Campgrounds) Were Corvids Eating Unattended Food?

Corvids Eating	Percent of Visitors (n=298)
Yes	5.7%
No	94.3%
Total	100.0%

Table 65c. (Trails and Visitor Centers) Were Corvids Eating Unattended Food?

Corvids Eating	Percent of Visitors (n=296)
Yes	8.4%
No	91.6%
Total	100.0%

Tables 66a through 66c show that corvids were intentionally attracted by 2.2% of visitors overall, but no campers were observed intentionally using food to attract corvids. There were several reasons visitors appeared to use food as an attraction: to pet the animal, to take pictures, to feed them, to get them to come closer, and to catch them.

Table 66a. Were Corvids Intentionally Attracted with Food?

Response	Percent of Respondents (n=586)
Yes	2.2%
No	97.8%
Total	100.0%

Table 66b. (Campgrounds) Were Corvids Intentionally Attracted with Food?

Response	Percent of Respondents (n=290)
Yes	0.0%
No	100.0%
Total	100.0%

Table 66c. (Trails and Visitor Centers) Were Corvids Intentionally Attracted with Food?

Response	Percent of Respondents (n=296)
Yes	4.4%
No	95.6%
Total	100.0%

Table 67a shows that only thirteen visitors (2%) intentionally fed corvids. Three visitors fed the corvids before they saw or heard an interpretive intervention, and seven visitors fed the corvids after they had participated in an interpretive intervention. For three visitors, it was unclear to the researchers whether they had participated in an intervention.

Table 67a. Did Visitors Intentionally Feed Corvids

Response	Percent of Respondents (n=586)
Yes	2.2%
No	97.8%
Total	100.0%

Table 67b. (Campgrounds) Did Visitors Intentionally Feed Corvids

Response	Percent of Respondents (n=290)
Yes	0.0%
No	100.0%
Total	100.0%

Table 67c. (Trails and Visitor Centers) Did Visitors Intentionally Feed Corvids

Response	Percent of Respondents (n=296)
Yes	4.4%
No	95.6%
Total	100.0%

Table 68 shows that six visitors intentionally scared away the corvids. Two visitors did this after having heard or seen an interpretive intervention, and one visitor fed the corvids before they had participated in an interpretive intervention. For three visitors, it was unclear to the researchers whether they had participated in an intervention.

Table 68. Were Visitors Intentionally Scaring Away Corvids?

Response	Percent of Visitors (n=586)
Yes	1.0%
No	99.0%
Total	100.0%

Table 69 shows that very few visitors (0.3%) actually moved to avoid contact with corvids.

Table 69. Did Visitors Move to Avoid Contact with Corvids?

Response	Percent of Visitors (n=585)
Yes	0.3%
No	99.7%
Total	100.0%

Table 70 shows that only 3.7% of visitors were observed talking to a ranger during their visit.

Table 70. Did visitors talk to a ranger?

Response	Percent of Visitors (n=327)
Yes	3.7%
No	96.3%
Total	100.0%

Table 71 shows that visitors were much more likely to talk to a volunteer (64.8%).

Table 71. Did visitors talk to a volunteer

Response	Percent of Visitors (n=91)
Yes	64.8%
No	35.2%
Total	100.0%

When a visitor did talk to a ranger or volunteer, Table 72 shows that the majority of visitors (84.5%) initiated the conversation.

Table 72. Ranger/volunteer initiated or visitor initiated?

Response	Percent of Visitors (n=71)
Visitor initiated	84.5%
Ranger or volunteer initiated	15.5%
Total	100.0%

Table 73 shows that the most common conversation (25%) was very short -- less than thirty seconds.

Table 73. Length of Conversation

Time (seconds)	Percent of Visitors (n=63)
0 to 30 sec	25.4%
31 to 60 sec	12.7%
61 to 120 sec	15.9%
121 to 180 sec	6.4%
181 to 300 sec	23.9%
301 to 600 sec	8.0%
601 or more sec	8.0%
Total	100.0%

Table 74 shows the most popular topics that visitors talked with rangers or volunteers about are trails, roads, and where the big trees are. Other topics include weather, kayaking and tidepools.

Table 74. Topics Discussed

Topic	First Topic (n=71)	Additional Topics (n=50)	Total
Trails	32.4%	14.1%	46.5%
Roads	14.1%	8.5%	22.6%
Where trees are	12.7%	15.5%	28.2%
Convenience (motel, gas)	8.5%	11.3%	19.8%
Birds	8.5%	1.4%	9.9%
Merchandise	8.5%	0.0%	8.5%
Park regulations	7.0%	5.6%	12.6%
Plants	4.2%	4.2%	8.4%
Interpretive programs	4.2%	1.4%	5.6%
Other	0.0%	8.5%	8.5%

Murrelet Signage

Table 75 shows the signage that was within a visitor's view during each visitor observation at a visitor center site. There is additional signage within view if the visitor walked to multiple locations during the time he or she was being observed. 47.2% of visitors had the opportunity to read the signage in one of the visitor centers first.

Table 75. Visitor Center Signage Present During Each Visit

Signage	First Sign (n=89)	Additional Signs (n=79)
Inside VC signage	47.2%	26.6%
Outside VC maps	23.6%	19.0%
Jed Smith Bear	21.3%	1.3%
Trailhead	4.5%	13.9%
Bathroom signage	2.2%	0.0%
Picnic Table sign	1.1%	1.3%
Jed Smith Story	0.0%	24.1%
Contributor List	0.0%	10.1%
Murrelet Sign- 3 ft.	0.0%	3.8%

Table 76 shows the degree to which visitors read visitor center signage. Most visitors (63.5%) stopped to read the first sign they saw.

Table 76. Degree to Which Visitors Read Visitor Center Signage

Signage	First Sign (n=85)	Additional Signs (n=73)
Appeared not to notice sign	21.2%	28.8%
Noticed the sign, but did not stop to read it	15.3%	9.6%
Stopped to read sign	63.5%	61.6%

Table 77 shows the signage that was within a visitor's view during each visitor observation at a campground site. A total of 50.0% of visitors had the opportunity to read the picnic table signage and 50.0% had the opportunity to read the murrelet sign.

Table 77. Campground Signage Present During Each Visit

Signage	First Sign (n=8)	Additional Signs (n=0)
Picnic Table sign	50.0%	0.0%
Murrelet Sign- 3 ft.	50.0%	0.0%

Table 78 shows the degree to which visitors read campground signage. Visitors did not read any signage 87.5% of the time. No visitors appeared to stop to read the signs.

Table 78. Degree to Which Visitors Read Campground Signage

Signage	First Sign (n=8)	Additional Signs (n=0)
Appeared not to notice sign	87.5%	0.0%
Noticed the sign, but did not stop to read it	12.5%	0.0%
Stopped to read sign	0.0%	0.0%

Table 79 shows the signage that was within a visitor's view during each visitor observation at a trailhead. There is additional signage within view if the visitor walked to multiple locations during the time he or she was being observed. Of the first sign, 73.6% of visitors had the opportunity to read the trail signage.

Table 79. Trail Signage Present During Each Visit

Signage	First Sign (n=182)	Additional Signs (n=304)
Trailhead	73.6%	43.8%
PC Park Map	18.1%	3.3%
Murrelet Sign- 3 ft.	5.5%	0.0%
Stout Grove info	1.6%	0.0%
Trail signs	0.5%	36.8%
Fern Canyon info	0.5%	16.1%

Table 80 shows the degree to which visitors read trail signage. Initially, 50% of visitors stopped to read a trail sign.

Table 80. Degree to Which Visitors Read Trail Signage

Signage	First Sign (n=181)	Additional Signs (n=304)
Appeared not to notice sign	33.7%	34.2%
Noticed the sign, but did not stop to read it	16.0%	19.7%
Stopped to read sign	50.3%	46.1%

In an analysis of specifically the murrelet signage, there were very few visitors who looked at and read the signage specifically dedicated to marbled murrelets. At Jed Smith, only three visitors walked by the new murrelet sign. Of those three, two visitors appeared not to notice the sign. The third visitor read the sign for 78 seconds.

There were more people who read the murrelet signage at Big Tree in Prairie Creek. This is most likely due to the fact that the signage is placed at the entrance/exit to the trail, so it is difficult to miss. The mean reading time of the visitors is 21 seconds. The minimum time is 3 seconds and the maximum time is 60 seconds.

Table 81. Degree to Which Visitors Read Big Tree Murrelet Signs

Response	Percentage of Visitors (n=15)
Appeared not to notice sign	33.3%
Noticed the sign, but did not stop to read it	20.0%
Stopped to read sign	46.7%

Marbled Murrelet Project Printed Materials Evaluation

Answers are in bold and underlined. "Yes" answers are given one point.

Item: From Forest's Edge to the Edge of Extinction (Sign)

Redwood National & State Parks
National Park Service
U.S. Department of the Interior
Department of Parks & Recreation
State of California

Don't Help a Good Bird Go Bad!
 Steller's jays, ravens, and crows follow the food paths of people! In doing so, they find and eat murrelet eggs and chicks. Please keep campsites and trails free of trash.

From Forest's Edge to the Edge of Extinction

Sheltered in a soft nest of moss and ferns, a marbled murrelet chick waits silently atop a massive redwood branch high above the forest floor. Its parents spend their day at sea, diving for small fish, returning at dusk to feed their solitary offspring. Like the fog that shrouds the forest, a murrelet's life is connected to both forest and sea.

Nearby, a Steller's jay hops along the forest floor scavenging for any morsel of food. Aggressive and incredibly intelligent—they can remember hundreds of different food locations—jays and their fellow corvids (ravens and crows) flourish at the ecologically-rich edges of the redwood forest. The edges of this once unbroken forest have

increased a hundred-fold in a hundred years. Highways, logging, cities, campgrounds, and picnic areas open broad boulevards into the heart of the redwood forest. Thus exposed, murrelet chicks and eggs make easy meals for crafty corvids. As the forest edge expands, the marbled murrelet lives today on the edge of extinction.





The marbled murrelet is the only seabird that breeds in old-growth coastal forests. They lay 2 to 3 white eggs speckled with brown spots. The eggs are laid in a nest of moss and ferns high in the forest. The parents spend their day at sea, diving for small fish, returning at dusk to feed their solitary offspring. Like the fog that shrouds the forest, a murrelet's life is connected to both forest and sea.

