

PARK ASSET MANAGEMENT PLAN (PAMP): AN ANALYSIS OF
PAMP AT THE GOLDEN GATE NATIONAL RECREATION AREA

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by
Bryceson S. Kawasaki-Yee

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~ Bryceson Kawasaki-Yee

“Another flaw in the human character is that everybody wants to build and nobody wants to do maintenance.”

~ Kurt Vonnegut

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LIST OF ACRONYMS

Acronym	Term	Definition
API	Asset Priority Index	An asset evaluation process that quantifies the value of an asset in relation to the mission of the park. The API utilizes a numeric rating system whereby assets are ranked (0-100).
CM	Corrective Maintenance	Unscheduled reactive repairs that would not be estimated and planned, but accomplished by local staff or existing service contractors.
CMMS	Computerized Maintenance Management System	CMMS is computer software that helps maintenance teams keep a record of all assets they are responsible for, schedule and track maintenance task, and keep a historical record of work that is performed.
CR	Component Renewal	Planned replacement of a component or system that will reach the end of its useful life based on condition and life cycle analysis within the facility's lifetime (e.g., roof systems, utility components, pavement, and other major dynamic equipment).
CRV	Current Replacement Value	Standard industry cost and engineering estimates of materials, supplies and labor required to replace facility at existing size and functional capability. This cost includes current cost for planning / design, construction, and construction management.
DM	Deferred Maintenance	Maintenance that was not performed when it should have been or was scheduled to be and which, therefore, is put off or delayed. Continued deferment of maintenance will result in deficiencies. In practice, this means actions that are required to correct existing deficiencies that are a result of unaccomplished past maintenance, repairs and replacements.

Acronym	Term	Definition
DO: #80	Director's Orders #80	Do: #80, established the NPS policies, requirements, and standards for implementing section 4 of Public Law 98-540.
DOI	Department of the Interior	Branch of the Federal government that protects America's natural resources and heritage.
EO: 13327	Executive Order: 13327	Federal Real Property Asset Management established the NPS policies, requirements, and standards for implementing section 4 of Public Law 98-540 (October 24, 1984). It directs the NPS to implement a maintenance management system to support real property maintenance and operations programs of the National Park System. This EO requires the NPS to provide information about real property assets, including heritage assets, facilities management, and facilities operation.
FCI	Facility Condition Index	A measure of a facility's relative condition at a particular point in time to other similar facilities. The FCI rating is a ration of the cost of repair of the assets deficiencies (deferred maintenance, recurring maintenance that has been deferred, component renewal that has been deferred and immediate personal hazard life safety repairs) divided by the current replacement value for the asset. $FCI = \frac{\text{Deferred Maintenance (DM)}}{\text{CRV}}$
FMSS	Facility Maintenance Software System	Asset-based work identification, work management, and work analysis program that allows a park, region, or WASO office to track all aspects of work related to a specific asset. Work includes planning and design, construction, operations and maintenance, and rehabilitation or removal of assets.

Acronym	Term	Definition
GGNRA	Golden Gate National Recreation Area	The Golden Gate National Recreation Area (GGNRA) is a U.S. National Recreation Area protecting 80,002 acres of ecologically and historically significant landscapes surrounding the San Francisco Bay Area. Much of the park is land formerly used by the United States Army. GGNRA is managed by the National Park Service and is one of the most visited units of the National Park system in the United States, with more than 15 million visitors a year. It is also one of the largest urban parks in the world.
NPS	National Park Service	Agency of the DOI who preserves the natural and cultural resources of the United States of America.
O&M	Operations and Maintenance	Activities that consist of three sub-work types; operations, recurring maintenance, and preventive maintenance.
ONPS	Operational National Park Service	Annual maintenance and operations appropriation for normal operations of the NPS. Includes no special funding for regular cyclic, cultural cyclic, repair/rehab, line item construction, and youth programs.
PAMP	Park Asset Management Plan	Response to Executive Order 13327: Federal Real Property Asset Management, the National Park Service implemented an asset management program which aims to answer the following questions: <ol style="list-style-type: none"> 1. What assets does the NPS own? 2. What is the Current Replacement Value (CRV) of the asset portfolio? 3. What is the condition of the portfolio? 4. Which assets have the highest priority in terms of mission, and where should parks focus their limited resources? 5. What is required to bring the portfolio to an acceptable condition and properly sustain it over time?

Acronym	Term	Definition
PFMD	Park Facility Management Division	<p>The WASO Park Facility Management Division provides leadership and policy direction to ensure the stewardship of the Service's constructed assets and the development of its maintenance workforce. The Division is responsible for:</p> <ul style="list-style-type: none"> • Servicewide facility management policy and program development; • Departmental, congressional, and interagency program liaison; • Servicewide budget formulation advocacy and prioritization; • Standards and procedures for the operation and maintenance of facilities; • Promoting life-cycle asset management across program areas; • Adopting new technologies to support program objectives; and • Coordination of the Servicewide Maintenance Advisory Committee
PM	Preventative Maintenance	Regularly scheduled periodic maintenance activities (within one year) on selected equipment. Ex. Inspection, lubrication, and minor adjustment.
RM	Recurring Maintenance	Work activities that recur based on normal wear patterns on a periodic cycle of greater than one year and less than 10 years (e.g., Painting, caulking, sealing, carpet replacement).
TCFO	Total Cost of Facility Ownership	TCFO is the forecast costs for operations and maintenance and component renewal requirements for new and existing buildings.

ABSTRACT

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The Department of the Interior's Asset Management Plan establishes a strategic direction for the management of assets within the Federal Real Property Asset Portfolio. Specifically, the Asset Management Plan addresses life cycle requirements of owned and leased buildings, structures, and land used for administrative purposes. Evaluation during the various phases of implementation of a Park Asset Management Plan can help identify ways to maximize effectiveness and improve efficiencies outlined in the implementation of the Golden Gate National Recreation Area's Park Asset Management Plan.

The methodology of this case study was conducted in two phases. The first phase looked to develop an understanding of the current state of the Park Asset Management Plan at the Golden Gate National Recreation Area and determine the strengths and weaknesses of the multi-year implementation process. Data were collected

through initial interviews of 16 individuals involved with the implementation of the Park Asset Management Plan at the Golden Gate National Recreation Area. Using data found in the interview process resulted in three recurring areas of focus:

1. Computerized maintenance management: specifically implementing, managing that information, and retaining that information.
2. Theory of maintenance management: specifically organizational perspective, prioritization, and staff management.
3. Issues in maintenance management: focusing on resistance to change, budget constraints, and an aging work force.

The second phase consisted of recommendations in order to bridge the gap between the current Park Asset Management Plan and where it should currently be in its ten-year implementation plan. Six focus areas found in phase two were the primary topics for recommendations on improving Park Asset Management Plan implementation efforts at Golden Gate National Recreation Area. As a result of this research, facility managers at the Golden Gate National Recreation Area have a better understanding of the unique internal and external issues surrounding the Park Asset Management Plan, as well as a list of focused recommendations to better improve park planning efforts.

CHAPTER I

INTRODUCTION

Operating as an agency within the Department of the Interior (DOI), the National Park Service (NPS) is comprised of over 400+ park sites, covering more than 84 million acres. These park sites can be found in every state of the United States, except Delaware; and four non-state jurisdictions: the District of Columbia, American Samoa, Guam, and Puerto Rico. NPS sites include national parks, monuments, battlefields, military parks, historical parks, historic sites, lakeshores, seashores, recreation areas, scenic rivers and trails, and even the White House. Developed through what is known as the “Organic Act,” authorized by President Woodrow Wilson on August 25, 1916, the National Park Service was created. The NPS mission statement is to:

Preserve unimpaired the natural and cultural resources and values of the national park system for the enjoyment, education, and inspiration of this and future generations. The Park Service cooperates with partners to extend the benefits of natural and cultural resource conservation and outdoor recreation throughout this country and the world. (NPS, 2015c)

With an annual maintenance budget of \$7 million a year, the Golden Gate National Recreation Area (GGNRA) is in its ninth year of implementing and piloting the Park Asset Management Plan (PAMP) with a goal of being fully implemented at the end of year ten. The PAMP is utilized to describe asset inventory, summarize current year maintenance budgets, communicate funding requirements, and provide strategies to better manage assets that are essential to park operations. In addition to the PAMP, computer

maintenance management systems (CMMS) are also utilized to give a snap-shot of total cost of facility ownership (TCFO). TCFO aims to optimize the investment decisions made by the National Park Service. It also helps to estimate life-cycle costs over extended horizons, including operations, recurring, preventative, and unscheduled maintenance (NPS, WASO, 2015c). In a time where annual budgets are decreasing and financial transparency is a requirement of the United States Government, GGNRA must implement and adhere to legislatively mandated regulations set forth by Congress.

Statement of the Problem

The Golden Gate National Recreation Area is in its ninth year of implementing its PAMP with a goal of full implementation by the end of year ten. Throughout the implementation process, there have been a variety of internal and external influences that have hampered this ten-year process. Specific attention was given to three areas pertaining to the implementation of the asset management plan at GGNRA. The first area looks at the CMMS and the challenges of implementing and maintaining a vast asset portfolio. The second area deals with managing actual maintenance task and prioritizing work based on the needs and goals identified by the National Park Service. The third section explores maintenance management issues, such as resistance to change, budget constraints, and an aging workforce, all of which directly affect the GGNRA maintenance asset management plan. By evaluating these influences to address current issues, the maintenance division at GGNRA can take full advantage of a properly implemented PAMP.

Implementing a CMMS

In 1985, US Public Law 98-540 Section 4 directed the NPS to develop, implement, and maintain a computerized maintenance management system to support maintenance and operation programs. After identifying the needs and requirements of a CMMS, the NPS selected IBM's Maximo as its official system of record. With the implementation of new facility management software system (FMSS), the NPS was able to establish a process for collecting detailed information pertaining to its vast asset portfolio. This inventory assessment was intended to establish and provide accurate and verifiable cost estimates for deferred maintenance (DM) as well as a means for documenting and addressing DM (NPS, 2009). The initial assessment also served as a management tool for park planning and decision making within the facility management division.

Along with a handful of other national park sites, the Golden Gate National Recreation Area was one of the first parks in the NPS to implement and test pilot a PAMP. Through the inventory assessment process, GGNRA was found to have 1,544 locations consisting of buildings, roads, trails, water/waste water systems, and campgrounds. Each location has between 3 and 40 associated assets creating a massive 10,771 park asset portfolio. In many instances, little to no information has been provided on new or upgraded infrastructure, reducing the effectiveness of a managed maintenance database system. Like many organizations, the GGNRA Facility Management Division is currently in the middle of a retirement upsurge. Some of the most seasoned veteran maintenance employees, some who have been around since the park lands were a part of the Department of Defense, are reaching the end of their federal careers. Along with their

departure, all the institutional knowledge and trade secrets are leaving the park. No amount of data in a CMMS can compensate for the amount of institutional knowledge-loss that occurs when these employees exit the maintenance division, putting greater strain on maintenance management programs.

Maintenance Asset Management

GGNRA is a unique urban park site in that it was originally a military reservation as far back as 1776. Much of the infrastructure that remains in the park today has currently reached or has exceeded its built life cycle established by current industry standards. Today, GGNRA's mission is to preserve and protect some 1,500+ assets, across 75,398 acres of parkland, while serving 16 million park visitors a year. With such a large asset portfolio, the GGNRA Facility Management Division must develop a strategic maintenance program that aligns organizational goals, prioritizes work, and also falls within budgeted staffing levels.

The primary goal of the Facility Management Division at the Golden Gate National Recreation Area is to maintain identified assets that contribute to the mission of the park and provide a safe and enjoyable park experience for visitors and park partners. There are currently 30+ different organizations operating within park boundaries including park partners, concession businesses, and educational institutions. The overall business perspective of these partners is that of financial stability, which does not fall entirely in-line with that of the Facility Management Division at GGNRA. "Effective maintenance management requires a multi-disciplinary approach where maintenance is viewed strategically from the overall business perspective" (Murthy, Atrens, & Eccleston, 2002, p. 287). With so many partnerships focusing on different business

models, the facility management division has struggled with the communication of maintenance related work on partner occupied buildings.

Facility maintenance is widely viewed as a necessary evil by many organizations because it generates high costs and consumes budgets (Ritter, n.d.). The problem at GGNRA is complicated by factors such as the age of facilities, differing views of maintenance theory, and the number of buildings, all of which puts a heavy workload that has shrunk from 145 in 2006 to 76 in 2016.

Maintenance Management Issues

In any maintenance management program, there are inherent issues and external influences that can hamper efforts of a successful program. The maintenance program at GGNRA is no different. The Facility Management Division has experienced resistance to organizational change, budget cuts, and an upsurge of retiring maintenance employees in the last three years, all effecting the implementation of the PAMP.

With the establishment of US Public Law 98-540, it was apparent that there needed to be an organizational shift of conducting business within facility management. The majority of maintenance task consisted of reactionary maintenance, rather than a planned recurring maintenance schedule. This prompted a restructuring of how work and job plans were established, forcing field staff and first line supervisors to change how they conducted maintenance for the past 12 years (Selman & Schneider, 2004). This has created a divide between “old-school” and “new-school” maintenance employees with how work is prioritized, reported, and captured. As a result, GGNRA has struggled to be accurate with how much resources (time and money) are being consumed to complete maintenance tasks. This affects the maintenance division by not meeting the goals

outlined in the PAMP. In guidance set forth by the Washington D.C. office, parks must meet a yearly goal of expending 55% of its base funding towards its preventive and recurring maintenance program as outlined in the park's PAMP. This ensures that parks are maintaining their most critical assets and allocated funding is being properly spent. Accuracy of the work being completed and to what critical assets is paramount to the success of the park asset management plan.

The central idea of a PAMP is to aid in the creation of an executable work plan that can be used to manage a park's assets. It is designed to provide park managers with a ten-year plan by prioritizing its identified assets according to the park's mission. The key concept is asset prioritization. This not only requires the constant annual update of asset priorities, but also the consensus of five different park divisions. Currently, GGNRA is on a five-year PAMP re-optimization plan where the Facility Management Division, Natural Resource Division, Cultural and Historic Preservation Division, Interpretation Division, and Project Management Division get together and reevaluate all 1,544 park identified assets. PAMP re-optimization has proven to be a very costly and time-consuming process at GGNRA and makes it clear that divisions do not prioritize park assets the same way. The Washington Park Facility Management Division (PFMD) office has left this area of the PAMP to the discretion of each park site which leads to a broad interpretation of what is most important to each division, and ultimately the park.

Background and Need

The Golden Gate National Recreation Area is one of the nation's largest coastal preserves and attracts 16 million visitors a year, making it one of the most highly

visited units in the National Park Service. GGNRA landmarks include sites such as Alcatraz, Fort Mason, Muir Woods National Monument, Fort Point National Historic Site, and the Presidio of San Francisco. There is a tremendous responsibility associated with operating and maintaining these historic, cultural, and natural treasures. In order to describe its asset inventory, summarize its current maintenance budget, communicate its funding requirements, and quantify strategies to better manage assets, the Golden Gate National Recreation Area developed a park asset management plan. For the past eight years, GGNRA has struggled to successfully implement and execute a PAMP. Factors were identified through a Strength, Weaknesses, Opportunities, and Threats (SWOT) analysis of questionnaire responses from key NPS staff who ranged from the PFMD regional directors to the Chief of Maintenance and facility managers at GGNRA. Follow up interviews were conducted to clarify responses and further the discussion of the PAMP. The following section will serve as the background and need of this thesis.