ENDANGERED



Nearby, a Steller's jay hops along the forest floor scavenging for any morsel of food. Aggressive and incredibly intelligent—they can remember hundreds of different food locations—jays and their fellow corvids (ravens and crows) flourish at the ecologically-rich edges of the redwood forest. The edges of this once unbroken forest have





Steller's jays, ravens, and crows follow the food paths of people! In doing so, they find and eat murrelet eggs and chicks. Please keep campsites and trails free of trash.

Thematic

Theme/Topic: From Forest's Edge to Edge of Extinction

Yes / **No**

Fifteen words or less per sentence

Average: 15.2 words per sentence

Yes / No

Five sentences or less per paragraph

Average: 5.7 sentences per paragraph

Yes / No

Three hundred total words or less

Total: 351 words

Yes / **No**

Flesch-Kincaid Grade Level less than 8th grade

Grade Level: 7.7

Yes / No

Flesch Reading Ease greater than 80

Reading Ease: 66.4

Yes / **No**

Use of graphics

Comments: photographs of murrelets and corvids

Yes / No

Total Score: 4

Item: From Forest's Edge to the Edge of Extinction (Sign)- Continued

Overall Comments

The main text is really two paragraphs broken down into three chunks. The captions at the bottom contain half of all the information. The take home message of “Don’t Help a Good Bird Go Bad!” is placed in the upper right hand corner where it is least likely to be read. It is also in small print. The text does contain some excellent phrases like “tasty tidbits” and “crafty corvids.”

Message Analysis

The message analysis provides an assessment of message types indicated by and supported through communication theory to improve message impact and effectiveness in behavioral change.

Post-conventional message- Visitors are told about the situation of the murrelet and they are expected to feel obligated to help.

Specific Behavioral Request- The main body of the sign is purely educational and does not make a specific behavioral request. The message that says “Don’t Help a Good Bird Go Bad!” but does not give a specific behavioral request. It does not tell the visitor what exactly they should do to stop a good bird from going bad. Specific behavioral requests are more effective in resulting in promoting those targeted behaviors.

Sanction Message- None given

Consequences for behavior clearly indicated- If a visitor read the whole sign, they might indirectly realize they are responsible for their actions and what happens to the birds.

Individual responsibility for consequences clearly indicated- Overall, this sign would benefit by giving a specific behavior request, such as “Don’t leave food out” or “Don’t feed the birds.”

Use of norm theory- None used

Item: Don't Help a Good Bird Go Bad (Older Sign)

Don't Help a Good Bird Go Bad!

Marbled Murrelets are:

- robin-sized seabirds that nest only in old-growth trees
- federally listed as a threatened species
- having their eggs and chicks eaten by jays, crows, ravens



Marbled Murrelet



Steller's Jay

Corvids are:

- ravens, jays, and crows
- opportunists looking for an easy meal
- waiting for you to leave food and trash
- circling areas where food has been left previously and in doing so, discovering murrelet nests, then . . .
- eating murrelet eggs and chicks

Please Don't Share Your Lunch With Any Birds!

Thematic

Yes / No

Theme/Topic: Don't help a good bird go bad

Fifteen words or less per sentence

Yes / No

Average: 8.0 words per sentence

Five sentences or less per paragraph

Yes / No

Average: 1 sentence per paragraph

Three hundred total words or less

Yes / No

Total: 76 words

Flesch-Kincaid Grade Level less than 8th grade

Yes / No

Grade Level: 0.8

Flesch Reading Ease greater than 80

Yes / No

Reading Ease: 100

Use of graphics

Yes / No

Comments: Grayscale drawings of murrelet and jay

Total Score: 7

Item: Don't Help a Good Bird Go Bad (Older Sign)- Continued

Overall Comments

This sign is easy to read due to two text chunks of bulleted information. The only use of color on the sign is red "nest only." The red could have been extended to include "nest only in old-growth trees." Otherwise visitors may wonder what "nest only" means. There could also be better use of color in the pictures. Other text could also be a different color, such as the take home message at the bottom of the sign "Please Don't Share Your Lunch With Any Birds!"

Message Analysis

The message analysis provides an assessment of message types indicated by and supported through communication theory to improve message impact and effectiveness in behavioral change.

Conventional message- Visitors are told to please not share their lunch with any birds. It implies that if you do, you would not be following the rules.

Specific Behavioral Request- The sign gives a direct request to not share your lunch with any birds. This message tries to be so memorable; however, visitors don't know that leaving food out or dropping crumbs does just as much damage. The specific behavioral request is directed toward the intentional feeding of birds and not the accidental dropping of crumbs.

Sanction Message- None given

Consequences for behavior clearly indicated- There are no consequences given.

Individual responsibility for consequences clearly indicated- None given. It is stated that in the end, it could result in the eggs getting eaten but the direct line of those consequences is not clearly the visitor's responsibility.

Use of norm theory- None used

Item: Don't Make a Good Bird Go Bad (Newer Sign)

Don't Make a Good Bird Go Bad!

Marbled Murrelets are:

- robin-sized seabirds that **nest only** in old-growth trees
- federally listed as a threatened species
- having their eggs and chicks eaten by jays, crows, and ravens



Marbled Murrelet



Steller's Jay

Corvids are:

- ravens, jays, and crows
- opportunists looking for an easy meal
- waiting for you to leave food and trash
- circling areas where food has been left previously and in doing so, discovering murrelet nests, then
- eating murrelet eggs and chicks

You Can Help — Please Don't Share Your Lunch With Any Birds!

Thematic Yes / No

Theme/Topic: Don't make a good bird go bad

Fifteen words or less per sentence Yes / No

Average: 11.0 words per sentence

Five sentences or less per paragraph Yes / No

Average: 1 sentence per paragraph

Three hundred total words or less Yes / No

Total: 79 words

Flesch-Kincaid Grade Level less than 8th grade Yes / No

Grade Level: 1.5

Flesch Reading Ease greater than 80 Yes / No

Reading Ease: 100

Use of graphics Yes / No

Comments: drawing of jay, full color murrelet picture

Total Score: 7

Item: Don't Help a Good Bird Go Bad (Newer Sign)- Continued

Overall Comments

The theme and take home message are now green in this newer version. The extra color really brings the sign to life compared to the old version. The marbled murrelet now has a picture instead of drawing. The jay is still drawn. Again, "nest only" is printed in red. The rest of that bullet should have been red to emphasize "nest only in old-growth trees". The new typeface in this version is a signature font. It could be difficult to read at a distance, for foreign visitors, or for children.

Message Analysis

The message analysis provides an assessment of message types indicated by and supported through communication theory to improve message impact and effectiveness in behavioral change.

Conventional message- As with the older version, visitors are told to please not share their lunch with any birds. It implies that if you do, you would not be following the rules.

Specific Behavioral Request- The sign gives a direct request to not share your lunch with any birds. As with the older sign, visitors are not told that leaving food out or dropping crumbs does just as much damage.

Sanction Message- None given

Consequences for behavior clearly indicated- There are no consequences given.

Individual responsibility for consequences clearly indicated- This version of the sign says "You Can Help." This indicates a sense of individual responsibility.

Use of norm theory- By saying "You Can Help," it implies that other visitors will be helping as well. In that way, it communicates a social norm for everyone to help.

Item: Coloring Page- Seventh Grade

Don't Help a Good Bird Go Bad!



Find the marbled murrelet chick. This fluff ball is yellow with brown spots and a black beak. Murrelets nest more than 150 feet high on a branch in the redwood forest. Nearby, royal blue Steller's jays cackle and squawk in the campground. Jays circle and circle the treetops waiting for people to leave food scraps on their picnic table. Instead, they may spy a murrelet nest and eat an egg or chick! A protected forest for the murrelet, ancient redwoods stand more than 300 feet tall. Still, too many of these magnificent trees have been cut down. There may not be enough big old limbs for the murrelet to nest on. And there may be too many crows, ravens, and jays that find a murrelet nest to ruin. Help save the murrelet. It is an endangered species! Be sure to keep a clean camp at all times.



Redwood National and State Parks

Thematic

Yes / No

Theme/Topic: *Don't help a good bird go bad*

Fifteen words or less per sentence

Yes / No

Average: 11.3 words per sentence

Five sentences or less per paragraph

Yes / **No**

Average: 13.0 sentences per paragraph

Item: Coloring Page- Seventh Grade- Continued

Three hundred total words or less Yes / No
Total: 147 words

Flesch-Kincaid Grade Level less than 8th grade Yes / No
Grade Level: 4.7

Flesch Reading Ease greater than 80 Yes / No
Reading Ease: 81.4

Use of graphics Yes / No
Comments: coloring page featuring birds and picnic site

Total Score: 6

Overall Comments

The text could have benefitted from some chunking. It is one chunk of nearly 150 words. The layout and design look good with the theme above, text below, and coloring picture in the middle. The perspective of the picture looking down from the treetops is a unique angle not seen very often.

Message Analysis

The message analysis provides an assessment of message types indicated by and supported through communication theory to improve message impact and effectiveness in behavioral change.

Post-Conventional message- Again, the message “Don’t Help a Good Bird Go Bad” is a post-conventional message. A visitor is expected to already want to help.

Specific Behavioral Request- This text says to be sure to keep a clean campsite at all times. This coloring page is developed for seventh graders and since they will most likely be camping with adults, it may be difficult for them to take the lead on keeping the campsite clean, but it is a specific request.

Sanction Message- There are the NPS and State Parks logos in the lower right hand corner of the coloring page. The logos imply that the agencies will support and enforce camp clean-up.

Consequences for behavior clearly indicated- There are no consequences given.

Individual responsibility for consequences clearly indicated- None

Use of norm theory- None

Item: Coloring Page- Fourth Grade

Don't Help a Good Bird Go Bad!



Can you find the baby chick? Its parents take turn bringing food to it from the ocean. The chick is a marbled murrelet. The other birds are called Steller's jays. How many jays do you see in the picture? Jays will eat just about anything that can be eaten in the forest. Did you see the food on the picnic table? This campsite has not been cleaned up! The jays are staying around to get more food. They could find the chick! If that happens, the jays will eat the chick. You can help the murrelets by helping your parents clean up after eating in the forest. Remember to never feed any wild animal in the parks including birds. Thank you!

Thematic

Yes / No

Theme/Topic: *Don't help a good bird go bad*

Fifteen words or less per sentence

Yes / No

Average: 8.5 words per sentence

Five sentences or less per paragraph

Yes / **No**

Average: 14.0 sentences per paragraph

Item: Coloring Page- Fourth Grade- Continued

Three hundred total words or less Yes / No
Total: 120 words

Flesch-Kincaid Grade Level less than 8th grade Yes / No
Grade Level: 3.0

Flesch Reading Ease greater than 80 Yes / No
Reading Ease: 88.1

Use of graphics Yes / No
Comments: coloring page featuring birds and picnic site

Total Score: 6

Overall Comments

This coloring page is similar to the other one, except the text is written for a younger audience. The last line of text implies that kids have a conscious awareness of when they are feeding the birds and that they would be able to stop feeding the birds. Based on some of the results of the study, kids sometimes feed the birds unknowingly by dropping food in parking lots and on trails. A message could be included in the text telling children to be careful not to drop crumbs.

Message Analysis

The message analysis provides an assessment of message types indicated by and supported through communication theory to improve message impact and effectiveness in behavioral change.

Post-Conventional message- Again, the message “Don’t Help a Good Bird Go Bad” is a post-conventional message.


Specific Behavioral Request- This text says to help parents clean up after eating in the forest. This is a much more reasonable request of a child than to expect the child to clean up on their own. The poster also says to never feed animals in the park.

Sanction Message- There is the Redwood National and State Parks logo to the left of the text. The logo implies that the agencies will support and enforce camp clean-up.

Consequences for behavior clearly indicated- There are no consequences given.

Individual responsibility for consequences clearly indicated- None

Use of norm theory- None

Item: Feed a Jay, Kill a Murrelet (rack card)


Redwood
National and State Parks

Feed a Jay, Kill a Murrelet

Marbled Murrelets: The resident population of marbled murrelets lives mainly at sea, yet travels inland to nest. Like small torpedoes, the nesting pair flies 60 miles per hour into the ancient coast redwood forest to find a large moss-covered branch. The moss provides a ready-made nest and the immense limb keeps all ages of murrelets from falling out of the tree at the slightest breeze. One robin-size adult flies to the ocean at dawn and dusk for food, actually flying through the watery depths in search of smelt and anchovies.

Corvids: You can hear the yackety-yak of the American crow, Steller's jay, or common raven as they fly overhead. Opportunists, they are always looking for an easy meal. e.g. trash, scraps, livestock feed, and bird feeder food. Corvid memory is even better than a bear's. Once one of these birds has received a food reward, it will return many times, circling the site over and over.

What's the connection? While the jay, raven, or crow is repeatedly flying over a previous food site, the bird may spy a murrelet nest, high in the redwood forest canopy. The adult murrelets are camouflaged, resembling a redwood branch, but any movement of them or their babies and the corvid will zero in, making a meal of chicks and eggs.

We need your help! Corvid numbers are on the rise while the marbled murrelets are on the decline. Most of the murrelet population in California nests within Redwood National and State Parks. Federally-listed as threatened, the murrelets need your help now! Please follow these guidelines while backpacking, camping, and picnicking.

Help prevent the death of murrelet chicks and eggs:

- Keep a clean camp.
- Carry plastic bags for trash.
- Pack out unburnable trash.
- Do not throw garbage into pit toilets or cat holes.
- Leave no food residue in the fire pit.
- Strain food particles from waste water.
- Scatter waste water.
- Don't share your lunch with any birds!

Corvids are just as important to the park's ecosystem as murrelets and predation by corvids is a natural process. However, feeding patterns that change because humans alter the environment are not natural. Thanks for your help!

Thematic

Yes / No**Theme/Topic: *Feed a Jay, Kill a Murrelet***

Fifteen words or less per sentence

Yes / No*Average: 12.7 words per sentence*

Five sentences or less per paragraph

Yes / No*Average: 4.6 sentences per paragraph*

Item: Feed a Jay, Kill a Murrelet (rack card)- Continued

Three hundred total words or less Yes / **No**
Total: 357 words

Flesch-Kincaid Grade Level less than 8th grade **Yes** / No
Grade Level: 7.3

Flesch Reading Ease greater than 80 Yes / **No**
Reading Ease: 65.2

Use of graphics Yes / **No**
Comments: only agency logo

Total Score: 4

Overall Comments

The rack card presents lots of information, but its appearance is very dull. Very few people read this rack card when asked by the interviewer. It is copied in grayscale with no pictures, only the agency logos and a great deal of text. Color and images may make this rack card more appealing to visitors to pick up and read.

Message Analysis

The message analysis provides an assessment of message types indicated by and supported through communication theory to improve message impact and effectiveness in behavioral change.

Conventional message- The main message is “Feed a Jay, Kill a Murrelet.” This message is a conventional message where there is a desire for the visitor to do the good thing.

Specific Behavioral Request- There is a bulleted list of eight things that visitors can do to help prevent the death of murrelet eggs and chicks.

Sanction Message- None


Consequences for behavior clearly indicated- The text gives the death of the murrelet eggs and chicks as the only reason not to feed the jays.

Individual responsibility for consequences clearly indicated- The card says “We need your help!” The consequence given for not following the bulleted list is the death of murrelet eggs and chicks.

Use of norm theory- None

Item: RNSP Visitor Guide

**Help Save the
Marbled Murrelet!**



On the Edge of Extinction

by Jeff Denny

Sheltered in a soft nest of moss and ferns, a marbled murrelet chick waits silently atop a massive redwood branch high above the forest floor. Its parents spend their day at sea, diving for small fish, returning at dusk to feed their solitary offspring. Like the fog that shrouds the forest, a murrelet's life is connected to both forest and sea.

Nearby, a Steller's jay hops along the forest floor scavenging for any morsel of food. Aggressive and incredibly intelligent — they can remember hundreds of different food locations — jays and their fellow corvids (ravens and crows) flourish at the ecologically-rich edges of the redwood forest.

The edges of this once unbroken forest have increased a hundred-fold in a hundred years. Highways, logging, cities, campgrounds, and picnic areas open broad boulevards into the heart of the redwood forest. Thus exposed, murrelet chicks and eggs make easy meals for crafty corvids. As the forest edge expands, the marbled murrelet lives today on the edge of extinction.

You can help! Please keep campsites, picnic areas, and trails free of food. Leave no crumb behind! Together, we can ensure a place in the wild for a rare bird.

Thematic

Yes / No

Theme/Topic: *Help Save the Marbled Murrelet!-
On the Edge of Extinction*

Fifteen words or less per sentence

Yes / No

Average: 15.0 words per sentence

Five sentences or less per paragraph

Yes / No

Average: 3.2 sentences per paragraph

Three hundred total words or less

Yes / No

Total: 195 words

Flesch-Kincaid Grade Level of 8th grade or less

Yes / No

Grade Level: 8.1

Item: RNSP Visitor Guide- Continued

Flesch Reading Ease greater than 80
Reading Ease: 63.1 Yes / **No**

Use of graphics
Comments: Picture of murrelet **Yes** / No

Total Score: 6

Overall Comments

The picture of the marbled murrelet really makes the article stand out from the other articles. There was a great use of a green background color. "Help Save the Marbled Murrelet!" placed at the top gets the attention of the reader. The article also provides actual things visitors can do like leave no crumb behind and pick up campsites.

Message Analysis

The message analysis provides an assessment of message types indicated by and supported through communication theory to improve message impact and effectiveness in behavioral change.

Post-Conventional message- The main message is that the murrelets are on the edge of extinction. It asks for visitor help to save the murrelet. This is a post-conventional message since the visitor must be internally driven to save something from extinction.

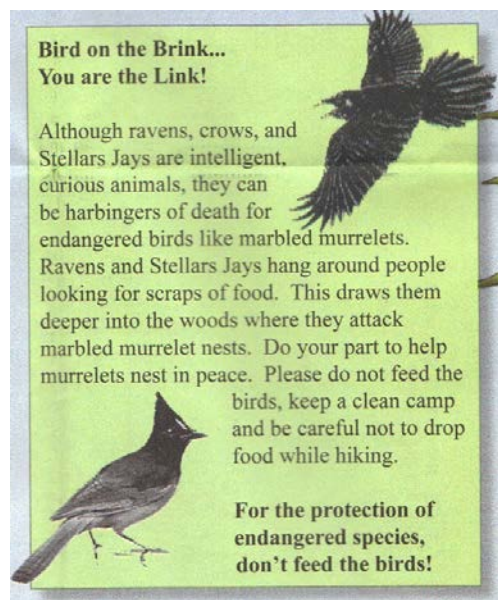
Specific Behavioral Request- The article does tell visitors to specifically pick up food and leave no crumbs behind.

Sanction Message- None

Consequences for behavior clearly indicated- The article says that if food is left behind, the jays will come in and the murrelet will go extinct.

Individual responsibility for consequences clearly indicated- The article says "Together, we can ensure a place in the wild for a rare bird." The word "together" could mean that if one visitor doesn't keep a clean site, other visitors will, so one person's actions don't matter.

Use of norm theory- There is the use of the social norm that everyone is helping to save the murrelet by keeping sites clean.

Item: CSP Visitor Guide

Thematic

Yes / No**Theme/Topic: Bird on the Brink... You are the Link!**

Fifteen words or less per sentence

Yes / No*Average: 14.1 words per sentence*

Five sentences or less per paragraph

Yes / No*Average: 3.0 sentences per paragraph*

Three hundred total words or less

Yes / No*Total: 85 words*Flesch-Kincaid Grade Level of 8th grade or less**Yes** / No*Grade Level: 7.0*

Flesch Reading Ease greater than 80

Yes / **No***Reading Ease: 70.0*

Use of graphics

Yes / No*Comments: Grayscale pictures of jay and crow*Total Score: 6

Item: CSP Visitor Guide - Continued

Overall Comments

“Bird on the Brink...You are the Link!” is catchy, but it is not on any other materials besides the Pledge. Consistency in messaging helps more visitors understand and remember the message. Also, the pictures of the jay and crow are in grayscale, but the publication is printed in color. Photographs printed in color may help get the message to more visitors.

Message Analysis

The message analysis provides an assessment of message types indicated by and supported through communication theory to improve message impact and effectiveness in behavioral change.

Post-Conventional message- The main message is that the murrelets are on the brink of extinction. It asks the visitor to not feed the birds for the protection of an endangered species. This again is a post-conventional message since the visitor must be internally driven to save something from extinction.

Specific Behavioral Request- The article tells visitors to keep a clean camp and to not drop food while hiking.