Computerized Maintenance Management Systems (CMMS)

With the required compliance of US Public Law 98-540, it was apparent that the NPS needed a means of inventorying its unique and substantial asset portfolio to better manage its 76,000 identified asset portfolio. According to Knapp (1984), the features of a CMMS program can result in a 30-50% increase in optimal use of people, materials, energy, and tools (as cited in Korka, Oloufa, & Thomas, 1997, p. 120). CMMSs have proven to be valuable tools when managing a maintenance program as they play a vital role in the modernization of maintenance operation and strategy. But implementing CMMSs are not without challenges.

Issues Implementing a CMMS

The introduction of a new computerized maintenance management system meant an organizational change for the National Park Service. As emphasized by Smailer (as cited by Korka et al., 1997, p. 120), the introduction of a CMMS can create resistance to change and an increased reliance on equipment (such as computers and internet servers) and requires a substantial learning curve as users adjust to new protocols (as cited in Korka et al., 1997, p. 120). To mitigate these potential issues Hipkin (1997) suggest three primary areas of focus:

- 1) Knowledge of the functionality of plant and process is essential before support systems are introduced; 2) Management commitment must adapt with the introduction of new technology; and 3) Infrastructure, policies, decision support, reporting and measurement procedures must change when new systems are implemented. (pp. 2435-2437)

Prior to the implementation of a CMMS, NPS first had to identify existing CMMS programs and determine if any existing programs could satisfy the goals of the Park Facility Management Division. Once a CMMS program was selected, it was critical for the management to commit and have stakeholder “buy in.” According to Heatly, Agarwal, and Tanniru (1995), this combination would best ensure the most effective implementation of a CMMS because the “extent of managers’ commitment is a reflection of their belief in the benefits of a project. Finally, with stakeholder “buy in,” the PFMD must continue to invest and update the program to ensure its success. This includes constant support to policy changes, training, and to all supporting systems and infrastructure.

Information Management

At the heart of the Park Facility Maintenance Division lies the Park Asset Management Plan, or PAMP. The PAMP provides a snapshot of a park's current asset portfolio and enables park staff to understand and articulate the current state of the asset portfolio and its funding requirements. The PAMP at GGNRA consist of 1,544 park identified locations which are composed of 10,771 assets. This massive dataset requires extensive and ongoing amounts of work to maintain its contents. Specifying who should be responsible for the "maintenance" of the database is critical to ensure data is accurate and up-to-date (Buddenhagen, 1996, p. 356). The quality of the contents within the CMMS program at GGNRA determines the effectiveness of maintenance program. The individuals tasked with maintaining the CMMS are the data experts and possess the ability to provide alternative perspectives and summarize the data into useful information that help with maintenance management decision making. The goal is to

extract information from the data set and transform it into an understandable structure for use. This process involves database and data management aspects, data pre-processing, model and inference considerations, interestingness metrics, complexity consideration, post-processing of discovered structures, visualization, and online updating. (Lachance, 2012, p. 69)

Institutional Knowledge

Perhaps the greatest asset to any organization lies within the knowledge of its frontline employees (Ramanujan & Kesh, 2004, p. 274). Organizations that recognize the value of tacit and explicit knowledge have a competitive advantage. Knowledge management is "an organization's ability to gather, organize share, and analyze the knowledge of individuals and groups across the organization in ways that directly impact performance" (Ramanujan & Kesh, 2004, p. 273). A complex park, a massive asset

portfolio and looming Baby Boomer retirements within the GGNRA maintenance division, combine to force the park to prepare for the vast knowledge loss. Rudy Ruggles (1999), a leading knowledge management thinking/practitioner, developed a process to build a knowledge database. His seven-step process includes 1) developing new knowledge; 2) accessing outside sources; 3) using the knowledge in the decision making process; 4) entrenching the knowledge in the products and services of the organization; 5) containing knowledge in documents, databases, and software; 6) once the knowledge is collected, sharing it with the entire organization in order to experience growth; and 7) having a means to measure the growth and the benefit knowledge management has brought to an organization (as cited in Ramanujan & Kesh, 2004, p. 274).

Maintenance Asset Management and Leadership

The success of a maintenance management program coincides with how well the maintenance program is managed. An effective maintenance program requires a multidisciplinary approach that not only prioritizes its maintenance according to organizational priorities but also looks to manage its maintenance staff effectively (Fleming, 2004). With over 30 different partnerships and 100+ maintenance employees, the Maintenance Division at GGNRA not only has to effectively manage its maintenance staff internally but also align the organizational perspective of maintenance with its partners in addition to the unique asset composition of GGNRA.

Organizational Perspective of Maintenance Management

Despite the general understanding that facility maintenance is an important and necessary aspect to any organization there is not a universal understanding of maintenance management theory at GGNRA. This has been found especially prevalent between GGNRA and its partnering agencies. Dann, Hillis, and Worthington (2006) compared perspectives about heritage and non-heritage organizational perspective of maintenance. The study suggested that a heritage and a partnering non-heritage organization require a coherent system of maintenance management. The authors suggest that in order to attain cohesiveness, each heritage organization should develop a loose framework surrounding its maintenance and align it to suit different organizational contexts (2006, p. 100). Doing so contributes to quality strategic and operational decision making between the heritage and non-heritage agencies.

At the core of a successful maintenance program is a carefully thought out maintenance management plan. The primary focus of a maintenance management plan is to articulate the current status and long-term goals of the organization's asset portfolio. With this information, the organization can clearly justify the need for additional resources to satisfy the requirement of the maintenance plan. Maintenance management plans are often constrained by the organization's available resources such as budget and staff; therefore, a method of prioritizing maintenance task is critical to the plan. Since the maintenance budget at GGNRA is comprised of federally allocated tax payer funding, it is imperative that there is a clearly defined and prioritized maintenance plan. With the aid

of a CMMS, mathematical algorithms and simulation tools are utilized to illustrate the concepts and importance of asset prioritization (Ni & Jin, 2012, p. 411).

Maintenance Prioritization

Just as it is important to prioritize an asset portfolio, it is equally important to manage maintenance staff to maximize the effectiveness of the maintenance program. Sullivan and McDonald (2011) define maintenance management as “the strategy of aligning people and resources in a manner that maximizes the ability of content experts to use their skills to create and implement workplace solutions” (p. 303). The primary focus of this leadership strategy is to empower the employee by becoming responsible for both the decisions and outcome of how he or she chose to perform maintenance task. Using this ‘hands-off’ approach, managers can expect a more positive working environment resulting in staff that are more effective. Many times managers want to control the details of each situation, resulting in micromanagement. By micromanaging, the manager disempowers and removes accountability from the content expert” (Sullivan & McDonald, 2011, p. 305). GGNRA should look to rely heavily on their trades experts (for example, carpenters, plumbers, electricians) when it comes to maintenance repairs as they are the subject matter experts. For managers and supervisors to accomplish this, they need to listen to their employees. Loy (2011) highlights three areas effective listening gives maintenance management. These include a tool to motivate, a tool to gain knowledge, and a tool to reinforce values (p. 30). By effectively listening to the employee managers, develop a trust based on self-worth, which in turn motivates and empowers the employee.

Maintenance Management Issues

Maintenance management is unique because its success is highly dependent on many different variables. These variables can occur both internally and externally within a maintenance division. Although planning maintenance tasks is generally a systematic process, the act of managing maintenance staff can be just as complicated and requires a great deal of focus and preparation from managers and first line supervisors. GGNRA must look to combat internal resistance to new maintenance business practices and prepare for mass exodus of veteran employee retirees, all while managing a dwindling operational maintenance budget.

Resistance to Change

Organizational change occurs when business strategies or major sections of a business are altered. This can include the restructuring of an organization or, more simply, a change of business practice. This change is the result of organizations recognizing new technologies, consumer demand, and changes to government policy. The maintenance division at GGNRA has recently undergone an organizational change, both administratively and to its field workers. In early 2012, the Financial and Business Management System (FBMS) was introduced to the National Park Service as the official system of record for finance and accountability for all organizations within the Department of the Interior. The introduction of this new system meant a substantial overhaul of maintenance business practices as well as the learning curve associated with a new computer system. In order to combat both internal and external resistance to change, employee participation from the entire spectrum must be taken into consideration. This not only motivates those individuals who will be affected the most

but also reduces the surprise factor. The more an organization involves its key stakeholders in the change and implementation process, the more likely the result will be a smoother transition of organizational change (Galambos, Dulmus, & Wodarski, 2005, p. 64).

Budget Constraints

Perhaps the biggest battle the maintenance division at GGNRA faces is its operational maintenance budget. The ratio of the allocated annual maintenance budget verses actual maintenance requirement is not proportional to the size of GGNRA's asset portfolio. There is currently \$3.1 million base funding gap between what is allocated to GGNRA's maintenance division and what is needed to meet the maintenance operation needs (Park Facility Management Division, 2006). With such a big funding gap and a fluctuating annual budget, GGNRA must rely on maintenance budget models to ensure the optimal spending of its \$7 million annual budget. In order for an organization to operate at a desired level of service in a declining resource environment, it is necessary to enhance the efficiency of those resources (Scroggins, Fielding, & Thompson, 2010, p. 8). By understanding major costs drivers, organizations can better optimize the utilization of resources in planned maintenance activities (Chan, 2008, p. 36).

Aging Workforce

One of the key resources maintenance relies on are those individuals who possess specialized trade skills. Maintenance is inherently a physically demanding job so in addition to highly technical trade skills, maintenance workers must be physically fit to do the job. According to the U.S. Census Bureau (2013, as cited in Brown, 2007), the number of people age 55 and older is expected to increase by 49% by 2014. Often the

ability to do physical labor diminishes with age. By making minor adjustments in the workplace, such as eliminating clutter, proper illumination, and minimizing changes to work schedules as suggested by L. Brown (2007), employers can ensure they are being inclusive with both their old and new generation employees.

In addition to this increase in workforce age, crafts/trades persons are a dying profession among millennials. This could be contributed to the fact that Generation Ys are driven towards more technology focused jobs, as they pay substantially more than craft and trades positions. In order to keep both Gen X and Gen Y satisfied, GGNRA must incorporate a hybrid of technical skills and computer technology into its maintenance program. This means providing extensive training to those who are not as technically savvy as Gen Y employees.

Purpose of the Study

The purpose of this study is to explore the issues within the Facility Management Division that hamper efforts to successfully implement a park asset management plan at the Golden Gate National Recreation Area. Legislatively mandated by the Federal Government, US Public Law 98-540 requires that the all sub-divisions of the Department of the Interior develop, implement, and maintain a computerized maintenance management system to support its maintenance and operation programs. The Golden Gate National Recreation Area is in its ninth year of planning and implementing a PAMP. Throughout the process, facility management administrators have encountered many challenging issues such as implementing a computer-based maintenance tracking system, managing maintenance, and operating maintenance

management programs with weak annual operations budgets. In order to determine what the issues were, the researcher conducted semi-structured interviews with top-level park administrators who had extensive influence and involvement of the PAMP at the Golden Gate National Recreation Area. By understanding the issues faced by administrators, recommendations for addressing critical elements of each issue could be made.

Research Questions

There are two primary research questions for this study. The first question is “What are the strengths and weaknesses of the Park Asset Management Plan at the Golden Gate National Recreation Area as expressed by maintenance professionals?” This question serves as a base to address the second question, which is “What ideas and strategies do experienced maintenance management professional have about what can be done to improve the PAMP implementation at the GGNRA?”

Educational Significance

This study will contribute to the academic body of knowledge and to the Golden Gate National Recreation Area, Facility Maintenance Division by providing an analysis of facility maintenance data collected over an eight-year period. This analysis contributes to understanding of the issues and why a PAMP is difficult to implement in a park site as large as GGNRA.

Limitations

Several limitations affected this study. The primary limitation was the poor quality of existing data. As will be discussed in this thesis, the quality of data provided by

the Maximo system is poor, containing incomplete records and voids due to system failure and transition. Another limitation was the data set consisted of only one NPS site, which was also one of the biggest sites in the service. Conclusions cannot be inferred to other park sites within the service.

CHAPTER II

LITERATURE REVIEW

Introduction

The purpose of this literature review was to identify and analyze documents and research articles relevant to the successful implementation of a maintenance asset management plan. This chapter serves as an overview of the relevant information pertaining to the Park Asset Management Plan (PAMP) and consists of three primary sections. Section One focuses on constraints of implementing a computerized maintenance management system (CMMS) and the issues concerning information management and retaining institutional knowledge. Section Two focuses on approaches to maintenance management, specifically organizational perspectives on maintenance, staff management, and prioritizing maintenance. Section Three will focus on common issues that arise in many maintenance programs, such as resistance to change, budget and resource constraints, and aging workforce.

National Park Service: Park Planning, Facilities, and Lands

The United States Department of the Interior's (DOI) National Park Service (NPS) is responsible for the management of 403 park units. Since its inception in 1916, the NPS has been labeled the "gold standard" in preserving and protecting natural and cultural resources. Many park sites include iconic built facilities and other natural and

culturally significant resources that must be maintained in order to preserve them in perpetuity for future generations.

Currently, the NPS portfolio includes more than

16,000 buildings, many historic, an estimated 8,500 monuments, over 16,000 miles of trails, some 1,200 water systems, about 1,400 wastewater treatment plants, and more than 4,000 employee housing units. The road work network consist of nearly 5,500 paved miles of road, an estimated 6,000 miles of unpaved roads and 1,700 bridges. (Selman & Rich, 2004, p. 2)

Understanding the total cost of facility ownership (TCFO) and the life-cycle costs of this vast asset portfolio is a huge undertaking. Key challenges for the NPS continue to be addressing a growing backlog of deferred maintenance (DM) and defining and meeting agency standards for regular operations and maintenance (O&M) requirements. Despite these challenges, the NPS continues to work towards its asset management, helping to meet the agency's overall mission. This section will give a brief overview of the Park Planning, Facilities, and Land Division of the NPS, and the multiple programs used to provide leadership and policy direction to ensure the stewardship of the Service's constructed assets and the development of a maintenance workforce.

Park Facility Management Division

The Park Facility Management Division (PFMD) is located at the NPS headquarters in Washington, D.C., with a small support office in Denver, Colorado.

PFMD is responsible for:

1. Service wide facility management policy and program development;
2. Departmental, congressional, and interagency program liaison;
3. Service wide budget formulation advocacy and prioritization;
4. Standards and procedures for the operation and maintenance of facilities;
5. Promoting life-cycle asset management across program areas;
6. Adopting new technologies to support program objectives; and

7. Coordination of the Service-wide Maintenance Advisory Committee. (NPS, WASO, 2009)

The division is broken up into eight branches, each managed as separate entities, focusing on a different facet of park planning, facility and land management.

These branches include:

1. Accessibility Management Branch that

creates and oversees a strategy of monitoring, coordination, continuing education, and technical assistance in order to assist parks in making all facilities, programs, and services as accessible as practicable in conformance with federal laws, regulations, standards, and NPS policy. (NPS, WASO, 2015b)

2. Asset Management Branch which is

responsible for developing and implementing new tools, standardized business practices, and training to maximize the life cycle of constructed assets. This branch conducts the following core functions: asset inventory, asset valuation, business practice development, condition assessment, and facility management training. (NPS, WASO, 2014a).

3. Business Operations and Support Services Branch that

maintains a centralized communications resource created to support PFMD subject matter experts and other facility management staff through the development, coordination and implementation of timely, accurate, effective and consistent communications products. (NPS, WASO, 2015a)

4. Environmental Compliance and Response Branch is “responsible for improving the environmental performance of NPS operations by providing technical and management solutions to existing and emerging environmental issues” (NPS, WASO, 2014b).

5. Facilities Planning Branch is responsible for “developing, testing, and deploying portfolio based facility management planning processes that enable more efficient and

effective stewardship and enjoyment of National Park Service resources” (NPS, WASO, 2014c).

6. Park Improvement Branch oversees the cyclic maintenance program, housing management program, Rec Fee project management, and Repair/Rehabilitation project management (NPS, WASO, 2007).

7. Sustainable Operations and Climate Change Branch is responsible for compliance in climate change, energy and water management and conservation, Green Parks Plan, pollution prevention, and sustainable buildings (NPS, 2015a).

8. Transportation Branch manages both 5,450 miles of paved public park roads and 4,100 miles of unpaved roads. This branch also manages dam safety and transportation management, such as alternative transportation and intelligent transportation systems (NPS, 2015b).

Each of these divisions combine to form the PFMD in order to provide leadership and policy direction to ensure the stewardship of the Service's constructed assets and the development of its maintenance workforce across its 403 park units. Properly caring for assets throughout their life cycle saves precious resources so the primary focus of the PAMP is long-term preservation (NPS, WASO, 2014a).

Asset Management Branch of Park Facility Management Division

As mentioned earlier in the literature review, the Asset Management Branch of the PFMD is responsible for developing and implementing new tools, standardized business practices, and training to maximize the life cycle of constructed assets. This branch conducts the following core functions: asset inventory, asset valuation, business

practice development, condition assessment, and facility management training. The NPS defines an asset as a physical structure or grouping of structures, land features, or other tangible property that has a specific service or function. The asset portfolio consists of roads, trails, buildings, and utility systems to monuments, marinas, fortifications, and aviation systems. The park asset management program, developed by the NPS, is a systematic approach to address five key questions:

1. What assets does the park own?
2. What is the condition of each assets?
3. What is the current replacement value of each asset?
4. What is required to properly sustain the assets over time?
5. What assets are the highest priorities relative to the park mission, and where should a park focus resources?

At the core of this life cycle business practice is the Park Asset Management Plan. The PAMP provides a snapshot of a particular park's current asset portfolio that will enable park administrators to understand and articulate the current state of its asset portfolio and the funding requirements of those assets. It gives park facility managers a tool to better understand what is required to bring their portfolio up to an acceptable condition and properly sustain it over time, as well as, where the park should spend their limited resources. This is accomplished through a review of how the park prioritizes its assets, bundles work orders into logical projects, estimates operating and maintenance requirements, demonstrates funding gaps, and identifies techniques to bridge these funding gaps. Successful implementation of a PAMP relies on complete and accurate data from a number of systems and resources. These systems include Facility

Management Software System, Project Management Information System, Project Scoping Tool, Asset Management Reporting System, as well as the informed judgment of knowledgeable park staff and managers. These data are used to populate several tools including the optimizer band that compares actual park budgets to industry standards for operations and maintenance for similar asset types.

With the implementation of a sound PAMP, each of the 403 park units can clearly prioritize, manage, and reduced deferred maintenance. This leads to the improvement of the overall condition of assets and presents a better picture for predicting and justifying budget requests and anticipating future maintenance needs. Ultimately, the PAMP enables a park to plan accordingly and fix problems before they become expensive emergencies.

Systems of Park Facility Management Division

The most significant issue the Park Facility Management Division faced was the lack of a standardized business process of prioritizing its maintenance. Parks across the Service were “practicing reactive, corrective maintenance and not managing facilities on a proactive, preventative or life-cycle basis” (Selman & Rich, 2004, p. 3). In 1998, an Office of Inspector General (OIG) audit found the NPS to have \$11.5 billion maintenance backlog across its park sites (OIG, 1998). It was clear that the NPS desperately needed a means of capturing and producing a snapshot of maintenance needs across the Service. The solution was a computerized maintenance management system (CMMS).

In order to be able to effectively manage a portfolio of 76,000 assets spread across 403 park units, the NPS needed a means of collecting detailed information about

park assets. In 1999, the NPS selected IBM's Maximo as its primary computerized maintenance management system. The intent of this new CMMS was to "provide accurate, verifiable cost estimates of deferred maintenance and establish a baseline for measuring the progress in remedying the problems" (Selman & Rich, 2004, p. 3). In addition, these data are intended to serve as a future management planning and decision making tool which also fulfilled organizational mandates such as Directors Order #80, US Public Law 98-540, and Executive order 13327: Real Property Asset Management. With this new data tool, the NPS could provide detailed information of current inventory condition, how much it would cost to return the asset portfolio to an acceptable condition, and asset information that would help effectively manage a recapitalization and preventative maintenance program.

Armed with detailed park asset information and along with the PAMP, park sites now have a means of clearly portraying and justifying park improvements captured in its capital investment strategy. The Project Management Information System is a Service wide NPS Intranet application designed to manage information about requests for project funding. Each fiscal year, project proposals are submitted, reviewed, approved, prioritized and then formulated under an available funding source. During the formulation process, a program manager at the Washington D.C. office or a budget officer at a regional headquarters determines which project funding requests meet the eligibility criteria for the call. These projects are then reviewed and prioritized for inclusion as part of the NPS Budget for a specific fiscal year.

In an effort to become for financially transparent and accountable, the DOI most recently fully implemented and deployed the Financial and Business Management

System (FBMS) across its nine bureaus. FBMS is an “integrated suite of software applications designed to streamline financial and administrative functions across all Department of Interior bureaus” (U.S. Department of Interior, 2015). The implementation of FBMS has allowed the DOI to manage its financial and business process into a single computer based software program. The FBMS program was designed to provide better data transparency, where data is centralized providing greater visibility for governance and auditing purposes; increased accuracy and time savings with the integration of multiple software programs into one suite; improved internal controls with a more streamline process of purchase requisitions and acceptance of goods receipts; and enhanced reporting capabilities with real-time accounting data. (Financial and Business Management System, 2013).

The introduction of FBMS has brought fundamental and constructive change to DOI in terms of how it conducts and manages its business (Financial and Business Management System, 2013). It has changed the way the DOI bureaus conduct financial business and improved its operational decision-making process. The FBMS Executive Steering Committee states, “FBMS is the cornerstone of a fully integrated business management system, supporting DOI as a world-class organization acknowledged for management excellence and effective mission delivery” (U.S. Department of Interior, n.d.).

The National Park Service portfolio based asset management plan directly aligns with Directors Order #80, US Public Law 98-540, and Executive order 13327. It establishes the framework and strategic direction for the NPS. Because of the overall condition of built assets and current prevailing budget constraints, the Park Service began

implementing an aggressive asset management program, in order to meet its mission.

With the many systems and divisions of the PFMD, the National Park Service now has a comprehensive strategy designed to address inherent costs of the lifecycle of an asset.

Computerized Maintenance Management Systems

The first section of the literature review explains the concept of computerized maintenance management systems. It offers an understanding of the important roles these systems play in modern maintenance operations and strategy. The Department of the Interior requires its nine bureaus to use CMMSs to report maintenance program expenditures and validate its \$1 billion annual budget (Attachment G, 2016-2020). An understanding of this topic is important to this thesis because it exposes the role and impacts a CMSS has on maintenance management.

Today, computerized maintenance management systems are integral components of most maintenance programs. CMMS play an integral part in managing a wide spectrum of maintenance information such as labor records, spare-parts inventories, repair schedules, and maintenance history. It provides capabilities to store, retrieve, and analyze information and facilitates communication and coordination of maintenance activities (Swanson, 1997). Knapp (1984, as cited by Korka et al., 1997) found CMMS can lead to 30-50% gains in the optimum use of people, material, energy, and tools. CMMS have proven to be invaluable tools to maintenance, but there have also been challenges. This following section will describe several challenges in CMMS implementation, the challenges in maintaining data integrity within the CMMS, and how institutional knowledge loss can influence a CMMS program.

Issues Implementing a CMMS

Perhaps the most limiting factor when implementing a new system is resistance to change (Kim & Kankanhalli, 2009). Despite all the advantages and improvements a CMMS bring to maintenance programs, potential problems do exist when introducing a CMMS program (Korka et al., 1997). This resistance can occur in both administrative and field staff. An early study conducted by Smailer (as cited in Korka et al., 1997) highlighted a few important issues that can occur when adopting a CMMS. They include:

1. The installation of a CMMS will create some resistance and apprehension to change. Employees know the introduction of a CMMS will have an impact on their jobs. Inevitably, they fear the unknown.
2. CMMS programs can have a high dependency on equipment, such as monitors, modems, printers, and the computer itself. Breakdowns with this equipment can delay CMMS processes so reliability of the equipment must be high.
3. The initial implementation phase of a CMMS can be difficult because in order to establish automated maintenance management systems, users must initially maintain the manual system as well.
4. The CMMS learning process takes time and mistakes will be made. On-the-job practices are necessary to learn CMMS in addition to classroom and manual instruction. Users must first learn how to use the program, and adjust it to suit their needs.

Resistance to change occurs with all new systems in every organization. According to Hipkin (1997), being attentive to three postulates established in his study can reduce resistance to change when introducing a CMMS.

□ Postulate 1: Knowledge of the functionality of plant and process is essential before support systems are introduced. This postulate focuses on the importance of knowledge and performance proficiency when implementing change programs. Hipkin contends that the “cardinal step in implementing new technologies is the study and rationalizing of existing processes” (p. 2432).

□ Postulate 2: Management commitment must adapt with the introduction of new technology. This postulate stresses the importance of coordinating the development of the CMMS with management through management initiatives. Hipkin (1997) adds “suboptimal use of systems results from an incomplete understanding of the technology or system by managers who fail to appreciate and anticipate the impact” (p. 2432).

□ Postulate 3: Infrastructure, policies, decision support, reporting and measurement procedures must change when new systems are implemented. Postulate 3 presents the idea that the successful implementation of new technology is contingent on well-developed supporting systems and infrastructure. This suggests reporting, recording and measurement systems are necessary or the CMMS will not meet the expectations of end users (Hipkin, 1997, p. 2434).

In addition to the abovementioned issues, the communication processes play vital roles in the successful implementation of a CMMS. The process of reporting, communicating information, and acquiring feedback can significantly change the effectiveness of a maintenance system (Bazarafshan & Hajjari, 2012). In order to facilitate this process, the standardization of information, the function of a good reporting system and improving quality of feedback are techniques to achieve a high level of desired performance (Bazarafshan & Hajjari, 2012). CMMS are employed as a means to

record maintenance activities and to facilitate the communication process.

Communicating how a CMMS will be utilized along with the organization of authorities and responsibilities within a maintenance division will determine how effective and successful a CMMS will become (Bazarafshan & Hajjari, 2012).

The biggest reason information systems tend to fail is due to user resistance to implementation (Kim & Kankanhalli, 2009). This section looked at some of the major issues faced when implementing a CMMS. From a high dependency on IT resources and equipment, to the significant amount of time it takes to learn a computer program, the implantation of a CMMS's is a very intricate process. By aligning organizational goals, attaining upper level management support, and investing in the proper resources can greatly increase the success of the program. This section informs this study in that the GGNRA is currently in the second phase of implementation of the FBMS program. Program administrators from the Washington D.C. office down to park sites have been met with resistance and opposition to the new budget-reporting program.

Information Management

CMMS technology offers organizations tremendous power. At the heart of a CMMS program is a detailed database of the organization's assets. Gathering and entering data, when initially setting up a CMMS program, is time-intensive and requires commitment from top administrators through in-the-field workers (Bagadia, n.d.). The creation and connection of the CMMS databases is the single most labor-intensive aspect of a CMMS. Once the system is fully defined, the focus turns to maintaining the dataset. This requires constant updating of the systems databases, backing up records, and

archiving old files. Specifying who should be responsible for the “maintenance” of the database is critical to ensure data is accurate and up-to-date (Buddenhagen, 1996).

CMMS programs are only as good as the data they contain. The person(s) assigned to manage the program becomes the CMMS data expert and can ascertain the level of effectiveness the CMMS brings to the maintenance program through what is known as “data mining.” Data mining is the process of analyzing data from different perspectives and summarizing it into useful information. This is usually done with computerized software (Palace, 1996). The overall goal of the data mining process is

to extract information from a data set and transform it into an understandable structure for use. This process involves database and data management aspects, data pre-processing, model and inference considerations, interestingness metrics, complexity consideration, post-processing of discovered structures, visualization, and online updating. (Lachance, 2012, p. 16)

Using a CMMS to manage data allows managers to more easily see the benefits of managing maintenance.

In addition to the upkeep of the asset portfolio data, labor and personnel records also needed to effectively manage maintenance on a real time basis. Labor costs are part of the true total cost of ownership. The maintenance division can account for over half of an organization’s workforce. Having an up-to-date staff list with corresponding current labor rates is important to the organization’s fiscal operations.

When an organization’s CMMS program is fully implemented, attention can shift to maintaining the data within the system. Depending on the size of the asset portfolio, this can be labor intensive. Designating a dedicated staff member to not only maintain but “mine” the data from within the system will improve the validity of the data and assist the park’s total costs of facility ownership in meeting projections. This section

informs this study because GGNRA has a substantial asset portfolio that has proven to be challenging due to constant maintaining and updating of records the PAMP document relies on.

Institutional Knowledge

Along with managing the data within a CMMS, organizations must depend and manage the institutional knowledge embedded in the individual and collective expertise of employees. They must not rely exclusively on data contained within a CMMS program. Knowledge is the basis for every activity performed by an organization and it can be found everywhere within that organization. Stakeholders within organizations are constantly seeking and converting data into usable knowledge and expertise to make decisions and shape events from within (Huber, 2007). The process used to organize and maintain this knowledge and expertise is called knowledge base theory. This theory states that efficiently using knowledge possessed by employees assists innovation. This “supports the know-how, know-where, know-who, know-what, know-when, and know-why of the organization” (Ramanujan & Kesh, 2004, p. 271).

Knowledge management is the ability of an organization to gather, organize, share, and analyze the knowledge of individual and collective employees in a way that directly contributes to an organization’s performance. Knowledge is commonly derived from data experience and information. Data are representations of observations and facts out of context, which has no direct meaning. Information is the result from placing meaningful context, such as a message, from the data. Thus, knowledge is what we believe is true based on the meaningful collection of information, through experience and communication (Ramanujan & Kesh, 2004). Knowledge can be viewed as a thing to be

stored and manipulated. The simultaneous process of knowing and acting is the result of applying knowledge and expertise. According to Levinson (2012), organizations need to manage knowledge both as an object and process. The author claims that knowledge can be classified as explicit or tacit knowledge. Explicit knowledge includes patents, customer data, and trademarks. Tacit knowledge is the knowledge that people carry around in their minds that managers need to access to increase effectiveness (Levinson, 2012).

“A company’s greatest assets may not lie in the products they make but the knowledge of the people who produce those products” (Ramanujan & Kesh, 2004, p. 274). Here lies the importance of establishing a method for collecting, managing, and maintaining that knowledge. According to Davenport (1996), “knowledge management is expensive, but so is stupidity.” He presents several ideas about building and maintaining a good quality knowledge database. They include collection of data, editing of that data, categorization of the data, developing infrastructures and applications for the distribution of the data and, training and educating employees on the collection and use of the data. Ruggles (1999), a leading knowledge management thinking/practitioner, has also developed a process to build a knowledge database. His seven-step process includes:

1. The development of new knowledge.
2. Accessing outside sources.
3. Use the knowledge in the decision making process.
4. Embed the knowledge in the products and services of the organization.
5. Containing knowledge in documents, databases, and software.

6. Once the knowledge is collected, it must be shared with the entire organization in order to experience growth.

7. A means to measure growth and the benefit knowledge management has brought to an organization.

CMMS programs are a very important aspect of any maintenance program. An even more important aspect is the institutional knowledge and expertise contained within the employees. Harmonizing these two tools together results in a higher quality maintenance program (Korka et al., 1997). In order to accomplish this, tacit knowledge should be managed. Processes like Ruggles (1999) outlines procedures organizations can use to retain and harness the tacit knowledge contained in their employees. This section informs this study because GGNRA relies heavily on the data contained in their CMMS, rather than their specialized maintenance staff. Finding a balance between the 'boots-on-the-ground' staff and the FMSS data will result in a higher quality decision making when it comes to maintenance at GGNRA.