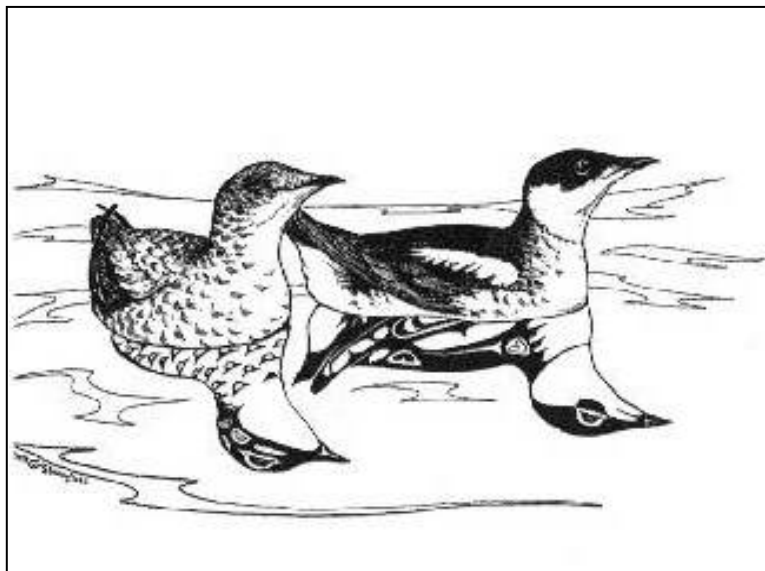
Sanction Message- None

Consequences for behavior clearly indicated- The article just states that clean-up is required for protection of endangered species. There is a lack of detail in this area.

Individual responsibility for consequences clearly indicated- None

Use of norm theory- The article says “do your part,” which means that others are also helping. This communicates a descriptive norm that everyone is helping.

Item: Postcard 1- The Marbled Murrelet



The Marbled Murrelet

The endangered marbled murrelet, one of the world's few seabirds to nest in trees, faces extinction. Marbled murrelets nest in very large coniferous trees within 35 miles of the ocean. Old-growth trees have huge diameter limbs for nesting, as well as canopy cover to protect murrelets from predators as they fly swiftly from their forest home to the sea and back gathering fish to feed their young.

Today, highways, logging, cities, campgrounds, and picnic areas have opened broad boulevards into the heart of the redwood forest, causing habitat destruction. With more "edges" to the forest, predators such as ravens, crows, and jays (corvids) increase in numbers and look for an easy meal.

Campgrounds have seven-to-nine times the number of corvids due to food droppings. Once corvids find food, they circle and circle the same site, high above the treetops, waiting for a hand out. Beware! While flying high, they may spy movement in a murrelet nest and devour the egg or chick!

You can help the plight of the murrelet! Please keep campsites, picnic areas, and trails free of food snacks. Do not leave one crumb of food behind in the forest. Together, we can ensure a place in the wild for a rare bird.

Note: The bird reflection represents the murrelet population in Alaska.
Illustration by Gary Bloomfield

Thematic

Theme/Topic: The Marbled Murrelet

Yes / **No**

Fifteen words or less per sentence

Average: 15.6 words per sentence

Yes / No

Five sentences or less per paragraph

Average: 3.2 sentences per paragraph

Yes / No

Item: Postcard 1- The Marbled Murrelet- Continued

Three hundred total words or less **Yes** / No
Total: 204 words

Flesch-Kincaid Grade Level of 8th grade or less **Yes** / No
Grade Level: 7.6

Flesch Reading Ease greater than 80 Yes / **No**
Reading Ease: 68.1

Use of graphics **Yes** / No
Comments: Grayscale and color options on front side

Total Score: 5

Overall Comments

The quality of drawings on the front of the postcards is excellent. There are both black and white and color images. A difficulty with these postcards is that there is so much text on the back, visitors can't write on them and mail them. Perhaps they should be called information cards.

Message Analysis

The message analysis provides an assessment of message types indicated by and supported through communication theory to improve message impact and effectiveness in behavioral change.

Post-Conventional message- The main message is the plight of the murrelets. It asks the visitor to not feed the birds to ensure a place in the wild for the murrelet. This again is a post-conventional message since the visitor must care about the murrelet and want to do something good.

Specific Behavioral Request- The article tells visitors to keep a clean camp and to not leave crumbs behind in the forest while hiking.

Sanction Message- None

Consequences for behavior clearly indicated- None

Individual responsibility for consequences clearly indicated- None

Use of norm theory- The article says "together we can," which means that others are also helping. This communicates a descriptive norm that everyone is helping.

Item: Postcard 2- Marbled Murrelet- Endangered**Marbled Murrelet - Endangered**

Can you imagine a bird that can fly 90 miles per hour? And this bird is no bigger than a potato! Not only that, our speedy seabird is flying through lots of trees with lots of branches! Picture a major league baseball pitcher trying to throw a fast ball through the dense forest. Do you think he might hit a tree? The murrelet has been cruising through the redwood treetops like a torpedo since birth, no problem. The parents are looking for a place to nest.

A seabird normally hangs out in water. So how can the murrelet fly through and land in the forest? It cannot hover like a hawk. Murrelets must find a huge limb and then use their hind legs to come to a practiced halt! They use ready-made moss for their nest and lay one egg. The chick takes one month to hatch. It is another month before the baby can fly. Once the fledgling is ready, it must fly as far as 30 miles to find the ocean where it will grow up. What a trip!

This amazing bird may go the way of the dodo bird (extinct!) for two reasons. Their nesting habitat — large old trees — have been logged and replaced by roads and campgrounds. Where people gather to eat, crow, ravens, and jays (corvids) follow. While the corvids are flying around, waiting for a food handout, they may spy the murrelet nest and eat the egg or chick! Please help! Make sure your family does not feed any birds and keeps every part of the forest clean of snacks! Thank you.

Torpedo! Potato! Cigar! The people who know the enduring story of the endangered marbled murrelet give this seabird their own description. What's yours?

Illustration by Gary Bloomfield

Thematic

Theme/Topic: *Marbled Murrelet- Endangered*

Yes / No

Fifteen words or less per sentence

Average: 10.3 words per sentence

Yes / No

Five sentences or less per paragraph

Average: 7.0 sentences per paragraph

Yes / **No**

Three hundred total words or less

Total: 290 words

Yes / No

Flesch-Kincaid Grade Level of 8th grade or less

Grade Level: 3.9

Yes / No

Flesch Reading Ease greater than 80

Reading Ease: 84.8

Yes / No

Use of graphics

Comments: Grayscale and color options on front side

Yes / No

Total Score: 6

Item: Postcard 2- Marbled Murrelet- Endangered- Continued

Overall Comments

The text for this card was very well written. It asks readers to think and answer questions. The length of the text is rather long, but with such actively written text, it doesn't seem like too much to read.

Message Analysis

The message analysis provides an assessment of message types indicated by and supported through communication theory to improve message impact and effectiveness in behavioral change.

Post-Conventional message- The main message is the extinction of the murrelets. It asks the visitor to not feed any birds. This again is a post-conventional message since the visitor must already want to do something good.

Specific Behavioral Request- The article tells visitors to not feed any birds and keep every part of the forest clean of snacks.

Sanction Message- None

Consequences for behavior clearly indicated- The text says "please help," but there are no specific consequences given.

Individual responsibility for consequences clearly indicated- None

Use of norm theory- None

Item: Postcard 3- From Forest's Edge to the Edge of Extinction



From Forest's Edge to the Edge of Extinction

Sheltered in a soft nest of moss and ferns, a marbled murrelet chick waits silently atop a massive redwood branch high above the forest floor. Its parents spend their day at sea, diving for small fish, returning at dusk to feed their solitary offspring. Like the fog that shrouds the forest, a murrelet's life is connected to both forest and sea.

Nearby, a Steller's jay hops along the forest floor scavenging for any morsel of food. Aggressive and incredibly intelligent — they can remember hundreds of different food locations — jays and their fellow corvids (ravens and crows) flourish at the ecologically-rich edges of the redwood forest.

The edges of this once unbroken forest have increased a hundred-fold in a hundred years. Highways, logging, cities, campgrounds, and picnic areas open broad boulevards into the heart of the redwood forest. Thus exposed, murrelet chicks and eggs make easy meals for crafty corvids. As the forest edge expands, the marbled murrelet lives today on the edge of extinction.

Illustration by Ram Parsh

Thematic

Yes / **No**

Theme/Topic: From Forest's Edge to Edge of Extinction

Fifteen words or less per sentence

Yes / **No**

Average: 18.2 words per sentence

Five sentences or less per paragraph

Yes / No

Average: 3.0 sentence per paragraph

Three hundred total words or less

Yes / No

Total: 164 words

Item: Postcard 3- From Forest's Edge to the Edge of Extinction- Continued

Flesch-Kincaid Grade Level of 8th grade or less Yes / **No**
Grade Level: 10.1

Flesch Reading Ease greater than 80 Yes / **No**
Reading Ease: 54.7

Use of graphics **Yes** / No
Comments: Color picture of murrelet on front side

Total Score: 3

Overall Comments

The text for this card is the same as for the larger sign. However, only the top portion of the sign text would fit on the postcard. Revisions to the text to make the postcard better for visitors may be necessary. The text lacks recommendations about not feeding the corvids.

Message Analysis

The message analysis provides an assessment of message types indicated by and supported through communication theory to improve message impact and effectiveness in behavioral change.

Post-Conventional message- The main message is the topic of from forest's edge to edge of extinction. This again is a post-conventional message since the visitor is not given any other information and must rely on their internal desire to do something good for the birds.

Specific Behavioral Request- None

Sanction Message- None

Consequences for behavior clearly indicated- None

Individual responsibility for consequences clearly indicated- None

Use of norm theory- None

Printed Materials Evaluation Summary

The highest scoring item was the “Don’t Make a Good Bird Go Bad” sign. The theme is very catchy and easy to remember. The text is easy to read, and there are pictures showing exactly what visitors should look for.

According to this rubric, the least effective item was the postcard featuring the text from the “From Forest’s Edge to the Edge of Extinction” sign. The text was in long sentences, and there were difficulties in readability. Some revisions to the text would be necessary to make this item better.

The Pledge looks like a great incentive to encourage good behavior surrounding the feeding of birds. Throughout the course of the study, no one was ever observed completing this Pledge. It could be that the Pledge was given at the campground check-in kiosk where the researchers were not located.

The Pledge itself states “Bird on the Brink, You are the Link!” The only other place this saying can be found is in the State Parks Visitor Guide. It is important to maintain the same message throughout all media types in order to present one message that visitors should remember. The Pledge could be improved by simply showing one of the more familiar messages.

The magnet and button are well designed with crisp, color images. They would make good incentives for visitors who take the Pledge. The phrase “From Sea to Trees” is displayed only on the magnet and not on any other media. However, this phrase works well on the magnet because it is underneath the phrase “Protect the Marbled Murrelet.” Text on the magnet and button are well proportioned.

One primary message that seems to be the most glaringly absent from the printed material is the specific message regarding crumbs and unintentional feeding. Given that negative behavioral impacts result from crumbs being dropped or left out, a message should be communicated on all interpretive pieces that provide that specific behavioral message.

All printed messages could be more effective if shortened and simplified. Results of the survey and interview indicate that visitors are retaining many messages regarding murrelets, but many of them are unrelated to the primary targeted behavioral request concerning food and corvids. Given the typical limited time a visitor attends to and then subsequently processes a message, simplification and conveying very specific behavioral requests should increase the overall percentage of visitors that receive the primary target message.

Marbled Murrelet Project Campfire Program Evaluation

Answers are in bold and underlined.

Title: The Dark Side of the Redwood Forest Date: 5-30-10 Ranger: Jenn

Time: 6 minutes, 35 seconds

Main point stated **Yes** / No

Main point: Put food away.

Tied murrelets into theme of program Yes / **No**

How:

Passed items out to audience to take home Yes / **No**

What:

Showed pictures of murrelets and corvids Yes / **No**

Comment:

Interacted with audience **Yes** / No

How: Questions

Example: Why am I happy you put your food away?

Gave correct information **Yes** / No

Comment:

Tied information back to main point **Yes** / No

*Comment: Told story of murrelet and then came
back around to putting food away*

Overall Comments

Told the audience that “we need your help.” She made it seem important for visitors to put their food away.

Title: The Dark Side of the Redwood Forest- Continued

Message Analysis

The message analysis provides an assessment of message types indicated by and supported through communication theory to improve message impact and effectiveness in behavioral change.

Pre-conventional message- Visitors are told to put their food away and that rangers walk around the campgrounds making sure this is done. This message is very much about obedience and punishment.

Specific Behavioral Request- A specific request was given to put food away.

Sanction Message- None given directly. However, it is implied when the ranger says, “rangers walk around looking.”

Consequences for behavior clearly indicated- Visitors were told that if they did not put their food away, jays would come eat it, and then jays would eat marbled murrelet eggs and chicks.

Individual responsibility for consequences clearly indicated- Yes. It was very clear that if food is not put away, the visitor would be responsible for the death of murrelet eggs and chicks.

Use of norm theory- There is the descriptive norm being used that illustrates everyone in the campground is putting their food away.

Title: Radar Station B-71 The Farm That Wasn't Date: 6-1-10 Ranger: Liam

Time: 3 minutes, 10 seconds

Main point stated Yes / **No**

Main point:

Tied murrelets into theme of program Yes / **No**

How:

Passed items out to audience to take home Yes / **No**

What:

Showed pictures of murrelets and corvids Yes / **No**

Comment:

Interacted with audience **Yes** / No

How: Asked if anyone had seen one.

Gave correct information **Yes** / No

Comment:

Tied information back to main point Yes / **No**

Comment:

Overall Comments

He gave information about the population of murrelets dropping and the introduction of predators to the area. He did ask everyone to take care of their food, but there was only minimal interaction with the audience.

Message Analysis

There was no main message given about marbled murrelets or jays, ravens, or crows.

Title: The Triumphant Struggle to Create RNSP Date: 6-11-10 Ranger: Aimee

Time: 3 minutes, 25 seconds

Main point stated Yes / **No**

Main point:

Tied murrelets into theme of program Yes / **No**

How:

Passed items out to audience to take home Yes / **No**

What:

Showed pictures of murrelets and corvids **Yes** / No

Comment: Showed murrelets, Stellar's jay, raven

Interacted with audience **Yes** / No

How: Asked "Has everyone heard of murrelets?"

Gave correct information Yes / **No**

Comment: Called them Marble Murrelets

Tied information back to main point Yes / **No**

Comment:

Overall Comments

This program lacked structure. Murrelets were also anthropomorphized in a significant way. The murrelets asked that visitors don't feed corvids or leave food out because the corvids eat their eggs and babies. The murrelets also said "thank you, thank you, thank you."

Message Analysis

There was no main message given about marbled murrelets or jays, ravens, or crows.

Title: Packers, Placers, and Prospectors

Date: 6-26-10

Ranger: David

Time: 2 minutes, 35 seconds

Main point stated

Yes / **No**

Main point:

Tied murrelets into theme of program

Yes / No

How: Murrelets are part of redwood region

Passed items out to audience to take home

Yes / No

What: Murrelet cards and coloring sheets

Showed pictures of murrelets and corvids

Yes / **No**

Comment:

Interacted with audience

Yes / No

How: Question

What is the only seabird that nests in redwoods?

Gave correct information

Yes / No

Comment:

Tied information back to main point

Yes / **No**

Comment:

Overall Comments

This program told the audience what murrelets are, what their threats are, and how visitors can help.

Message Analysis

There was no main message given about marbled murrelets or jays, ravens, or crows.

Title: Uniquely Adapted Redwoods

Date: 6-28-10

Ranger: Renee

Time: 17 minutes, 5 seconds

Main point stated

Yes / No

Main point: They're cool little birds.

Tied murrelets into theme of program

Yes / No

How:

Passed items out to audience to take home

Yes / No

What:

Showed pictures of murrelets and corvids

Yes / No

Comment: Many slides of murrelets and corvids

Interacted with audience

Yes / No

How: Question- What is this bird?

Gave correct information

Yes / No

Comment:

Tied information back to main point

Yes / No

*Comment: Kept bringing points back to them
being cool little birds.*

Overall Comments

There was a great deal of time spent on the marbled murrelet during the program. The interpreter used great analogies to explain everything to the audience. She described how murrelets are like penguins the way they can fly through the water. The interpreter did a good job of letting visitors know how they can help.

Title: Uniquely Adapted Redwoods- Continued

Message Analysis

The message analysis provides an assessment of message types indicated by and supported through communication theory to improve message impact and effectiveness in behavioral change.

Post-conventional message- Visitors are told about the situation of the murrelet and they are meant to feel obligated to help.

Specific Behavioral Request- The visitors were asked not to feed the jays and to keep food in bear boxes.

Sanction Message- None

Consequences for behavior clearly indicated- The ranger gave an example of a good consequence that when the Parks wanted to lessen the bear problem, they had everyone put their food in a bear locker, and then the bears didn't come near people anymore. She said that if everyone works together, the same thing could happen for the jays.

Individual responsibility for consequences clearly indicated- None

Use of norm theory- Descriptive norm used to illustrate the good behavior everyone is doing.

Title: There Goes the Neighborhood

Date: 6-30-10

Ranger: Steven

Time: 5 minutes, 35 seconds

Main point stated

Yes / No

Main point: Unique bird

Tied murrelets into theme of program

Yes / No

How:

Passed items out to audience to take home

Yes / No

*What: Literature, cards, stickers, posters
and coloring sheets*

Showed pictures of murrelets and corvids

Yes / No

Comment: In slides

Interacted with audience

Yes / No

How: Question

How many of you have heard of the murrelet?

Gave correct information

Yes / No

Comment:

Tied information back to main point

Yes / No

Comment: Brought point back to interesting species

Overall Comments

The program gave complete information. The interpreter said this is our last effort to bring back the marbled murrelets and he asked people to please read the signs and follow them.

Title: There Goes the Neighborhood- Continued

Message Analysis

The message analysis provides an assessment of message types indicated by and supported through communication theory to improve message impact and effectiveness in behavioral change.

Post-conventional message- Visitors are told about the situation of the murrelet and they are meant to feel obligated to help an endangered species.

Specific Behavioral Request- The ranger said everyone should read the signs that say “Don’t feed the jays.” There are no signs that give that message in that way.

Sanction Message- None given

Consequences for behavior clearly indicated- A visitor could get the idea from this talk that marbled murrelets are an endangered species and that jays should not be fed. This was not presented as well as it could have been, so the audience may not have been able to put this idea together.

Individual responsibility for consequences clearly indicated- None

Use of norm theory- None used

Title: Redwood Reconstruction

Date: 7-1-10

Ranger: Forrest

Time: 4 minutes, 41 seconds

Main point stated

Yes / No

Main point: Special little bird

Tied murrelets into theme of program

Yes / No

How:

Passed items out to audience to take home

Yes / No

What: Murrelet cards to all

Showed pictures of murrelets and corvids

Yes / No

Comment:

Interacted with audience

Yes / No

How: Question- How many have heard? Not heard?

Gave correct information

Yes / No

Comment:

Tied information back to main point

Yes / No

Comment:

Overall Comments

The program gave a summary of the murrelet being an endangered sea bird. Visitors should pick up their food so the jays, crows, and ravens don't eat it and look in trees for murrelet eggs and chicks.

Title: Redwood Reconstruction- Continued

Message Analysis

The message analysis provides an assessment of message types indicated by and supported through communication theory to improve message impact and effectiveness in behavioral change.

Post-conventional message- Visitors are told about the situation of the murrelet and they are meant to feel obligated to help.

Specific Behavioral Request- During the talk, visitors were told not to feed jays, ravens, or crows and to pick up any food they drop on the ground.

Sanction Message- None given

Consequences for behavior clearly indicated- If a visitor feeds a jay, raven or crow, the bird will look in the trees for murrelet eggs and chicks.

Individual responsibility for consequences clearly indicated- None given

Use of norm theory- A descriptive norm was used in telling everyone to not feed the birds and pick up food from the ground.

Title: The Redwood Story Date: 7-9-10 Ranger: Ryan

Time: 3 minutes, 21 seconds

Main point stated **Yes** / No

Main point: Murrelets are an important bird.

Tied murrelets into theme of program **Yes** / No

How: Murrelets are important to the redwood story.

Passed items out to audience to take home **Yes** / No

What: Visitor Guide and Junior Ranger paper

Showed pictures of murrelets and corvids **Yes** / No

Comment: Many slides of pictures

Interacted with audience **Yes** / No

How: Campfire song and group quiz

Gave correct information **Yes** / No

Comment:

Tied information back to main point **Yes** / No

Comment: Information related to how murrelets are important.