Maintenance Asset Management and Leadership

Maintenance management is the integration of processes within organizations that maintain, develop, and support the effectiveness of its primary activities (Sapp, 2013). This includes operations and maintenance or the day-to-day activities necessary to operate a maintenance program. Like many maintenance programs, daily activities are often interrupted by unplanned maintenance tasks making job plans difficult to implement. To make matters worse, many organizations lack adequate resources to complete current operational needs and address these unplanned events. This leads to

deferred maintenance and “can eventually destroy a maintenance operation when the resources required to meet the maintenance deficit become greater than the resources available for the entire maintenance operation” (Brown, 1996, p. 235). In order to address these challenges,

organizations have turned to the study of maintenance management, which focuses on reducing the adverse effects of breakdown and maximizing facility availability at minimum costs while operating within environmental constraints. (Sheu & Krajewski, 1994, p. 1366)

The Facility Management Division at GGNRA is currently under a reorganization of its employees and maintenance priorities, influencing its maintenance program directly. It is important to execute the reorganization in a manner that improves the maintenance management program and is worth the investment of time and resources. This section will focus on organizational perspective as the driver of maintenance management, the different approaches to maintenance staff management, and finally prioritizing maintenance.

Organizational Perspective of Maintenance Management

“Effective maintenance management requires a multi-disciplinary approach where maintenance is viewed strategically from the overall business perspective” write Murthy et al. (2002, p. 295). Just as maintenance management is fundamental to achieving an organization’s business objectives, prioritizing that maintenance is just as strategically important (Pitt, Goyal, & Sapri, 2006). Murthy et al. (2002) identify two key elements to strategic maintenance approach:

1. Maintenance management is a vital core business activity for business survival and success and as such, it must be managed strategically.

2. Effective maintenance management needs to be based in quantitative business models that integrate maintenance with other decisions such as production. (p. 290)

In a study titled “Assessing How Organizational Approach the Maintenance Management of Listed Buildings” Dann et al. (2006) found that the organizational driver, (e.g., cultural/resource protection, money) influence the approach and attitude towards maintenance management. When the organization’s goal was profit, the organization focused its maintenance program on maintenance activities that would further their corporate strategy. This included exterior maintenance to facilities because the image of the organization was determined to be a top priority. To this type of organizational culture, “buildings play a positive role in establishing the organization’s image, in helping the organization achieve their commercial aims for the income they generate” (Dann et al., 2006, p. 102). Also, the attitude towards strategic maintenance was viewed as an activity rather than a long-term maintenance plan. Conversely, the organization whose primary focus was cultural and historic preservation focused their maintenance program on maintaining the critical systems of the facilities to ensure the longevity and permanence of the asset. For these organizations, health, safety, and budgetary constraints are an everyday reality. With flat budget resources, often supplemented by governmental funding through competitive internal grant calls, a more focused and thorough maintenance plan was necessary to justify appropriated funding. Long-term, comprehensive maintenance analysis was done to each asset in order to gauge the need of the maintenance program. Here, many “stake-holding interests were brought together on a regular basis to consider the future management of sites holistically” (Dan et al., 2006,

p. 100). The attitude of these organizations focused on getting the most “bang-for-your-buck” while meeting mission statements and mandated regulations.

It is important to focus the maintenance management program to meet the needs and goals of an organization. Establishing what is most important can help guide and focus efforts to ensure the success of the organization. Dann et al. (2006) found that organizational drivers such as profit or cultural and historic preservation can influence the view of maintenance. In addition to this, approaching maintenance strategically from the organization perspective contributes to the overall success of the organization. Golden Gate National Recreation Area collaborates with many different organizations, all with separate organizational drivers. GGNRA has struggled to align their maintenance goals with the organizational drivers of the partnering agencies.

Approach to Maintenance Staff Management

Each maintenance operation has its own unique management approach. While it is important to manage maintenance operations, it is also important to properly and effectively manage maintenance employees. Here, “the use of leadership principles can significantly improve job performance indicators, information flow, and working relationships” (Sullivan & McDonald, 2011, p. 303). There is copious literature about how to successfully manage employees ranging from motivation in the workplace to leading based on behavioral approaches. When it comes to managing maintenance staff, a more hands on approach by staff and a more hands off approach from managers is more conducive to a positive working environment (Sullivan & McDonald, 2011).

Leadership, as it pertains to maintenance management, can be defined as “the strategy of aligning people and resources in a manner that maximizes the ability of

content experts, to use their skills to create and implement workplace solutions” (Sullivan & McDonald, 2011, p. 303). These content experts include trades workers such as electricians, carpenters, and utility systems operators. In order to attain this, communicating needs accurately and efficiently plays an important role in how fast maintenance is completed and reduces overall down time (Sullivan & McDonald, 2011). According to Badger and Kashiwagi’s (2001, as cited in Sullivan & McDonald, 2011, p. 305) Information Measurement Theory, managers should empower their content experts, employees to be responsible for making their own decisions rather than micromanaging them. When managers “direct work for the content expert, the manager disempowers and removes accountability from the content expert” (Sullivan & McDonald, 2011, p. 305). Management should allow content experts to perform their responsibilities as they see fit. The inherent issue with this school of thought is that “managers are taught to control the details of each situation as a gesture of authority and expertise” (Sullivan & McDonald, 2011, p. 304).

In order to communicate effectively managers must listen effectively. “Listening is one of the most crucial skills leaders need to possess but is often the most difficult to master. It takes hard work, concentration, and specific skill sets to become an effective listener” (Loy, 2011, p. 30). In the article, “Hear Me! Are we Listening to Our Employees,” Loy highlights three areas which effective listening will strengthen skills when it comes to managing maintenance employees. These areas include listening as a tool to motivate, to gain knowledge, and to reinforce values. Listening to motivate discusses how the lack of listening will de-motivate and diminish an employee’s sense of self-worth, responsibility, and ownership (Loy, 2011, p. 30). By effectively listening,

employees will feel empowered and “will give back their time, energy, and passion to your organization. They will be motivated to bring ideas, creativity, and solutions to the table” (Loy, 2011, p. 30). Listening to gain knowledge delves into the idea that as managers, constantly striving to attain knowledge in all areas of the organization will ensure success. The best source of knowledge is employees, new and old, who have the expertise of knowing how to deal with day-to-day operations. Each employee brings a unique set of skills to the table. Finally, listening as a tool to reinforce value discusses how employees want to feel within the organization. Employees need to “perceive that their ideas, knowledge, and concepts are important to the success of the team as a whole. Employees who perceive a sense of value from their leaders will become highly committed” (Loy, 2011, p. 31). The author concludes that in order to achieve this perceived value by employees’, managers need to not only listen but also take an active interest in each employee.

Properly managing staff is an integral part of the success of a maintenance management program. Studies such as Sullivan and McDonald (2011) showed that giving staff more responsibility results in a more positive work environment. Empowering employees to make decisions gives them a sense of worth to the organization, hopefully resulting in higher effective performance. The core element to this is not only communication between managers and employees, but also how well the manager listens to the employee. Listening gives managers the ability to gain knowledge, motivate, and to reinforce key values. This section informs this study because along with relying on the data within the CMMS system at GGNRA, park and maintenance administrators should

seek input from its maintenance staff. Integrating the knowledge from field staff with the data contained in the CMMS program can build a stronger asset management program.

Maintenance Prioritization

There are many different schools of thought when it comes to the prioritization of maintenance. Maintenance management programs can vary greatly depending on the context of the maintenance operation. Dotzlar (2009) suggests three primary factors that determine the context of the maintenance operation:

1. The characteristics of the system being maintained (p. 12).
2. The goals of the maintenance managers (p. 12).
3. The scope of the maintenance operation (p. 12).

Here, the system characteristics include factors such as age, type, and condition of the asset that are important when establishing a base line for a maintenance program. The goals of the maintenance operation incorporate several intended maintenance outcomes such as minimizing cost, avoiding breakdowns, maximizing effectiveness. Finally, the scope of the maintenance operation refers to the size and the type of intervention that occurs in the maintenance system. There are two types of interventions, which are minimal repair and preventative maintenance. “Minimal repairs take place when failures occur, while preventative maintenance is performed according to a predetermined schedule” (Bartholomew-Biggs, Christianson, & Zuo, 2006, p. 262).

In an effort to prioritize maintenance, many facility managers will employ the use of a computerized maintenance management system. Here, mathematical algorithms and simulation tools are utilized to illustrate the concepts and importance of asset prioritization (Ni & Jin 2012). There are many different algorithms and review processes

used to prioritize maintenance, including the asset priority index (API) and facility class index (FCI). The API is a numerical scale, generally zero to 100, that measures how well a given asset aligns with the mission of the organization. Each asset is prioritized numerically in terms of its importance to the organization. The API also helps determine which assets are important and the level to which they should be maintained. There are two means of scoring APIs: group scoring where facility managers and stakeholders meet to score each asset and expert scoring where subject matter experts assess the asset portfolio. The FCI is a measurement of a facility's relative condition at a particular point in time. The FCI is determined by dividing the costs of all the deficiencies of a particular asset by the Current Replacement Value (CRV) (Park Facility Management Division, 2008).

$$\text{FCI} = \frac{\text{DM} + \text{RMDM} + \text{CRDM}}{\text{Current Replacement Value (CRV)}}$$

A lower FCI point value (0 – 0.10) indicates the asset is in better condition. Conversely, a higher FCI point value (0.50 – and above) indicates the asset is in worse condition. When combining the API and FCI together, facility managers can begin to identify the type of work required for the specific assets. The vertical bar along the graph's left side represents the API point value. A lower API point value indicates the asset's contribution is less significant in relation to accomplishing the mission of the organization. Conversely, a high API point value indicates the asset contributes significantly to the mission of the organization. The horizontal bar along the graph's bottom represents the FCI point value. A lower FCI point value indicates the asset is in

better condition. Conversely, a higher FCI point value indicates the asset is in worse condition. The API and FCI is just one of many mathematical simulator tools facility managers can find helpful in work prioritization and resource allocation. It can also aid in making difficult but informed decisions. Figure 1 represents the Maintenance Funding Model graph.

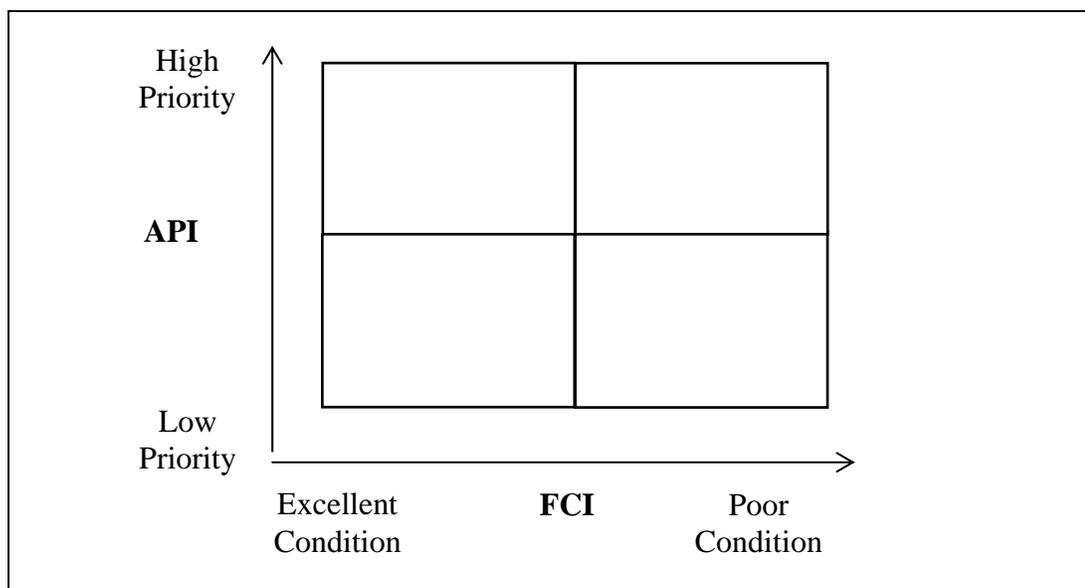


Figure 1. Maintenance funding model graph.

Many different factors influence the scope of an asset management program. From asset portfolio characteristics to the goals and focus of the organization, the ability to identify what assets are most important to an organization is paramount to its success. There many different metrics that can be used to prioritize an asset portfolio. By analyzing the condition of each asset and weighing its importance to an organization, facility managers can not only create job plans but also make quality informed decisions. This section contributes to this study in that GGNRA currently uses an API to plan its

maintenance budget. Though the API process is great at prioritizing planned work it fails to address unforeseen breakdowns that often plague maintenance the GGNRA's maintenance division. Focusing on what is most important can help build a better maintenance management program.

Maintenance Management Issues

Operation and Maintenance can be defined as the day-to-day activities necessary for a facility and its systems to perform to its intended function. These facilities must be operated using an integrated approach devoted to the coordination of operation, maintenance, space, infrastructure, and staff in order to optimize usage and efficiency (Sapp, 2013). The Golden Gate National Recreation Area, Facility Management Division faces a multitude of maintenance management issues that influence the overall effectiveness of the asset management plan. This section will focus on maintenance management issues, such as resistance to change, maintenance budget constraints, and the aging of the workforce.

Resistance to Change

Organizational change is characterized by a set of interrelated activities that emphasize employee participation with the specific purpose of modifying the formal policies, programs, and procedures of agencies. It includes the management practices of the agencies that engage in these activities (Resnick & Patti, 1980). Organizational change also includes planned or unplanned agency responses of organizations to internal and external pressures and modifications to routine tasks, roles, and functions of the staff (Dalziel & Schoonover, 1988). In a study entitled, "Principle for Organizational Change

in Human Service Agencies,” Galambos et al. (2005), looked at five principles to success in organizational change. The five approaches include 1) develop a system for continuous discussion and feedback for entities likely to be impacted by the change including those within the organization and ones at the outside constituency levels; 2) prepare the organization for change; 3) ensure that there are methods, processes and resources available to provide education and training regarding new technologies, policy changes and the change process itself; 4) using employee participation, develop a system to recognize and reward employees for achieving targeted results and organizational goals; and 5) use the organizational change effort to build into the agency a continuous process for change. The study concludes that these five principles are tools to help organizations deal with both internal and external environmental, social, and political forces that will support and encourage an organizational change effort. Not only will these tools assist organizations in adapting positive changes, it will also benefit the employees as well (Galambos et al., 2005).

In order for an organization to successfully change, the administrative staff as well as the employees of the agency must have the capability and flexibility for change (Galambos et al., 2005). If managers and employees are flexible towards change, organizations can be modified to address variations within the environment. Successful strategic change requires modification in an organization’s human resources as well as its goals, structure and technology (Bennett, Lehman, & Forst, 1999, as cited in Galambos et al., 2005). Organizational culture is another factor to consider in the change effort. Organizational culture is a well-researched dimension of organizational functioning that identifies norms and values in the workplace as being key predictors of organizational

success. James and McIntyre (1996, as cited in Gilsson, 2000), suggest that culture is the property of the organizational social system and that norm and values drive the behaviors of the workers within that system. According to Glisson (2000), the organizational culture determines how things are done within the organization. For instance, norms include the way employees interact, how they approach their work, and what work behaviors are emphasized through rewards and sanctions. Culture describes the social impact of the work environment and includes patterns of social interaction.