Overall Comments

This was by far the best campfire program. The interpreter used a variety of interpretive techniques to present information to the audience. It was a pleasure to see the hundreds of visitors in the audience for such an interactive program. The marbled murrelet story was mentioned in the campfire song as well as twice in the fun quiz. The interpreter also had comment cards available for anything that needs improvement.

Title: The Redwood Story- Continued

Message Analysis

The message analysis provides an assessment of message types indicated by and supported through communication theory to improve message impact and effectiveness in behavioral change.

Conventional message- Visitors are told that the murrelets are an important bird and it would be wrong if they are not around anymore.

Specific Behavioral Request- In song, visitors were told not to leave food or snacks out.

Sanction Message- None given

Consequences for behavior clearly indicated- In the song, if visitors do not follow the rules of putting food away, the “crows and the jays get tamer every day and they eat the marbled murrelet’s eggs.”

Individual responsibility for consequences clearly indicated- While the talk does give responsibility to visitors to clean up after themselves, it does not issue responsibility to individuals. It is more like group responsibility.

Use of norm theory- Descriptive norms are used to show that everyone is helping clean up.

Campfire Programs Evaluation Summary

The marbled murrelet was mentioned in every campfire program that the researchers attended. The main difference among all of the programs was the way the message was incorporated into the program. There were some interpreters who were able to weave the murrelet message in with whatever their theme for the night was. There were other interpreters who seemed like they were just talking about the murrelets as an aside because they had to. There were a couple instances in which interpreters said “And now let’s get back to the program” or “Let’s get this program started.” This implies that murrelets were not an important aspect of their campfire program.

There was one interpreter who did an excellent job of including the murrelets in the program. He used interaction with the audience through song to talk about the murrelets. It flowed seamlessly with his other main points for the evening.

As with the printed materials, interpreters need to give a specific behavioral request so visitors know what to do. One interpreter told everyone to keep a clean campsite which was great because it gave the visitors something specific they could do. This message could be made even more effective by indicating what “clean” means; it means “crumb clean”. Otherwise, the use of the term clean is clearly up for interpretation by the visitor. Other interpreters talked about the murrelets without having a main point or any sort of cohesive message for the audience. They were just giving random facts about murrelets.

Overall, there is quite a variety of interpreters giving messages about murrelets. Some did very well and some could use just a few tips to make their program more effective. In every program the researchers saw, it was impressive that the murrelets were given such great attention. With just a few changes, the murrelet message can be even more effective.

Roving Ranger Observations

Date: May 9, 2010 Location: Stout Grove
 Start Time: 2:00 P.M. End Time: 3:00 P.M. walk ended

Answered questions about

- Poison oak
- How tall trees are measured
- Where is the tallest tree
- Tolowa and Yurok peoples and the decline of their population during the Gold Rush
- Who was Jedediah Smith and how difficult the terrain was to walk on his expedition

Guided walk theme “Survival is the Key for Redwoods”

- Gave examples of how redwoods have survived lightning and fire
- Had group walk the distance equivalent to the height of an old growth redwood

Date: June 6, 2010 Location: Stout Grove
 Start Time: 11:45 A.M. End Time: 12:00 P.M.

Answered questions about

- How rain has affected trail conditions
- How suitable the trail is for older visitors. After initial descent the trail is flat.

Date: June 24, 2010 Location: Big Tree
 Start Time: 3:00 P.M. End Time: 3:30 P.M.

Talked about

- Marbled murrelets and jays
- Gave stickers and postcards to visitors

Date: June 25, 2010 Location: Prairie Creek Visitor Center
 Start Time: 2:15 P.M. End Time: 2:30 P.M.

Answered questions about

- Trails to go hiking on
- Joining her on a hike
- Where bathrooms are

Date: June 26, 2010 Location: Prairie Creek Campground
 Start Time: 8:00 A.M. End Time: 9:00 A.M.

(Researcher was pretending to be a camper.)

Talked about

- How we did a good job putting food away
- The murrelet is a little bird that nests in trees around here
- Jays and crows are attracted to visitor food and they get the babies of murrelets
- Told me thank you for doing a good job
- He handed out a marbled murrelet postcard with a message on the back

Date: July 3, 2010 Location: Prairie Creek- Gold Bluffs Beach Campground
 Start Time: 10:30 A.M. End Time: 11:00 P.M.

Talked about

- Marbled murrelets and jays (General information about how they nest in old growth and fish in the sea. Lay one egg per year. Feeding jays leads them to eat murrelet eggs and chicks. Need to keep campsite clean.)
- Gave postcards to visitors

L.E. Ranger sees empty campsite with numerous crows eating food left out

- Ranger picks up all food and throws it away
- Leaves note for campers that it is unacceptable to keep a campsite with food out
- Writes a report on the situation

Date: July 14, 2010 Location: Stout Grove
 Start Time: 2:40 P.M. End Time: 3:00 P.M.

National Park Service Volunteer

Talked about

- NPS does not believe in hauling out fallen redwoods to clear space
- It does not make sense to cut down an old growth that would live for thousands of years just to make a house that will burn down in fifty years

Conclusions and Recommendations

Data was collected from several sites within Prairie Creek Redwoods State Park, Del Norte Coast Redwoods State Park, and Jedediah Smith Redwood State Park. On-site data collection occurred from May through July 2010. Three instruments were used to collect data from visitors -- a survey was completed by 650 visitors, interviews were conducted with 179 visitors, and observations were made of 596 visitors.

Visitor Characteristics

According to results from the written survey, approximately 52% of visitors were male. Most visitors (25.1%) were between the ages of 18 and 29 years. Not surprisingly, a majority of the visitors were white (87.4%), highly educated (over 63% had completed college or graduate school), and most visitors were financially well off (median household income of \$60-80,000). Over half of visitors (54.3%) had never been to RNSP before. Family groups were the most common (62.3%) visitor group type.

Visitor Attitudes and Knowledge toward Murrelets and Corvids

Fewer than half of sampled visitors could name a threat to the murrelet, and of those that could, only 13% indicated that people feeding jays or leaving out food was a main threat. When asked what the message was that they received about marbled murrelets, 57.7% of those who responded said they are endangered/threatened, 21.6% mentioned their dependence on redwoods, but only 15.5% said don't feed jays, ravens, or crows. Again on the survey, when asked what message they received about corvids (jays, ravens, and crows), 48.4% of those who responded said don't feed jays, ravens, or crows, 24.9% said corvids eat the eggs and chicks of murrelets, and 12.4% said they follow humans and find eggs and chicks. On the interview, when asked about any messages they have received about murrelets or corvids in the parks, 34.1% of those who responded said not to feed jays, ravens, and crows, 17.6% said feed a jay kill a murrelet, and 15.4% said put food and garbage away.

Most visitors have attitudes toward wildlife that the parks would be pleased with. The question that had most visitors in agreement (5.04 out of 6.0) was “Marbled murrelets are important to protect.” There was also strong group disagreement (1.36 out of 6.0) that “The Parks think it’s ok to feed jays, ravens, or crows.”

Visitors were relatively neutral on the enjoyment of seeing corvids at their campsite (3.16 out of 6.0) and photographing corvids up close (2.94 out of 6.0) with half of the visitors agreeing with the statements and half disagreeing. Visitors were, in general, not that interested in learning more about the marbled murrelets (3.73 out of 6.0), even though they felt very strongly that marbled murrelets are important to protect (5.04 out of 6.0). Some visitors also stated that they have seen other visitors accidentally drop food.

Interpretive Messaging

This study focuses on two different types of marbled murrelet messaging in Redwood National and State Parks (RNSP) and how effective those messages and mediums are at communicating with visitors. First is the written messaging that visitors receive in the form of signs, rack cards, visitor guide articles, children's coloring pages, magnets, buttons and postcards. Second is the oral messaging that visitors receive in visitor centers, campground check-in kiosks, campfire programs, guided hikes, and from roving rangers. This report shows what is being done well and what improvements can be made to make murrelet messaging in RNSP more effective. Although many visitors are receiving and recalling targeted messages, with some minor alterations and changes in practice, interpretive messages can be attended to and remembered by more visitors.

Written Interpretive Messaging

Based on the results, written messaging reaches a larger population than does oral messaging. According to the results of the written survey, 53.7% of visitors viewed informational or educational signs, 43.2% read the Visitor Guide, and 34.2% walked a brochure or signed self-guided trail. These results show that more visitors are exposed to written messaging than they are to spoken messages. Therefore, because more people are exposed to written messages, they have more of an impact at communicating the message. All written messages provided to the researchers were analyzed for technical aspects as well as message type.

Overall, the written materials did a very good job at conveying a detailed sense of what the problem is (feeding corvids that then eat murrelet eggs and chicks). However, almost all messages were post-conventional. That means that in order for one of these messages to be understood and followed by a visitor, the visitor must already have developed ethics of what is right and wrong. Most people are not in this stage, but rather in the pre-conventional or conventional stage where they do something because it is right or wrong. There were no sanction messages given in the signage, other than one use of just the RNSP logo and one use of the NPS and CA State Parks logos. There was no written message along with the logos. This means that messaging is not affecting people who respond solely to a message where if they do something wrong they will get caught and subsequently punished (pre-conventional message). If it is supported through accurate management repercussions, then a message stating, "the fine for leaving out food is____, but the

fine for future generations is far larger,” would address both pre-conventional and post-conventional sanctions and should be more effective. Every printed material item should show the logo for RNSP or NPS and CA State Parks and have a message in small typeface next to the logo that says something like “Fine for feeding birds and wildlife.” This conveys a sanction message for those who will only respond to a pre-conventional message. If the fine is large, then it is recommended that it be specifically listed on the material.

For both the survey and interview, the main place (over 60% in all cases) that visitors heard or saw the messages about murrelets and corvids was from an informational or educational sign. Given the critical nature of the protection issue for this species, message simplification should lend to an increase in the number of visitors who recall the “target” message—Don’t feed the corvids, even unintentionally. When examining the printed material, the messages of protection status and dependence on redwoods are located first and therefore receive the most attention by visitors. Considering all eleven interpretive pieces examined, only one had the specific targeted message early in content, and all the remaining pieces placed the target message at the end. Given that most visitors read from top to bottom and most are not reading the entire interpretive piece, it is no surprise that a much higher percentage of visitors knew about the protection status of the murrelet and a much lesser percentage knew they should not feed the corvids.