Change within any organization does not happen overnight. It takes the effort of the entire collective organization in order for change to occur. Successful organizational change requires adaptation and a smooth transition from the old way of conducting business to the new way of being held accountable. In order to accomplish this, participation and support of all stakeholders within an organization is critical. This includes senior executives, supervisors, and frontline staff. Organizational culture also plays a critical role in organizational change as it influences change socially. This section influences this study in that GGNRA is in the initial stages of implementing a new business management program imposed externally by the Department of the Interior. This program has been met with resistance (e.g., poor program support) that has hampered implementation efforts. Understanding how program managers approached implementing this new program will give insight to why GGNRA is experiencing resistance to change.

Budget Constraints

There are many factors that have influence on an organization's budget. Seasons, economic climate, and unforeseen events all play a role in financial stability of

an organization. Just like seasons can effect an organization's budget, budgets can influence the effectiveness of a maintenance management program. Maintenance is often the most resource consuming aspect of any organization and can account for nearly one third of an organizations overall budget. In emergencies, maintenance activities can be temporarily suspended if required resources become unavailable (Ait-Kadi, Menye, & Kane, 2011, p. 678). A well-developed maintenance management program contains a framework for cost allocation and tracking those costs efficiently. Understanding major cost drivers enable organizations to better optimize the utilization of resources in planned maintenance activities (Chan, 2008, p. 36).

There are numerous costs associated with maintaining and operating facilities. Expenses range from leasing commissions, management fees, taxes, operating expenses, and maintenance costs. Maintenance budgets are made up of several allocated costs such as operations and maintenance costs, capital improvement projects, and personnel costs. It is important to note that maintenance budgets vary from year to year and cannot be viewed as a fixed expense. In order for maintenance managers to budget and plan against budget constraints, they must take into account such ideas as the Inverse-Square Rule for Deferred Maintenance Theory (Geaslin, 2005, p. 30). This theory "teaches that deferring maintenance can produce risk-to-reward ratios from 15-1 to 40-1" (Geaslin, 2005, p. 30). In order to combat this risk "early intervention is necessary or expenses will become the square of the root-failure part or a minimum of 15 times the early intervention costs" (Geaslin, 2005, p. 29). That is, the risk of deferring maintenance is significantly higher than the reward of doing so. Budget constraints not only affect the physical condition of your critical assets, but also the ability of the maintenance division to schedule work

order requests in terms of the labor force. When maintenance programs are faced with budget cuts managers must re-prioritize maintenance task, focus on the most critical needs, while operating under staffed and under budget.

In order for an organization to operate at a desired level of service in a declining resource environment, it is necessary to enhance the efficiency of those resources (Scroggins et al., 2010, p. 8). This is where selecting a maintenance budget model that fits the organization becomes critical. Ottoman, Nixon, and Lofgren, (1999) suggest four establishing criteria for the evaluation of maintenance budgeting models:

- ❑ Criteria 1: Measure of Salient Characteristics of a facility - Includes replacement cost, value, age, size, function, location, type of construction, and condition.
- ❑ Criteria 2: Lifecycle - Looks at the lifecycle of a facilities structure, architectural, mechanical, and electrical systems, subsystems, and components.
- ❑ Criteria 3: Maintenance Deferred Penalty Cost – Takes into account penalty costs incurred as a result of failure to provide adequate preventative maintenance.
- ❑ Criteria 4: Data Requirements – How precisely maintenance and information is reflected in the budget model.

Budget models can then be compounded with these four criteria and given a numerical score based on the relative merit of each model in response to each criterion. A good understanding of the overall maintenance finances is essential to providing adequate resources for a successful maintenance program.

The quality of maintenance operations rely greatly on the size of a maintenance budget. The size of a maintenance budget relies on how well maintenance managers can convey the need and requirement to meet maintenance division goals. In

order to express this need, theories such as the Inverse-Square Rule for Deferred Maintenance Theory strategically convey maintenance budget needs. Also, budget models that prioritize the most critical needs to an organization is crucial to justifying maintenance budgets. This section informs this study in that with a dwindling budget the maintenance division at GGNRA is faced with having to justify maintenance plans and budgets.

Aging Workforce

Facility managers are faced with an increasing number of baby boomer employees over the age of 50 who are retiring or are considering retiring within a few years. This leads to concerns about the ability to retain institutional knowledge as discussed in a previous section. The number of people age 55 and older was expected to increase by 49% between 2011 and to 2012 (U.S. Bureau of Labor Statistics, 2013). This figure represents 21% of the total civilian work force, a percentage that has doubled since 2004 (Brown, 2007). As this generational gap increases and as technology advances, managers must find ways to accommodate those employees who are not ready to retire while simultaneously preparing for a mass exodus.

The U.S. Department of Labor reports that workers today will have had 10 to 14 different employers by age 38. In addition to this, one in four of these workers will be in a job for less than one year (Carlson, 2012). According to Brooks Baker, a vice president for facilities at the University of Alabama at Birmingham, “Gen X and Gen Y don’t embrace craft and trade positions as a lofty goal. We have a problem—we have a gap here with pride in being a craftsperson or trades person” (Carlson, 2012). Rogers (2006) presents four causes for shortages of skilled trades:

- 1) Skilled trades are not viewed as desirable professions.
- 2) Education systems' lack focus on skilled trades.
- 3) There is difficulty in attracting skilled workers to industry.
- 4) Effort, time and cost to train apprentices exceeds the immediate benefits.

To address these causes, the author proposes a four part systematic approach to recruit, select, train, and job redesign intended to attract and target the right employees. Recruiting promotes partnerships, often resulting in school-to work internship programs. Selection focuses on hiring for specialty skill sets and works hand-in-hand with training needs. Training streamlines and establishes training and job needs. Job redesign establishes job plans and organizational objectives (Rogers, 2006).

The field of maintenance is a very physically demanding occupation so safety is a top priority. To put age and safety into perspective, the Bureau of Labor Statistics data shows that the median days away from work due to an injury was higher for older workers. The data showed that workers over the age of 45+ averaged 11-12 days away from work annually due to injury (Brown, 2007). According to occupational therapist Marji Hajic (as cited in Brown, 2007), factors such as vision, hearing, changes to reflex, and physical changes to the body begin occurring to individuals in their 40s. The author suggests making a few minor adjustments in the workplace, such as eliminating clutter, proper illumination, and minimizing changes to work schedules (Brown, 2007). Another measure that benefits not only older employees but younger employees as well is the implementation of a wellness program. Wellness programs are “designed to promote healthy lifestyles and educate employees on the benefits of proper nutrition adequate rest, regular exercise, and routine medical exams” (Marsh Inc., 2011, p. 5). These programs

promote health and safety for employees and can specifically target workers in particular age groups.

According to the U.S. Department of Commerce, in 2001 over half of the labor force utilized a computer at work (Czaja & Moen, 2004, as cited in Helander, 1997). As technology advances and becomes more prevalent in the work place, this number is expected to grow. There is a common social misconception that older people are resistant to change and have a negative outlook on the use of technology (Czaja & Moen, 2004, as cited in Helander, 1997). According to Czaja, (1997) older people are generally receptive to the use of technology just as long as it is easy to use and they are provided with adequate training and support. Countless studies have examined the use of technology by older adults. These studies show that older adults are able to use technology to complete work task but are much slower at acquiring the necessary skills to operate computer programs. The literature of these studies suggest training interventions to aid in learning new programs and points out the importance of matching training strategies to the competency of each worker (Czaja & Moen, 2004, as cited in Helander, 1997).

Summary

This literature review analyzed documents and research articles relevant to implementing a maintenance asset management plan. Three primary topics were identified: computerized maintenance management systems, maintenance management and leadership, and maintenance management issues. Understanding the information discussed will help in the evaluation of a successful maintenance asset management plan.

CHAPTER III

METHODOLOGY

Introduction

This chapter serves as an overview of the methods used to answer the proposed research questions of this case study:

- 1) What are the strengths and weaknesses of the Park Asset Management Plan at the Golden Gate National Recreation Area as expressed by maintenance professionals?
- 2) What ideas and strategies do experienced maintenance management professional have about what can be done to improve the PAMP implementation at the GGNRA?

This case study was broken up into two phases in order to quantify the current state of Park Asset Management Plan (PAMP) implementation. Phase One consisted of self-administered questionnaires administered via email that found recurring issues relating to PAMP implementation. The participants of this research consisted of several high-level park, regional, and Washington, D.C. level administrators who have or are currently involved in PAMP implementation at the Golden Gate National Recreation Area (GGNRA). Questions focused on exploring the issues each participant had encountered since implementing the PAMP. Building on the findings of Phase One, Phase Two sought to explore the interview subject's responses and develop recommendations. The goal of the two-phased methods sought to bridge the gap between where the current status of PAMP compared to the projected level in the 10-year

implementation plan. In order to categorize the findings of this study, the Strengths, Weakness, Opportunities, and Threats (SWOT) method of analysis was used.

Setting

This case study took place at the Golden Gate National Recreation Area, a National Park Service site located in San Francisco, California. Operating under the Department of the Interior, GGNRA is one of the most unique and largest of the 403 National Park sites across the service. Several things make GGNRA unique, such as the 1,344 identified assets in its portfolio that must be managed and maintained on an annual maintenance budget of about \$7 million, the location of the assets, and the extensive site and facility use as one of the most visited NPS units. The research of this study focused on the Facility Management Division, specifically the Facility Management Software System (FMSS) office where comprehensive park asset data are collected, maintained, and stored. Data for this research effort were collected via email correspondence and in-person interviews conducted at the different office sites of the interviewees throughout the park.

Sample / Participants

The sampling procedure used by the researcher was purposive sampling that targeted experienced park administrators who currently or formally worked for the Park Facility Management Division (PFMD) and/or the Facility Management Division at the Golden Gate National Recreation Area. The General Schedule (GS) rank of these individuals was typically GS-15 to GS-9. These participants have positions that significantly influenced the initial PAMP implementation process either across the

National Park Service or at GGNRA. Participants of this study included: the Chief of Park Facility Management Division, Pacific West Region PFMD Regional Coordinator, two regional FMSS coordinators, Park General Superintendent, Chief of Maintenance, two maintenance facility managers, two facility maintenance supervisors, facilities management historic architect, and five FMSS specialist, including two former specialists who initially developed the PAMP at GGNRA. Research participants were selected because of their extensive expertise in the facility asset management field or because they directly participated in the long-term PAMP execution at GGNRA. In interest of broadening the understanding of PAMP at a more senior administrative level, four participants from the Pacific West Regional Office (PWR) and two participants from the Washington, D.C. office were also interviewed.

Data Collection / Procedures

Data for this study were collected using self-administered electronic questionnaires conducted via email. Because the research portion of this study required participation of human subjects, an exempt status application to the California State University, Chico's Institutional Review Board (IRB) was filed to ensure all human subject research complied with institutional, federal, and ethical guidelines. Once the research was reviewed and approved by the IRB Chair, the interview subjects were contacted and asked to participate in this study. The data collection process took place over a three-week period. Each research participant was emailed both the informed consent letter and research questionnaire. The self-administered questionnaire took between 30-60 minutes to complete. Follow-up interviews were conducted as needed for

response clarification. Once all the data were collected, the researcher analyzed the responses using a Strengths, Weaknesses, Opportunities, and Threats (SWOT) analysis. To further the discussion of the PAMP, recurring responses to the SWOT analysis were identified and developed into focus areas, which also serve as recommendations to GGNRA.

The questionnaire used in this research consisted of eight questions geared towards exploring the respondents' perception of the PAMP at the Golden Gate National Recreation Area. Open-ended questions include:

1. In your opinion, is the Park Asset Management Plan (PAMP) valuable? Why or why not?
2. What are the strengths of PAMP? Please elaborate.
3. What are the weaknesses of PAMP? Please elaborate.
4. What are your views on how PAMP has been implemented at the Golden Gate National Recreation Area (GGNRA)?
5. What, from your perspective, are some of the challenges the GGNRA faces trying to implement and maintain PAMP?
6. What suggestions do you have to improve PAMP planning efforts at the GGNRA?
7. What suggestions do you have to improve PAMP implementation efforts at the GGNRA?
8. Please add any additional comments regarding the PAMP and/or PAMP.

With the final collection of the research questionnaires, responses were compiled and organized by question to find common themes. In total, 16 self-

administered questionnaires were completed. Common themes and recurring issues evident across all questionnaire responses suggested the questionnaire was sufficient to identify issues for further exploration in the second phase of the study.

In order to maintain participant confidentiality, questionnaires and all interview notes were secured in a locked location in the researcher's private office. Upon completion of the research project, all interview notes will be destroyed via confidential document shredding.

Data Analysis

Once the data were collected, responses were analyzed using the Strengths, Weaknesses, Opportunities and Threats method of analysis. According to Simoneaux and Stroud (2011), SWOT analysis is an effective tool for managing change, determining strategic direction, and setting realistic goals and objectives. Strength and weaknesses are based on an "internal audit" of the organization or program, while opportunities and threats relate to the "environmental factors" that need to be taken into account when planning strategic actions (Gable, Jae-Nam, Kee-Young, & Green, 2007). Question #2 identifies strengths that describe the positive attributes, both tangible and intangible, that can be found within the organization or program and can be controlled. Question #2b identifies weaknesses that are attributes that undermine the value of an organization or program. Question #5a identifies opportunities that are external factors that contribute to an organization or program in a positive manner. Finally, Question #4 identifies threats that are the uncontrollable external factors that are harmful to an organization or program (Simoneaux & Stroud, 2011).

The SWOT method of analysis is broken down into three phases: identification of findings, classification and validation of each finding, and recommendations of a course of action for each finding. In order to gain the most in-depth analysis that SWOT has to offer, the analysis should be conducted by a group of stakeholders with different perspectives of the organization (Berry, 2014). Not only does this give valuable insight about an organization or process from a multitude of viewpoints, but also encourages participation of staff in the resulting strategy. Once the stakeholders had a chance to contribute to the SWOT analysis, findings are classified into a four-square SWOT analysis template where strengths and weaknesses (internal) are linked to opportunity and threats (external). This gives a visual prioritized list of strengths to capitalize on, weaknesses that need to be addressed, opportunities to invest in, and threats that have been identified. The SWOT analysis generates ideas and objectives by matching strengths to offset weaknesses, strengths to capitalize on opportunities, and strengths to offset threats (Olson, 2008).

Summary

The objective of this study was to analyze the implementation of the PAMP at the Golden Gate National Recreation Area by identifying its strengths, weaknesses, opportunities, and threats. With the use of the SWOT analysis, the researcher was able to identify issues and develop recommendations to bridge implementation gaps.

CHAPTER IV

RESULTS

Introduction

This chapter serves as an overview for the results of the SWOT analysis at the Golden Gate National Recreation Area. The primary objectives of the data collection in this study were to:

1. Analyze the implementation of the Park Asset Management Plan (PAMP) at the Golden Gate National Recreation Area (GGNRA) by exploring its strengths and weaknesses as an asset management system and,

2. Develop strategies to improve the PAMP implementation at the GGNRA.

Detailed explanations to explain how each finding was identified and classified and recommendations for further action are developed for each area of analysis. This chapter also identifies six focus areas found through recurring responses in the research questionnaire. These focus area topics are the product of the Strengths, Weaknesses, Opportunities, and Threats (SWOT) analysis responses, synthesized into focus area categories. The focus areas also serve as the recommended course of action.

PAMP SWOT Analysis

The goal of this SWOT was to categorize the interview subject's responses into a well-recognized and meaningful framework and to develop recommendations in

order to bridge the gap between current PAMP statuses and the anticipated point based on a projected ten year implementation plan. The following findings were identified through reoccurring responses from the research questionnaires. The questionnaire responses were compiled and organized as they applied to the SWOT analysis. In addition to the standard SWOT method of analysis, the researcher also included a section labeled “other findings” that did not fit in the traditional SWOT categories but were important results of this research. This following analysis of each SWOT category offers an explanation to why each finding was identified.

Strengths

Strengths are internal qualities of the structure, capabilities, resources, and skills of a program. Strengths should identify positive characteristics that give that program a competitive edge (Simoneaux & Stroud, 2011). The SWOT analysis for this research identified three strengths of the PAMP.

1. S1: The PAMP identifies GGNRA’s asset portfolio and ranks assets according to significance and priority. It also quantifies the needs of the facility management division. The consensus from the research responses highlighted that the PAMP excels at identifying the facility management portfolio at GGNRA. It is used as a tool by management to make educated decisions based on the optimizer band; the level of maintenance each asset should receive; facility condition index; the relative condition of an asset; and asset priority indexes, the value of an asset in relation to the mission of the park.

2. S2: The PAMP allows for real-time information that enables park administrators to understand the impacts of operational and developmental changes from a facility management perspective.

3. S3: In addition to being a snapshot of GGNRA's asset portfolio, the PAMP also enables management to identify gaps in funding and staffing levels to the current funded requirement. This allows for transparency and the ability to become a more effective organization.

Weaknesses

Weaknesses are the internal qualities that prevent an organization or program from completing its mission and can put an organization at a disadvantage if they are not corrected (Simoneaux & Stroud, 2011). These weaknesses directly inhibit the success and growth of a program. The SWOT analysis for this research identified six weaknesses of the PAMP.

1. W1: The PAMP program is theoretical and works in an 'ideal' setting, not in reality.

An overwhelming response to weaknesses of the PAMP is that although its strength is portraying the needs of facility management because GGNRA is an atypically large number of built assets, it is a less-than-ideal park to apply a park asset management plan. The PAMP at GGNRA was developed during management discussions where budget and staffing levels were not an issue. This prevented exposing the gap between current funding and required operational funding. Even though this theory of the PAMP can show the gaps and deficiencies, the NPS will never have the funds to take care of the \$264 million in deferred maintenance backlog just at GGNRA (NPS, 2014). The PAMP

also does not take budget cuts or reduction in staffing into account, making projected job plans almost impossible.

2. W2: Poor program support from WASO Office and contractor that provides PAMP support and updates to GGNRA.

Since its inception 2006, PFMD has gone through one PAMP re-optimization at each park site, seven different updates of the IBM Maximo system, and brought on one supporting system in its nine years of implementation. These “upgrades” have been deployed with very little forethought and in some instances not followed through. Many of the interviewees attribute the underperformance of the PAMP to the poor ancillary systems such as FMSS, Web CRV, Asset Management Reporting System (AMRS), and other programs designed to address some aspect of the PAMP that is not performing as projected or designed. One interview subject associated the PAMP with “building the airplane while it is flying,” showing that even at the highest management level details of how the PAMP benefits parks are not well understood or thought through.

3. W3: Viewed as a ‘paper-exercise’ by management and not as relevant as other park programs.

Many of the facility management administrators at the park level feel that they adhere to PAMP at GGNRA, even with multiple local and political challenges they face. Conversely, Regional and WASO level PFMD officials feel that park level management view the PAMP as a paper exercise and are not followed because of opinions, potential priorities, new leadership, and pressure from the community and park partners. The PAMP was developed, designed and intended to help managers make sophisticated decisions based on park priorities, not to make things more complicated. Making the

PAMP ubiquitous to every planning discussion will make it relevant across all park divisions.

4. W4: The PAMP guidance is left to be interpreted by the park site on how to implement.

The PAMP is built around the theory of prioritizing the maintenance tasks assigned to an identified asset portfolio. The major goal of the PAMP is to articulate how GGNRA currently maintains its assets and how the park intends to maintain those assets well into the future. Although the tools are in place, park sites are left to determine to what extent they will utilize the PAMP and how they will implement the program. Many of the respondents feel that because the PAMP is simply a plan, it does not have to be used on regular operational basis. After 10 years of no real consistency, each park site continues to conduct business differently because they are unique and face very different issues.

5. W5: Lack of program comprehension between maintenance management and field staff.

The issue the PAMP at GGNRA faces is the lack of internal communication within the Facility Management Division. Many of the maintenance field staff have little to no understanding of the PAMP program or how it applies to their day-to-day work. Frontline supervisors who manage these work crews also have little to no comprehension of the PAMP or how it should be used as a tool to plan and justify the work their staff completes. In many cases, work is done to locations that have a high optimizer band and low asset priority, which is counterintuitive to the purpose of PAMP that mainly focuses on highest priority assets.

6. W6: Aging asset portfolio; facilities state of repair. (Weakness)

The National Park Service currently manages an asset portfolio of 76,000 constructed assets, with a total deferred maintenance estimate exceeding \$11.5 billion (2014). GGNRA currently identifies 1,544 constructed assets, primarily comprised of military installed buildings and fortifications dating as from 1853. Many of these buildings were built as temporary establishments and installed during the Civil War era. These buildings were built around the same time and many of them have reached or have far exceeded their expected design life. This has further complicated the PAMP and escalated deferred maintenance costs to \$257,084,663 at the Golden Gate National Recreation Area alone. Although GGNRA has tried to combat this issue through its Capital Investment Strategy and Repair Rehab funded programs, which invest capital into high priority assets in the form of projects, the facility maintenance division still does not have the operational funds to maintain these important and irreplaceable assets.

Opportunities

Opportunities are the external influences that could positively contribute to the growth of an organization or program (Simoneaux & Stroud, 2011). The SWOT analysis for this research identified two opportunities of the PAMP.

1. O1: Use the PAMP to communicate with internal and external stakeholders about projects.

GGNRA currently has more than 30 park partners who conduct business within park boundaries. These partners include of for-profit and not-for-profit enterprises and do not consistently share the same organizational perspective as the NPS. The biggest objection the Business Management Office faces from park partners is when, where, and

why the NPS chooses to complete capital investment facility projects. The answer lies within the PAMP and NPS mandated Capital Investment Strategy (CIS). By using the PAMP to communicate with stakeholders GGNRA has a way of conveying why certain projects are more important than others. The PAMP also serves as a basis for training and educating park partners in the tasks that are required to maintain the buildings they occupy to a standard specified by GGNRA.

2. O2: Use the PAMP to hold staff, contractors, and park partners accountable.

In an effort to hold park sites accountable for their PAMP efforts, a section of the Park Superintendent's yearly performance appraisal is dedicated to how much deferred maintenance is corrected within that particular fiscal year. GGNRA could take this appraisal process a step further and make it part the performance evaluation of frontline supervisors, field staff, contractors, and park partners. The PAMP at GGNRA is constantly viewed only as a Facility Management program, even though each division has some connection to the PAMP. Making the PAMP part of other unit's performance appraisal processes would give PAMP more relevancy and, by extension, more support or adherence.

Threats

Threats are the external factors of a program that could potentially cause direct harm and significant stress to the objectives of the program. Threat elements are typically out of the control of the organization or program (Simoneaux & Stroud, 2011). The SWOT analysis for this research identified five threats of the PAMP.

1. T1: Challenges from both internal and external stakeholders with different agendas and poor communication.

The GGNRA shares park boundaries with one of the wealthiest communities in the country, making it one of the highest profile parks in the Service. GGNRA continues to face pressure from park partners, concessionaires, and the adjacent communities to integrate and improve its park sites. These local interest groups and stakeholders seek to improve the park even if their desired improvements do not necessarily align with park priorities, much less the PAMP. One respondent refers to the park as “wanting to be everything to everyone. It seems that there are no ideas that are turned down, and the continuing use of single interest groups to determine priorities for maintenance.”

2. T2: A retiring maintenance workforce, leading to rapid employee turnover; resistance to change due to changing technology.

Many of the Facility Management administrators feel that problem with the PAMP lies within a generational gap emerging in the work force. The NPS, along with other governmental agencies, are in the middle of a retirement upsurge due to the Baby Boomer generation reaching their retirement age. To compound the issue, Gen X has had a hard time adjusting to this new maintenance theory of planning and using computerized maintenance management systems to track the work they do. For the Gen X staff, maintenance has always been inherently reactive in nature. When something broke, they fixed it. This new theory of preventing and scheduling maintenance processes based on importance and park budgets has led to a lack of interest and understanding of the PAMP among older generation employees.

3. T3: Limited budgets and staffing levels resulting in maintenance backlog.

Along with the many other government agencies, the National Park Service has been faced with budget cuts, hiring freezes, and government shut downs. The benefits of

the PAMP are often difficult to visualize by administrators outside of the maintenance division, so justifying budget requirements to non-maintenance park administrators can be difficult. In spite of static budgets, the facilities at GGNRA continue to deteriorate at an accelerating rate. This will eventually lead to higher deferred maintenance costs and increased funding requirements.

4. T4: Continual footprint growth with disregard to maintenance requirements.

The National Park Service mission includes the preservation and protection of natural and cultural sites. GGNRA currently has \$264,084,663 in deferred maintenance costs to its 1,500+ asset portfolio. This figure continues to grow with the park inheriting new property and as park partners continue to build within park boundaries. Increasing the NPS asset portfolio is often done with no regard to the condition of the newly acquired site, who will perform site maintenance, and how that maintenance will be funded. An example of this is the newly constructed overlooks being built throughout the park. The Golden Gate National Parks Conservancy (GGNPC) rehabilitates and constructs new facilities through philanthropic dollars donated to its organization. Being that GGNRA is very much an urban park, these overlooks are subject to graffiti and other maintenance issues as a result of their urban setting. These 'new' park sites typically default to the facility management division that is already spread thin on both budget and maintenance personnel. Park administrators are faced with the issue of turning down money they would not normally receive in an annual budget or allowing partner organizations, such as the GGNPC, to continue to build facilities throughout the park that strain available maintenance resources.

5. T5: Overburden of information compiled into a complex assortment of data management systems.

Computerized maintenance management systems rely solely on the information entered into the system. But when does too much information become more a part of the problem than the solution? When the asset inventory at GGNRA was collected and put into the FMSS database, there was very little Washington D.C. office guidance or oversight of the contractor collecting the data. Guidance as to what and how to go about collecting data was left to the discretion of the park site. To further complicate things, high school aged interns were hired by the contractors to collect the data. These interns had little to no knowledge of basic maintenance management concepts resulting in an asset portfolio of over 15,000+ records. One respondent referred to this process as “garbage in, garbage out.”

Other Findings

Other findings are the thoughts and views that did not fall into any particular category of the SWOT analysis but were important to this research because of the reoccurrence in responses. The research identified two other findings relative to the PAMP.

1. Ot1: Standardize and require all 403 park units to use the PAMP and incorporate into both short and long term decision making.

The National Park Service is an agency of the federal government, so it must maintain and adhere to federally mandated requirements set forth by Congress. Currently, the NPS is required to report and plan its annual budget of \$2.5 billion (2013) in its yearly publication of the “Green Book,” which outlines and justifies the NPS budget for

the fiscal year. At present, there is no standard that each park must adhere to when reporting. The intent of the PAMP and FMSS is to serve as a database collection system that WASO level administration can use to query to analyze the total cost of facility ownership of its asset portfolio across the Service. The consensus of upper level management respondents was that the National Park Service will realize the benefits of a well-executed PAMP when it becomes standardized across all of its 406 park units.

2. Ot2: Manage what you already have.

A current hot topic between the National Park Service and Congress is the acquisition of new parklands and facilities. This concern stems from the constant NPS requests for additional funding to purchase new lands despite ongoing national debt crises and budget deficits. Two interview respondents suggested that GGNRA focus on the current asset portfolio and reevaluate assets in the lower priority bands to “free-up” planned resources. One respondent went further, suggesting that the park demolish these assets and completely remove them from the Park Service inventory.

Focus Areas

The focus area portion of this research study is a result of the recurring recommendations from the interview participants, as well as, their consistent responses through the SWOT analysis. By compiling and identifying these common recurring themes, the researcher was able to develop three categories that focus on the internal, external, and service wide contributing factors that influence the success of the PAMP at GGNRA. Category One focuses on the internal education / training, and data management within the Facility Management Division at GGNRA. Category Two

consists of two external influences that are not necessarily components of the PAMP program but contributes to the overall program success. This category focuses on park partner communication and leadership buy-in across all park divisions. The final category brings attention to the PAMP program nationally and focuses on standardizing the PAMP process service wide, as well as, better program support from the Washington, D.C. office. These two programmatic items can contribute to the success of the PAMP, not only at GGNRA, but across the entire National Park Service. It is important to note that although these focus areas fall into different categories, each one works jointly with the others and could contribute to the success of the PAMP program as a whole.

Focus Area #1: Education and Training

Internal education and training of the PAMP at GGNRA is important to ensure that staff within the Facility Management Division comprehends the program in its entirety. Understanding the theory of the PAMP, gives meaning and relevancy to the day-to-day work the maintenance staff completes. It is critical to have education and training executed at the most senior level, the park superintendent, to the most basic maintenance position, a WG-5 custodian.

There were 15 related responses from the SWOT that support this focus area: two strengths, one weakness, eight opportunities, three threats, and one response to the PAMP implementation efforts at GGNRA. The overwhelming responses came from the “opportunities” feedback that focused on the education and training of frontline supervisors and field staff within the facility management division. Respondents felt that the education and training should focus on the PAMP theory and how it correlates to prioritizing maintenance task. Respondents also felt that every new field staff employee

should receive an introductory course on asset management and new supervisors should receive training on mandated PAMP program requirements. Education and training that focuses on the core objectives of the PAMP will create a working environment that supports and embraces its concepts. In addition, there was a consensus that all maintenance staff should commit to the PAMP and that it should be a part of the annual individual performance review process.

Focus Area #2: Data Management

Although the PAMP is a theoretical document, its true value shows when it becomes an accurate and viable work plan. Computer management programs such as FMSS are used to capture and document all aspects of maintenance management, which is then synthesized into an asset management plan. At the core of a successful PAMP is quality data management known as a condition assessment. Condition assessments are the linear data management process consisting of the generation of work orders, the execution of the work order request, and capturing the reported labor/material/equipment/services into an enterprise asset management system. Work orders are then closed and evaluated for adjustments to be made for the following year's work plan.

There were 15 related responses from the SWOT that support this focus area: three strengths, two weaknesses, five responses to PAMP value, two responses to the PAMP implementation efforts, and three additional respondent comments. The facility management leadership at GGNRA should focus their efforts on capturing and maintaining the quality of data within its asset portfolio. This can be accomplished by consistently conducting annual condition assessments and holding both supervisors and field staff accountable for accurately reporting to work order requests. This focus area

coincides with the focus area #1: Education and Training. Being trained on the data management process, as well as the importance of accurate record keeping, will aid in mitigating any potential errors.

Focus Area #3: Park Partner Communication

Communication with park partners regarding the PAMP is important to establishing maintenance standards for those park partners who lease and/or occupy NPS owned buildings. Using the PAMP as a tool for creating maintenance requirements enables GGNRA to hold park partners accountable for recurring, annual, and preventative maintenance requirements established by the Business Management Office. Maintenance such as annual fire inspections, roofing, and exterior painting should be a part of the asset management plan to ensure that local, state, and federal laws are being upheld.

There were seven related responses from the SWOT that support this focus area: two weaknesses, two opportunities, and three threats. In order to make the PAMP relevant to park partner communication the PAMP should be at the forefront of establishing partner-leasing agreements and identifying noted deficiencies. The PAMP is an excellent means of establishing the foundation and conveying the priorities of the park in a way that both organizations can understand and plan for.

Focus Area #4: Leadership Support Across All Divisions

Leadership support of the PAMP across all park divisions is critical to the overall success of any management program, including the asset management. Top-level administrators from each division should be included in the PAMP process to establish

divisional priorities concerning the management plan. In order to make this plan relevant to the park, the PAMP should be a key topic of discussion at the most simplest of planning meetings. Just like public safety, accessibility, and cultural and natural resource protection are considered in every planning discussion, the PAMP should also be a part of the overall discussion.