In some cases, there were specific behavioral requests made and consequences for behavior clearly indicated. A good example of this is “Don’t share your lunch with any birds!” It gives a specific request to the visitor. However, this message may not be the most appropriate as intentional feeding may not be the most critical source of corvids gaining food. A more specific message such as “crumb clean” may be more effective at obtaining the desired target behaviors. If you should not even leave crumbs out, then feeding the birds your lunch would definitely be bad. Since most visitors are first time visitors, and messaging tends to reach first time users more effectively than repeat users (because repeat visitors sometimes tune out messages they have previously seen/heard), then behavioral messages should be very specific and target the most detrimental and common negative behavior.

There were very few cases in which individual responsibility for consequences was clearly indicated. The messaging refers to “we” and “us” instead of “you.” That gives a person a sense of freedom from responsibility since so many others will do the work and that one person’s efforts no longer seem valuable. This is good use of norm theory, however, since everyone can assume it’s something everyone does and an individual usually won’t want to go against the norm. So, the best message will include both “we” and “you.” Starting messages with a theme statement at or near the top of the message stating something such as, “you can save the marbled murrelet...” will help instill the visitors’ responsibility for the consequences. This coupled with a very specific behavioral request regarding crumbs will help increase the targeted behavioral impact of the message.

Based on interview results, all of the educational signs need to have better pictures of corvids and marbled murrelets. During the interview, the interviewer held up a series of four pictures. The robin was correctly identified by 76.8% of visitors. The duck was correctly identified by 97.4% of visitors. However, only 29.1% could identify the Steller’s jay and 29.8% could identify the marbled murrelet. In addition, since visitors do not attend to or read messages for very long, then pictures and messages may be more effective at producing the desired behavior if they focus on the corvids. Although the ultimate goal is protecting the murrelet, the targeted outcome is in terms of the visitors’ behavior in relationship to the corvids not the murrelet. Rarely does a visitor ever even see a murrelet. The murrelet is one step removed from the process and may make the ease of messaging more difficult. A simple message such as, “Keep a crumb clean campsite and you protect the marbled murrelet” would convey the main message. Visitors may be getting lost in the levels of steps that occur between the crumbs, food and the murrelet’s fate.

In summary, while the current signage is working to a degree, there are changes that can be made to try to reach even more of the visitor population. A conventional message should be developed with a specific behavioral request, such as “Please don’t feed the jays, ravens, or crows.” The message would also be more effective if it illustrates the social norm behind the request, such as “Everyone picks up their food.” There also needs to be part of the message that conveys consequences for behavior and individual responsibility for consequences. For example, “Crumbs kill murrelets,” or “Every crumb counts,” would both address the specific target behavior desired.

The consequence is that murrelets will die and individual responsibility is conveyed in “every one of your crumbs count.” Including different types of messages that target various behavior beliefs and the associated target behaviors will ensure that a wide audience is reached. In addition, those specific target messages should occur first in all printed material. Make the request first and then explain why. If visitors only read some of the message, they will be more likely to receive the primary target message if it is located in larger print and higher in hierarchy on the sign. It can and should be repeated at the end. Finally, in order for more visitors to recognize the birds they are supposed to look out for and not feed, a sign or brochure should show photographs of the jay, raven and crow. Pictures of the murrelet are not as critical as ones associated with the primary target behavior.

Graphic messages should:

1. Provide the primary target message at the top of the sign- largest print and located first.
2. Locate materials closer to trailheads, parking lots and in closer proximity to the visitor’s opportunity to read and/or take them.
3. Use short, simple, specific messages. Don’t spend so much time describing and explaining the importance of the murrelet. Get to the target behavior quickly.
4. Provide a very specific behavioral request. Define the behavior desired; Is it crumb clean or do not feed the corvids that is the primary targeted behavior?
5. Provide graphics that define and describe the subject of the target behavior: the corvids getting visitors’ food. Graphics of the murrelet are less important.
6. Include both pre-conventional (fine- fear of punishment appeals) and post-conventional (future generations-ethical appeals) sanction messages.

Oral Interpretive Messaging

For oral messaging, campfire programs, visitor center interactions and roving interpretation was evaluated using a similar method as the written messaging. Only 26% talked with a Roving Ranger (some of whom may have been referring to the ‘researcher’), 12.0% of visitors attended a campfire program, 5.5% went to a Junior Ranger program, and 3.8% of visitors went on a ranger led walk.

There were some programs that gave great thematic messages about marbled murrelets. There were other programs where a main message regarding marbled murrelets could not be identified. The best murrelet messages were those that were incorporated into the larger program. One ranger in particular created a song and question and answer game incorporating the marbled murrelet for the whole audience to be a part of. This was by far the best program. The programs where the ranger put the murrelet in the talk as an aside did not get their message about marbled murrelets across to the audience as well as they could have.

Visitors also heard the murrelet message from roving rangers. Some of the rangers never discussed the murrelets, but the few who walked around handing out free postcards about the marbled murrelet made a huge difference. When the researchers approached visitors who had received postcards, visitors were proud to be able to answer all the interview questions. This, coupled with the relative high percentage of first time visitors, indicates that interpretive messages can be an effective method of behavioral modification if applied more specifically and more often.

Inside a visitor center is really an area where the marbled murrelet message should be given, but it's not. Out of all the people coming out of the visitor centers, 46.2% could not state anything about the marbled murrelet or they gave a wildly incorrect guess. While the people behind the desk are volunteers usually managed by a cooperating association, they are volunteers who should know how to discuss the importance of the murrelet issue. The data shows that only 3.7% of visitors talk to a ranger while 64.8% of visitors talk to a volunteer, so it is critical that volunteers be just as informed as rangers on important issues and trained to provide those targeted messages to the public.

Oral messages should:

1. Be provided early in any communication with visitors and, where possible, repeated often.
2. Be provided more frequently and consistently in roving interpretation along trails, campsites and visitor centers and should include a short message about what "crumb clean" means and why it is important.
3. Be integrated into Campfire programs early and seamlessly into the larger program.

4. Be provided in training for all staff in Visitor Centers, gift shops and maintenance throughout the park, so that they are capable, willing and confident in providing target messages to visitors encountered. These staff are often in more contact with visitors on a daily basis and as such can be an important mechanism for increasing overall dissemination of the message.

Other Observations Made by Researchers

The researchers made a few observations about jays, ravens, and crows throughout the course of the project. It was observed that the jays that get the most food wait at a campsite while a group is eating. Then, as soon as the group leaves, the jays swoop in. They eat leftover food found in the fire pit, camp stove, and where any dishwater was emptied. It should be emphasized in messaging that visitors need to check the cleanliness of their fire pit and camp stove before leaving it out unattended. These details could follow the short specific request to leave a “crumb clean” site and then you could explain with bullets what crumb clean means and why it is important.

Children are responsible for quite a few incidents where food is deliberately thrown at the birds. Children are often heard saying they want to pet or catch the bird. These are often very young children not old enough for Junior Rangers. More messaging directed at the parents of younger children might help address this problem.

Big Tree at Prairie Creek has the most aggressive corvids of all the survey locations. Birds will sit on the side mirrors of cars looking at the people inside the car. People often feed them because they look “cute” or “hungry.” A warning message inside visitor centers specifically about the craftiness of the Big Tree birds might be helpful.

Limitation

It should be noted that many visitors were confused and thought the researchers were rangers even though no uniforms were worn. This could have impacted the results of the question in both the survey and interview asking visitors to indicate which interpretive services they used.

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APPENDIX A
Marbled Murrelet Sampling Plan

		Interview Jen Taylor	Observe Jen Taylor	Observe Pope/Martin	Survey Pope/Martin
Sat	5/1/2010		Prairie Creek		
Sun	5/2/2010	Prairie Creek			
Mon	5/3/2010				
Tue	5/4/2010		Del Norte/ Jed	Del Norte/ Jed	
Wed	5/5/2010				
Thur	5/6/2010		Del Norte		Prairie Creek
Fri	5/7/2010	Del Norte			
Sat	5/8/2010		Jed Smith	Prairie Creek	
Sun	5/9/2010	Jed Smith			
Mon	5/10/2010			Prairie Creek	
Tue	5/11/2010				Prairie Creek
Wed	5/12/2010		Prairie Creek		
Thur	5/13/2010			Prairie Creek	
Fri	5/14/2010		Prairie Creek		
Sat	5/15/2010	Prairie Creek			
Sun	5/16/2010		Del Norte	Jed Smith	
Mon	5/17/2010	Del Norte			Jed Smith
Tue	5/18/2010		Jed Smith		
Wed	5/19/2010	Jed Smith			
Thur	5/20/2010				
Fri	5/21/2010	X	X	Prairie Creek	
Sat	5/22/2010	X	X	Prairie Creek	
Sun	5/23/2010	X	X		Prairie Creek
Mon	5/24/2010				Prairie Creek
Tue	5/25/2010				
Wed	5/26/2010				
Thur	5/27/2010			Del Norte	
Fri	5/28/2010				Del Norte
Sat	5/29/2010		Prairie Creek	Jed Smith	
Sun	5/30/2010	Prairie Creek			Jed Smith
Mon	5/31/2010		Prairie Creek		
Tue	6/1/2010	Prairie Creek			
Wed	6/2/2010				
Thur	6/3/2010			Prairie Creek	
Fri	6/4/2010				Prairie Creek
Sat	6/5/2010		Jed Smith	Prairie Creek	
Sun	6/6/2010	Jed Smith			Prairie Creek
Mon	6/7/2010		Del Norte		

Tue	6/8/2010	Del Norte			
Wed	6/9/2010				
Thur	6/10/2010		Prairie Creek		
Fri	6/11/2010	Prairie Creek		Del Norte	
Sat	6/12/2010		Prairie Creek		Del Norte
Sun	6/13/2010	Prairie Creek		Jed Smith	
Mon	6/14/2010				Jed Smith
Tue	6/15/2010				
Wed	6/16/2010				
Thur	6/17/2010		Jed Smith	Prairie Creek	
Fri	6/18/2010	Jed Smith			Prairie Creek
Sat	6/19/2010		Del Norte	Prairie Creek	
Sun	6/20/2010	Del Norte			Prairie Creek
Mon	6/21/2010	X	X		
Tue	6/22/2010				
Wed	6/23/2010				
Thur	6/24/2010			Prairie Creek	
Fri	6/25/2010		Prairie Creek	X	X
Sat	6/26/2010	Prairie Creek		X	X
Sun	6/27/2010		Prairie Creek	X	X
Mon	6/28/2010	Prairie Creek			Jed Smith
Tue	6/29/2010			Del Norte	
Wed	6/30/2010				Del Norte
Thur	7/1/2010			X	X
Fri	7/2/2010	Prairie Creek		X	X
Sat	7/3/2010	Prairie Creek		X	X
Sun	7/4/2010			X	X
Mon	7/5/2010			X	X
Tue	7/6/2010			X	X
Wed	7/7/2010				
Thur	7/8/2010			Prairie Creek	
Fri	7/9/2010	Del Norte			Prairie Creek
Sat	7/10/2010	Del Norte		Prairie Creek	
Sun	7/11/2010				Prairie Creek
Mon	7/12/2010				
Tue	7/13/2010	Jed Smith			
Wed	7/14/2010	Jed Smith			
Thur	7/15/2010			Jed Smith	
Fri	7/16/2010				Jed Smith
Sat	7/17/2010			Del Norte	
Sun	7/18/2010	Prairie Creek			Del Norte
Mon	7/19/2010	Prairie Creek			
Tue	7/20/2010				