There were 29 related responses from the SWOT that support this focus area making it by far the most discussed topic by all respondents: four weaknesses, eight opportunities, seven threats, one responses to PAMP value, six responses to the PAMP implementation efforts, and three additional respondent comments. Including all other park divisions in the establishment of the PAMP will simplify the park planning process by enabling each park divisions to have a chance to contribute to the discussion as the PAMP applies to their division's mission. If park leadership understands the importance of GGNRA's PAMP, they will more than likely to give it the priority and consideration it needs to succeed. Having all divisions informed about and in support of PAMP gives the park leverage with park partners and the public when it comes to making high profile decisions.

Focus Area #5: Standardize PAMP Process
Service Wide

Standardizing the PAMP process across the entire National Park Service will alleviate much of the ambiguity asset managers at the park level face when developing and implementing a PAMP. Currently, WASO establishes facility management requirements such as preventative maintenance requirements and annual reporting requests but the process for attaining that information is ambiguous. Many of the current

PAMP processes are not developed at the WASO level but are instead established at the park or region level by the FMSS team. To make matters more complicated, each park site uses the PAMP in a different manner. Having a clear path and the support from the National office is a critical component to the success of the PAMP service wide.

There were 13 related responses from the SWOT that support this focus area: four weaknesses, one opportunity, two threats, three responses to the PAMP implementation efforts, and three additional respondent comments. Standardizing the PAMP process should include clear-cut guidance on labor reporting, API, FCI, OB rating criteria, establishing job plans, and creating quality park projects. Standardizing the process should not be a way for the WASO office to restrict parks, but rather establish common standards that can be implemented regardless of the park site.

Focus Area #6: Program Support

The PFMD office is currently in its 30th year of establishing and managing the NPS parklands and facilities. Over the past decade, the theory of maintenance management and the technology that goes along with asset management plans have evolved dramatically. In order for the NPS to take full advantage of these improvements the PFMD office needs to constantly invest in updating the PAMP's system components.

There were seven related responses from the SWOT that support this focus area: one weakness, one opportunity, one threat, one response to PAMP value, two responses to the PAMP implementation efforts, and one additional respondent comment. There are currently 10 systems that work in conjunction with one another to support the PAMP. The Washington, D.C. office should work with the contractor to continually

update these systems and provide support and training to each park site as new system components are implemented to better support the facility management division.

Summary

The purpose of this chapter is to provide a summary of the responses from the SWOT analysis of this study. Based on recurring responses from the SWOT analysis, six focus areas were developed and classified into internal, external, and service-wide contributing factors that influence PAMP implementation at GGNRA. These focus areas serve as practical suggestions for park administrators to improve PAMP planning and implementation efforts based on the responses of the most senior facility management administrator down to park level frontline supervisors.

CHAPTER V

DISCUSSION, RECOMMENDATIONS AND CONCLUSIONS

The National Park Service (NPS) is responsible for management of some of the most significant natural and cultural resources in the United States. In response to *Public Law 98-540* and in an effort to better manage these national treasures the NPS introduced *Director's Orders: #80*. DO: #80 outlines the maintenance and asset management investment the NPS requires in order to provide stewardship for these natural and culturally historic places. With a Park Asset Management Plan (PAMP), the NPS has the ability inventory its unique asset portfolio and clearly articulate maintenance program requirements.

The original intent of this thesis was to assess the 10-year PAMP implementation plan at the Golden Gate National Recreation Area (GGNRA). The researcher explored the PAMP's strengths and weaknesses as an asset management system and, assessed what could be done to improve implementation efforts. Over the course of this thesis, the researcher was able to identify key issues that have hindered the successful implementation of a PAMP. Because of this thesis, park administrators as well as the researcher, have a better understanding of the internal and external complexities involved with the PAMP implementation.

Discussion

The Park Asset Management Plan is designed to provide a snapshot of a parks current asset portfolio and enables park administrators to understand and articulate the funding requirements of those assets. Although asset management plan was put in place, unique park sites such as the Golden Gate National Recreation Area have experienced both internal and external issues in fully executing its PAMP. In order to evaluate where the GGNRA currently stands in their 10-year implementation plan, a Strengths, Weaknesses, Opportunities, and Threats (SWOT) analysis was completed to identify and bridge gaps in implementation efforts. The SWOT analysis of this case study revealed a wide array of concerns respondents feel lead to the demise of the PAMP at GGNRA (evidently found through the recurring responses of the SWOT analysis).

PAMP: SWOT Discussion

The consensus in the *strengths* portion of the analysis found that the PAMP does an excellent job of portraying the priorities of the Facility Management Division. Having a document that summarizes GGNRA's asset portfolio has been instrumental in identifying gaps in both staffing and funding levels. The PAMP has the potential to become useful in helping management make sound maintenance management decisions. When it comes to the numerous maintenance projects throughout the park, the PAMP has proven itself an invaluable tool in justifying project priorities as it applies to the parks General Management Plan. Conversely, the *weaknesses* portion of the SWOT found that respondents viewed the PAMP as a theoretical plan and could not be applied to the parks unique asset portfolio. Respondents also felt that the PAMP suffered due to a lack of program support from the Washington, D.C. office and an internal misunderstanding of

how the program applies to other park divisions. In addition, funding cutbacks have hampered PAMP efforts as the gap between annual funding and the required operational funding continues to grow. The opportunities portion of the SWOT uncovered multiple responses for using the PAMP as a means of holding both internal (supervisors and field staff) and external (park partners and contractors) accountable. Respondents suggested internally integrating the PAMP into yearly performance appraisals as a means of making it relevant to the job. Additionally, the majority of the respondents felt that the PAMP should be incorporated to the planning and maintenance discussion between park partners and project contractors in a way that makes maintenance a top priority. Requiring external stakeholders to use the PAMP as guidance for making maintenance decisions will get everyone focused on the same objectives as GGNRA and ultimately the NPS.

The *threats* portion of the SWOT exposed numerous issues focusing on poor communication, lack of program understanding, generational differences and personnel issues in the workforce, and the ongoing issue between park portfolio growth and the disregard for maintenance responsibility. The underlying issue is lack of communication. The facility management administrators have departmentalized the PAMP and have failed to make the PAMP a relevant topic of discussion outside of the division. To make matters worse, there is even a lack of program understanding within the Facility Management Division. This has only compounded implementation efforts.

Focus Area Discussion

In an effort to bridge gaps in the PAMP implementation efforts at GGNRA, the researcher was able to find commonalities in the SWOT responses and develop six focus areas. The focus areas were classified into three categories that emphasize the

internal, external, and service wide contributing factors necessary for the success of the PAMP at GGNRA. These focus areas serve as practical recommendations for park administrators to progress the current PAMP implementation plan. Six focus areas were identified through reoccurring responses in the SWOT analysis. The recommended internal focus areas include the education and training of PAMP theory and process to facility management staff and refocusing the FMSS data collection to better reflect the current asset portfolio. Recommended external focus areas include improving park partner communication and leadership buy-into the PAMP across all GGNRA divisions. Finally, service wide focus areas include standardizing PAMP program process and better overall program support from the Washington, D.C. office. It is important to note that although this list of prescribed focus areas addresses very different issues, each must be jointly considered as they influence each other.

Limitations

Although the findings of this thesis helped identify limitations affecting PAMP implementation at the Golden Gate National Recreation Area, there were several limitations to the study. The first limitation relates to the sample and the unique park asset portfolio composition at the Golden Gate National Recreation Area. GGNRA is composed of some 600+historic structures spanning across 75,398 acres of parkland. Many of these historic structures were built as temporary establishments, not designed to exceed a 50-year lifespan. With so many assets built in the same era, much of the historic infrastructure is failing at the same time, leading to a higher than normal deferred maintenance cost. GGNRA is also one of the largest, urban park sites within the NPS,

therefore, inferences and generalizations cannot be applied to other dissimilar park sites within the service.

Recommendations for Future Research

Based on the results of this study, there are three recommendations for future research. The first recommendation involves research into large-scale enterprise maintenance management systems. Research should focus on current industry best approaches in both public and private maintenance management trends such as CMMS's, asset management theory and standardizing programmatic items on a large scale. Future research should focus on how current industry trends apply to the maintenance management method being studied. The second recommendation involves research into PAMP implementation efforts at smaller national parks. Research should focus on evaluating PAMP application to a smaller asset portfolio to see if PAMP's are more simply implementable on a smaller scale. The third recommendation involves the findings of this research effort. Research should focus on applying the findings of this case study at other national park service sites.

Conclusion

This thesis analyzed asset management implementation efforts at the Golden Gate National Recreation Area through a case study of its Park Asset Management Plan. A review of research literature and interviews with PAMP subject matter experts was the basis for a SWOT analysis. This analysis identified six focus areas of improvement in PAMP implementation efforts, not only at GGNRA, but at other park sites throughout the service.

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APPENDIX A

INFORMED CONSENT FORM

Informed Consent for Thesis Research

Title: Park Asset Management Plan (PAMP): An Analysis of PAMP at the Golden Gate National Recreation Area

Researcher: Bryceson Kawasaki-Yee, MA candidate

Dear Respondent:

I am a student at the California State University, Chico and I am conducting research examining the implementation of the Park Asset Management Plan (PAMP) at the Golden Gate National Recreation Area. It is my understanding that you are currently, or have participated in the PAMP implementation at Golden Gate.

I am interested in your experiences working with the PAMP, so I have enclosed a short questionnaire which asks you to respond to a series of questions. The focus of the questionnaire is to evaluate the effectiveness of the PAMP in general, as well as, its effectiveness at the Golden Gate National Recreation Area. You are free to decline to answer specific question(s) or choose not to participate entirely.

Your participation is completely voluntary. By completing this questionnaire, you are voluntarily agreeing to participate in this research. There are no known risks if you decide to participate and there are no costs for participating in the study. The information you provide will be used for academic purposes and future studies and will take about 30 – 60 minutes to complete. Information collected may not benefit you directly, but the information learned in this study should provide more general benefits to the Facility Management Division at the Golden Gate.

If you have any questions about the research in general or about your role in this study, please feel contact me, Bryceson Kawasaki-Yee, MA candidate at the California State University, Chico at 510-396-9152 or at bryceson_kawasaki@nps.gov. You may also contact my faculty advisor, Dr. Emilyn Sheffield at eshffield@csuchico.edu or the Graduate Coordinator of the Department of Recreation, Hospitality & Park Management, Dr. Laura McLachlin at lmclachlin@csuchico.edu.

This study was reviewed and approved by the Institutional Review Board (IRB) at the California State University, Chico. Questions concerning your rights as a participant in

this research may be addresses to the IRB Chairperson, Dr. John Mahoney at 530-898-6880.

Thank you for your participation in this study. Your input is greatly appreciated.

Sincerely,

Bryceson Kawasaki-Yee
MA candidate
Department of Recreation, Hospitality & Park Management
California State University, Chico

APPENDIX B

RESEARCH QUESTIONNAIRE

Question #1: In your opinion, is the Park Asset Management Plan (PAMP) valuable?
Why or why not?

Question#2a: What are the strengths of PAMP? Please elaborate.

Question#2b: What are the weaknesses of PAMP? Please elaborate.

Question#3: What are your views on how PAMP has been implemented at the Golden Gate National Recreation Area (GGNRA)?

Question#4: What, from your perspective, are some of the challenges the GGNRA faces trying to implement and maintain PAMP?

Question#5a: What suggestions do you have to improve PAMP planning efforts at the GGNRA?

Question#5b: What suggestions do you have to improve PAMP implementation efforts at the GGNRA?

Question#6: Please add any additional comments regarding the PAMP and/or PAMP implementation at GGNRA.

APPENDIX C

INTERVIEW RESPONSES

This collection of interview responses has been edited to remove all references to personal identity. Each question is research question is identified in bold, followed by responses in bullet format.

Question #1: In your opinion, is the Park Asset Management Plan (PAMP) valuable? Why or why not?

- In my opinion the PAMP is/can be a valuable tool if used to the appropriate degree. GGNRA was one of a few Parks that had a considerable amount of effort put forth at the outset, both in house and by contractors coming through the WASO office. Many of us were immersed in the data capability, participated in multiple training sessions and marched forward. We established the GGNRA PAMP with buy in from numerous Divisions and Management support, setting a standard for how and what we would spend our shrinking dollars on.
- Yes the Park Asset Management Plan is a valuable tool. When used properly by the Park Management team, financial decisions can be made and prioritized. Never before has the NPS been able to do this. In years past, NPS would try and fix everything and in this financially strapped climate we can no longer operate in that manner. With the PAMP parks can quickly use data to target High Priority Assets for Demolition and for Project funding.
- I feel the process of developing a PAMP is very valuable. It provides a snap shot of the park's facility operations allowing us to see our needs when compared to our capabilities. Otherwise, we know our facilities staff is over worked, and cannot meet all the demands that are being placed on it but cannot quantify the imbalance. By having a PAMP, can attempt to prioritize those demands to allow the staff to focus their efforts more effectively. It also allows the facility management division to more effectively have input on development decisions.
- Yes, it can allow for Facility managers to better manage the condition of assets, and identify Assets that are the most important to maintain with the budget limitations imposed on the NPS.
- Yes – because it is an acknowledgement that the National Park Service does not have enough resources to maintain those assets that we own. And it serves as a practical means for park managers to assign priority work to those priority assets for ONPS funding as well as think about and identify what other funding/options might exist to maintain those assets that may not be as high a priority for base (ONPS) funding.

- Yes. It helps the park make sound decisions on how to manage their assets with the limited fund that are available and project future costs.
- Yes, it is a useful document to show where the parks current workload should be directed.
- It is valuable in identifying the Park's needs and plans to address the many assets the Park needs to maintain and fund in order of the priority rankings of the assets. Obviously and unfortunately, the lack of funding to implement the PAMP in a positive way is the real draw back.
- I find the PAMP valuable in provided background data on why we should prioritize our work. I do believe that the latest PAMP provides too much detail regarding partner/non-NPS facilities and doesn't focus enough on NPS buildings. O & M, along with other funding sources should only be utilized on high priority NPS occupied buildings (OB 1 & 2's, 3's if funding permits). The current optimizer needs to be revised to reflect current funding allocations, not "in an ideal funding state."
- The Park Asset Management Plan is a very valuable tool. However, the value is often diminished by lack of proper use from the park management team and/or the Chief of Maintenance. The management teams across the service played a part in the re-optimization and PAMP process, and therefore should be highly vested in utilizing this information and basing decisions and spending on the results of the PAMP. The service wide comprehensive call and the priorities for it should be based on PAMP data. This will help the park determine the best potential projects based on where the park has committed to spending the limited base funding.
- Absolutely...It takes a tremendous amount asset data on inventory, current condition, current requirements and using that information allows a park to create investment scenarios and determine outcomes.
- I believe that the PAMP is a valuable tool for park staff to utilize as it collects all the pertinent data and helps the park to understand its portfolio. It also will allow the park to develop a work plan that is visible to all and enables the park to prioritize its assets for execution.
- The PAMP is a valuable tool to help park facility managers identify and plan for allocating park funding and staff to the highest priority facility assets.
- Yes, to some extent. The PAMP has allowed the NPS to develop a portfolio of its assets. It allows the NPS to determine the condition of these assets and develop a plan for maintenance and operations. PAMP is not valuable. PAMP is not a realistic goal and when decisions are being made on projects and funding, it is a detriment to the parks. When setting the PAMP it was originally established as a way to determine

cost of operations and maintenance in an ideal setting. It does not take into account staffing and funding constraints.