Wed	7/21/2010				
Thur	7/22/2010			Prairie Creek	
Fri	7/23/2010				Prairie Creek
Sat	7/24/2010			Prairie Creek	
Sun	7/25/2010	Jed Smith			Prairie Creek
Mon	7/26/2010	Del Norte			
Tue	7/27/2010				
Wed	7/28/2010			Del Norte	
Thur	7/29/2010				Del Norte
Fri	7/30/2010			Jed Smith	

APPENDIX B
Marbled Murrelet Visitor Survey

Thank you for taking the time to fill out this questionnaire. Your responses will help guide the future development of interpretive materials here at Redwood National and State Parks. Please answer all questions as they relate to your current visit here. Since this survey is anonymous, please do not provide your name.

1. How many people are in your group?

- _____ # seniors (65 or older)
 _____ # of adults (under 65)
 _____ # of children (under 18)

2. How would you describe your group?

- ____ Alone
 ____ Family only
 ____ Friends only
 ____ Family and friends
 ____ Organized club
 ____ Other: please specify _____

3. How long is your entire visit to Redwood National and State Parks?

- _____ # of days and/or _____ # of hours and/or _____ # of minutes

4. As of this time, how long have you been at Redwood National and State Parks?

- _____ # of days and/or _____ # of hours and/or _____ # of minutes

5. While in Redwood National and State Parks, which of the following parks have you visited?
 (check all that apply)

- ____ Prairie Creek Redwoods State Park
 ____ Del Norte Coast Redwoods State Park
 ____ Jedediah Smith Redwoods State Park
 ____ Redwood National Park

6. Have you visited any of the parks listed above before this visit?

- ____ Yes ____ No

If yes, about how many times?

- ____ 1 to 2 times
 ____ 3 to 5 times
 ____ 6 to 9 times
 ____ 10 or more times

(please continue →)

7. What is the reason for your visit here today? (check all that apply)

- Hiking or walking
- Enjoying the scenery
- Bird watching
- Wildlife viewing
- Camping
- Picnic
- Biking
- Tidepool exploration
- Horseback riding
- Fishing
- Getting information from the visitor center
- Attending interpretive program or guided walk
- Other: please specify _____

8. While in Redwood National and State Parks, which of the following interpretive services have you used? (check all that apply)

- Visited the Visitor Center
- Viewed informational or educational signs
- Read Visitor Guide
- Attended a ranger led campfire program
- Participated in a ranger led walk
- Walked a self-guided interpretive trail (brochure or sign)
- Talked with a ranger on a trail, in a campground, or in a parking area
- Had your children participate in a Junior Ranger program
- Shopped in the Visitor Center bookstore
- Other: Please describe: _____

9. Can you name one main threat to marbled murrelet eggs and chicks?

Don't Know

10. What is one thing you can do to help keep marbled murrelets safe?

Don't Know

(please continue →)

11a. Have you heard or seen any messages about marbled murrelets during your current visit to Redwood National and State Parks?
 Yes No

11b. What was the message you received about marbled murrelets?

11c. Where did you hear or see that message about marbled murrelets? (check all that apply)

- Visitor Center
- Informational or educational signs
- Printed Visitor Guide
- Ranger led campfire program
- Ranger led walk
- Self-guided interpretive trail (brochure or sign)
- Talked with a ranger on a trail, in a campground, or in a parking area
- Child's participation in a Junior Ranger program
- Visitor Center bookstore
- Other: please specify _____

12a. Have you heard or seen any messages about corvids (jays, ravens, and crows) during your current visit to Redwood National and State Parks?
 Yes No

12b. What was the message you received about corvids (jays, ravens, and crows)?

12c. Where did you hear or see that message about corvids (jays, ravens, and crows)? (check all that apply)

- Visitor Center
- Informational or educational signs
- Printed Visitor Guide
- Ranger led campfire program
- Ranger led walk
- Self-guided interpretive trail (brochure or sign)
- Talked with a ranger on a trail, in a campground, or in a parking area
- Child's participation in a Junior Ranger program
- Visitor Center bookstore
- Other: please specify _____

13. Have you noticed any jays, ravens, or crows at this site during your visit today?

- Yes No Don't Know

(please continue →)

14. Have you observed jays, ravens, or crows eating human food (yours or others) during your visit?
 Yes No Don't Know

15. Please rate how knowledgeable you feel you are about the interaction between marbled murrelets and corvids at Redwood National and State Parks.

Not very knowledgeable—————Very knowledgeable
 1 2 3 4 5 6

16. Please rate how interested you are in learning more about the interaction between marbled murrelets and corvids at Redwood National and State Parks.

Not interested—————Very interested
 1 2 3 4 5 6

17. How would you prefer to receive information about marbled murrelets and corvids? Circle the number that best represents how you would like to receive information:

	Least Preferred				Most Preferred	
Two dimensional/flat panel signs	1	2	3	4	5	6
Brochures	1	2	3	4	5	6
Talking with park ranger	1	2	3	4	5	6
Audio/visual programs	1	2	3	4	5	6
Other: please specify _____	1	2	3	4	5	6

18. When looking at signs, do you find yourself spending more time: (check only one)

looking at pictures
 reading information

19. Please rate how much you agree with the following statements:

	Disagree					Agree	
a. It is fun for me to feed jays, ravens, or crows	1	2	3	4	5	6	
b. I like seeing jays, ravens, or crows around my campsite	1	2	3	4	5	6	
c. I enjoy photographing jays, ravens, or crows up close	1	2	3	4	5	6	
d. My children enjoy feeding jays, ravens, or crows	1	2	3	4	5	6	
e. I can eat at my campsite without leaving crumbs	1	2	3	4	5	6	
f. I have seen other visitors feed jays, ravens, or crows	1	2	3	4	5	6	
g. I have seen other visitors accidentally drop food	1	2	3	4	5	6	
h. The Parks think it's ok to feed jays, ravens, or crows	1	2	3	4	5	6	
i. I think it is ok to feed jays, ravens, or crows	1	2	3	4	5	6	
j. The Parks care if I feed jays, ravens, or crows	1	2	3	4	5	6	
k. I want to know more about marbled murrelets	1	2	3	4	5	6	
l. Other visitors should know more about marbled murrelets	1	2	3	4	5	6	
m. Marbled murrelets are important to protect	1	2	3	4	5	6	

(please continue →)

Please respond to the following questions about yourself:

20. ___ Male ___ Female

21. Age _____

22. Which of these groups would you say best represents your race or ethnicity?

___ American Indian/ Alaska Native

___ Native Hawaiian/Pacific Islander

___ Black/African American

___ Hispanic/Latino

___ Asian

___ White

___ Other: please specify _____

___ Prefer not to answer

23. Which of the following categories best describes your annual household income before taxes?

___ Less than \$20,000

___ Between \$20,000 and \$39,999

___ Between \$40,000 and \$59,999

___ Between \$60,000 and \$79,999

___ Between \$80,000 and \$99,999

___ Between \$100,000 and \$119,999

___ \$120,000 or more

___ Prefer not to answer

24. Circle the highest grade you have completed.

Grade school 8 or less

High school 9 10 11 12

College 13 14 15 16 (16= Bachelor's Degree)

Graduate school 17 +

25. Where do you live?

City _____ State _____ Zip Code _____

26. Other Comments

Thank you!

Your information will assist in better management, visitor information and services provided.

APPENDIX C
Marbled Murrelet Interview

Is this your first visit here? If not, how many previous visits?

Why did you choose to visit this location today?

How long have you been here so far?

What activities are you participating in here today?

What do you know about marbled murrelets?

What do you know about jays, ravens, or crows?

Have you noticed any jays, ravens, or crows at this site during your visit today? If yes, would you say they made your experience here better or worse?

Have you observed jays, ravens, or crows eating your food during your visit? What do you think about that?

What do you know about the interaction between corvids and marbled murrelets?

Have you heard or seen any messages about marbled murrelets during your current visit to Redwood National and State Parks? (then ask about corvids)

What was the message you received about marbled murrelets? (then ask about corvids)

Where did you hear or see that message?

What interpretive services have you participated in? (visitor center, guided walk, roving ranger, campfire program, viewing signs, bookstore, Visitor Guide)

Opinions on interpretive services related to murrelets and corvids (improvements, clarifications)

APPENDIX D
Marbled Murrelet Observations

Date: _____ Site: _____
Observation Start Time: _____ Observation End Time: _____

1. How many people in group?
 _____ # seniors (65 or older)
 _____ # of adults (under 65)
 _____ # of children (under 18)
2. What activities are the visitors participating in?

Corvids

3. Number of corvids in sight of visitors?
4. Closest distance a corvid approached?
5. Human food present on the ground or otherwise unattended?
6. Corvids eating unattended food?

Visitors

7. Did the visitors consume food? Before or after an observed interpretive intervention?
8. Were ravens, jays or crows intentionally attracted with food? Why?
9. Did visitors intentionally feed ravens, jays, or crows?
10. Did visitors unintentionally drop food?
11. Did visitors unintentionally leave food out or in unattended packs?
12. Were visitors intentionally scaring away ravens, jays, or crows?
13. Did visitors move to avoid contact with ravens, jays, or crows?

Signage

14. Describe signage present
15. Visitors: Appear not to notice sign *or* Noticed the sign, but did not stop to read it *or* Stopped to read the sign (Time: _____)

Ranger roving on-site

16. Did visitors talk to ranger? Visitor or ranger initiated? How long?
17. What was discussed?