- I believe that the PAMP can be a very valuable tool to assist Facility Managers, in preparing and implementing a well thought out plan of scheduled asset maintenance, commencing with a comprehensive condition assessment to develop a real time base line, document deficiencies and failures and develop a planned, maintenance schedule (PM, RM, DM), and replacement schedule (CR, CRDM) that not only aligns with the design life and life cycle of the asset or component, but with the annual budget, or can be put forward in a larger project to compete for cyclic or repair rehab monies. It provides for a paradigm shift in the manner in which maintenance is viewed and performed. The PAMP allows for a more proactive rather than reactive approach to asset maintenance. as well as members of all Divisions within a Park, to form a cohesive collaboration in the management of all park assets; natural, cultural, structural and historic. Can provide a documented record of maintenance throughout an asset's life cycle, in accordance with its design life. Regularly scheduled and performed preventive maintenance can extend the design life of an asset, so perhaps total replacement or renewal can be deferred until funding can be obtained and obligated. Having a plan, or a schedule of the when can assist all in making fiscally responsible decisions for asset management. Allows for managers to allocate a percentage of the overall budget to the maintenance needs of a particular asset – preventive, corrective, deferred and ultimately replacement. Preventive maintenance if done as scheduled provides for the opportunity to prevent asset or system failures, deficiencies or any corrective needs. If an asset is nearing the end of its design life, but can be repaired, then a corrective maintenance work order can be generated. It may be less expensive and a higher cost benefit to repair than to perform a total component renewal. If total replacement can be deferred. Allocate a percentage for the unexpected, unplanned.
- I think it is valuable, but I am always surprised that it is seen as something we “choose” to do. A basic planning budget based on priorities should just be a common sense action. So yes, valuable, but in the same sense as is brushing one's teeth.

Question#2a: What are the strengths of PAMP? Please elaborate.

- In a perfect world, the PAMP definitely prioritizes the assets that are to be worked on when budgets don't allow everything to be accomplished. Hard decisions are made by committee that are agreed upon to be the most valuable assets with a highest priority given as to where you would spend your dollars. It also comes with an excellent system for tracking how, when and where those dollars are spent.
- The PAMP quantifies the facility management needs in the Park. It provides a tool to manage those needs against the capabilities (financial and staffing). It provides real time data to park management to allow them to understand the impacts of operational

and developmental changes from a facility management perspective. Has the potential to offer good benefits to Park Management to create a more effective organization.

- Park Managers can focus their limited Operation and Maintenance funds to the highest priority (Visitor Use, Mission Critical, and Culturally Significant) assets.
- Work order management is key in the PAMP; we do a good job of tracking costs back to assets, and identifying deficiencies that need to be corrected, and the formation of projects to compete for various funding requests. The PM part of the program is very good for work planning, and long as it is managed properly.
- As stated above, the PAMP's strength is the application of priority of asset to the park (API) and condition (FCI) along with importance to maintain (Optimizer band) to provide the parks a means by which to prioritize work and to provide a means to have a predictive deferred maintenance rate by optimizer band category if no additional funding/resources are obtained. It does not preclude other work that may not have been planned, but it is a very effective way to demonstrate what critical planned work is NOT occurring when it should.
- Strengths: Clearly identifies priority assets and the cost of ownership.
- As above, it is a lot of useful information that can be used to direct work efforts and dollars where they are most needed. Many parts are straight forward, the DM/CRV relationship i.e. FCI. Total DM, how supplemental funding factors in.
- Identifies the tremendous amount of assets that need to be maintained/repared as well as the projected income vs. costs in maintaining these assets. A good tool for requesting and justifying funds to maintain/repair the Park's assets although in realistic terms, it's a no brainer that the funding needed will not be anywhere close to what is needed now or in the future.
- The PAMP can provide the facilities staff a means to research priority facilities using the optimizer.
- The strengths of the PAMP are it is a tool that allows management teams to make educated decisions based on optimizer bands and commit to focusing limited resources on the highest priority assets.
- Collecting the vast amount of data related to a parks asset portfolio can be a huge effort. Park staff often calls it "feeding the beast". The PAMP, when completed allows park managers to utilize and see the benefit or fruits of their labor.
- As mentioned in question 1 collecting the data and having that information is a key strength. Prioritizing the asset data is also a milestone for the park to actually have a

ranking system for priorities. Having the ability to put a plan together using real time dollars and work execution is an eye opener for park management as the saying goes we cannot do everything.

- The PAMP provides data driven decision making for maintenance staff to look ahead at preventative maintenance for the most important park facilities beyond the recurring daily crisis or emergency repairs.
- When used as a guide, it helps identify and prioritize assets. Helps look at funding gaps. Good attempt at developing a baseline for property and its cost to maintain and operate.
- Planned, scheduled maintenance and replacement. If a park has one hundred percent commitment to the success of its PAMP, then the plan will garner a high success rate and will become an invaluable, cost effective tool in asset management.
- It is based in reality, and on the prioritized assets that align with park legislative authority. It takes the budget available into account, which is the only real way to plan.

Question#2b: What are the weaknesses of PAMP? Please elaborate.

- I believe that we work in an environment where no one likes to say no, so we are always striving to do it all. When working to a PAMP where there are not enough resources to do it all, reality hits and decisions have to be made to be able to say no and live with the consequences. A good example is you have two public restrooms that each need \$100 worth of work and you only have a total of \$100, which one gets fixed? That sounds like a simple example, but it escalates in proportion to similarities where \$100's of thousands of dollar decisions are made. So, in reality I find that we spent an extraordinary amount of time to put together a plan that gave us information we don't like to accept.
- Since it is a snap shot, it is almost out of date by the time it is compiled. For example, deferred maintenance is scoped at the time of inspection and a quantity is defined, it can be placed in the PAMP is accurate only to the inspection date. Since a lot of deterioration, unless addressed, continues to occur often at an exponential rate, your costs are no longer accurate and the effort to keep them up to date is excessive. It creates its own work load to the facility management division, when the division's resources are already stretched too thin to meet operational demands. While admirable in its intent, it is almost impossible to implement, when the budget imbalance is so great. The PAMP would work better if all assets were in good condition but they are not so break down maintenance needs are large. Management, staff, and public expectations are out of balance with the facility management division capabilities. Everything is a high priority regardless of what the PAMP says. The presumption of the PAMP is that you balance your resources against priorities

and funding. But in an era of flat budgets, you are always losing ground. Each year you can do less and less. At some point, it is an effort in futility. There is a general resistance by staff and management to insure that good information is getting into the database on which the PAMP is developed. The time and effort is seen as excessive especially to the staff when they see not direct benefit. Needs to be more aligned with the GMP, Park Management decisions, and Public Perception.

- It's only good if the Park Management follows the Plan. Park managers do not like to see facilities fall apart or neglected.
- In a large park with over 1,000 locations and partners and it is really difficult to manage all the data that moves in and out of the system, communication is key here and it breaks down. Projects are completed and no word gets back to the facility management team, how to update data? In smaller parks data management is a lot easier. In a large park such as GOGA with partners and housing, the PAMP is a difficult challenge to manage.
- The weakness of the PAMP is the implementation of the plan. There is a major lack of understanding in both the maintenance leadership and field staff of asset management principles on which PAMP planned maintenance is based. There is also a lack of expertise in the staff administering the Facilities Software program that tracks maintenance work, in both software changes such as the incorporation of FBMS functionality into the FMSS software and analysis of the data that is input into the system. There is almost no analysis of the data that is input (of what data is input at this point) to determine if the park is providing the most effective maintenance to its most important assets and components. In addition, the PAMP would be easier to implement if more assets were in good condition, which is not the case for most parks. I have heard so many times "how can we only fix our most important assets when everything's breaking." That tells me there is no true understanding of how the PAMP works.
- Weaknesses: The actual costs of maintaining assets are not truly reflected and it's set up to operate in an ideal world.
- The complexity of putting it in action. It is a complex document that is not easily understood. There are parts that are vague or deployed without being thought through. The greatest example is PFMD stating that the optimization portion of the PAMP can and will used to measure parks' adherence to PM floors. In reality they have not developed a way in which to do so, this leaves parks in the dark as to what to expect or plan for.
- I believe the asset rating system could be vastly improved since the ratings of the assets dictates what will/can't be funded. How this could be done is up to the NPS brain trust.

- The PAMP as written is done so in an ideal state, not reality. From a budgetary framework we will never allocate.
- The weaknesses of the PAMP tend to be the re-optimization/PAMP process is viewed by the management team as a paper exercise and often not followed. This PAMP is designed as a tool to help managers, not make things more complicated. Often they are not willing to follow through with what the plan says due to changes in opinions of assets, potential priorities, new leadership, pressure from the community or partners, etc.
- The PAMP in itself is theoretical. The true value comes when it becomes an actual work plan that is documented in an enterprise asset management system (FMSS) in the form of work orders; the work orders are executed, reported against (labor, equipment, materials, services), and closed and the outcomes evaluated, adjustments made to the following year work plan based on the evaluation and then trended over several years. This is another tremendous effort that unless done appropriately, the value of PAMP is greatly diminished.
- Change is the key word for execution, the saying that we know what we are doing or we have always done it like this needs to be thrown out the door. This product will work if you can get all stakeholders on board. With the amount of manpower it takes to collect and keep current that is a weakness and trying to get the older generation to change is very difficult.
- The PAMP assumes adequate funding to complete the work, which is not always the reality.
 - a) Figures used in PAMP are unrealistic – NPS will never have the funds to take care of backlog of maintenance on our properties.
 - b) Business practices have yet to be developed for specialized assets (LCS, Heritage Assets, and Fortifications).
 - c) Poor implementation.
 - d) Does not take Budget or reduction in staffing into account.
 - e) Poor ancillary systems (FMSS, CRV, and many band aid programs). It would be best to have one inclusive system.
 - f) Too much information/complex tracking (for example Grounds Care had many different activities and the PAMP required that each be tracked separately).
 - g) Poor communication and guidance from WASO office. Park is often left to interpret and implement without the necessary tools to do so.
 - h) After 10 years, there is not real consistency. Each park still does things differently, because they are unique and have different issues. Some processes have improved, but this has been a tedious process.
- Ideal in theory, but may not be reality. If a park is unable to garner one hundred percent comprehension of the purpose and end result of a PAMP, and achieves one

hundred percent commitment to the established PAMP, it will endure a higher rate of failure and will ultimately suffer from achieving a high rate of success in implementation.

- It is a report we work to, and thus can sit on a shelf. There need to be ways to integrate the discussion of it into Project Review, Operational Meetings, leadership meetings and even hiring. Like Accessibility, Safety and Sustainability are currently checked off for every discussion, we need to make the PAMP as ubiquitous when even in the smallest of planning discussions. Make it relevant.

Question#3: What are your views on how PAMP has been implemented at the Golden Gate National Recreation Area (GGNRA)?

- I think the Park did an excellent job of establishing the list of priority assets, making those hard decisions with group consensus. Under our previous COM, we made the Sup't and Deputy Sup't keenly aware of what the Facilities Division needed to maintain our inventory. There are still times where changes are made that are not in line with the PAMP based on a Priority of the Day, unforeseen issues, political pressures, Park neighbors, etc.
- I think after 2 versions of the PAMP the management team is starting to follow it. I see in the near future they may want to make adjustments due to the Potential of more Project funds being made available. The region would like to see a Re-Optimization and PAMP overhaul every 5 years.
- It has only been partially successful. The Park management has not fully bought off on the PAMP. It is not seen as a tool to help in making development or operational decisions, but rather as a check off item when reporting back to WASO or PWR.
- I think the idea of the PAMP is sound, the way it was launched without a definitive set of directions, and rapidly changing landscape of data required by WASO is very hard to maintain Data, the PAMP evolves over time.
- As the person who led the implementation of the PAMP at GOGA with the help of the Washington Office, I believe it was only partially implemented, PM's were identified and put in FMSS and DM work on priority 1 assets that were in FMSS at the time were bundled into PMIS packages. Other cyclic recurring planned work (RM, CR) were never identified nor planned.
- The PAMP has not necessarily been implemented fully. We have used it to the best of our abilities however, we still lack the ability to fully implement and manage daily crises.

- Since I have been retired from Golden Gate for over 6 years, it is difficult for me to answer this question. As I recall, we often "kicked the can down the road" every year during the bundling of projects escapade - projects that were prioritized for a specific FY had their priority changed to put them in a different group/lower priority and moved 1,2 or more FY's down the road. This was done to fund higher priority projects and newer projects that came in with high priorities. So, I would say that it just seemed that it was business as usual, i.e., it just wasn't getting done and in many cases it wasn't going to get done PAMP or no PAMP.
- I believe the overall mindset exists with most folks to work smarter. We all understand that there are other functions that are mandated from the management team where we can't always work exactly to the PAMP. That's where planning a percentage of every trade/ops person can be beneficial. We have good actually to work from to say roughly 280 hours will cover each FTE for unplanned work.
- I do not feel like the PAMP was taken seriously the first go around at all, but went better the second time. I still do not feel like the park is making decisions driven strictly by the PAMP. I feel like a huge part of this was due to lack of education. Staff thought they knew how the PAMP was supposed to work, although in re-optimization a lot of things changed. For example: not banding all concessions assets as OB5, the use of supplemental resources, mobility, seasonality, etc.
- I believe that we are implementing the PAMP at GOGA but only at the barest of minimums. Park Management has not adapted its concept and all Facility Managers have not bought into this new way of doing business. The hope is that with a new Supt and new Chief that they will be a little more detail orientated and get us new the next level.
- At my level, I was not involved regularly with the PAMP, but know it was utilized to set priorities for the facility staff.
- Although gathering of data to develop the baseline of inventory went well, implementation has been difficult.
 - a) Lack of management understanding and support / not a priority.
 - b) It seems unrealistic given the staffing issues that we have. GOGA has many lapsed positions and given this, along with funding constraints, the park cannot meet requirements.
 - c) Different divisions and park partners do not follow PAMP protocol. Until recently FMSS (the keepers of PAMP) had been bypassed at project creation and projection completion.
 - d) Requirements are unrealistic and there has been many times when supervisors and managers participated in the PAMP exercise and mentioned that it is unrealistic and not used.

- e) No support at GOGA. In situations where budget and FMSS should work together to satisfy both budget and PAMP requirements, there was no cooperation.
 - f) FBMS/Budget affects the ability to implement. Management made decisions regarding the budget which impacted how data was collected in order to satisfy PAMP and TCFO requirements. There was a time when Asset Management practices were NOT adhered to.
 - g) WASO did not provide clear guidance and often changed the rules mid-stream. For example, when offering options for data entered in FMSS to upload into our payroll system and FBMS, WASO provided several options, which resulted in many parks throughout the network doing things differently.
- From my personal experience, it did take a great deal of time to formulate a solid PAMP. The FMSS team, here at GOGA, endured several changes, and modifications not only at the Park level, but at the WASO level which attributed to a delay in implementation. Then it took quite a bit of time to fully implement the PAMP. Even today, I think that even though we are operating under our established PAMP, time has not been allotted to fully analyze and identify where the PAMP is fully successful, and where it needs improvement.
 - No one outside of Maintenance has any idea of what we are prioritizing. When other divisions continue to make decisions on growing park operations and programs without learning about the prioritization of the PAMP, then it is difficult to stay true to it.

Question#4: What, from your perspective, are some of the challenges the GGNRA faces trying to implement and maintain PAMP?

- The lack of staff or experience to appropriately maintain assets in the PAMP, financial resources, changing priorities, different agendas, experience to update the PAMP when management decisions have been made to do so.
- As stated above, inadequate support from management and staff either in the utilizing the PAMP as a tool in the decision making process related to operations or development. Facility management staff needs to be more supportive in getting good data into FMSS. Garbage in results in Garbage out. Too many of our high priority buildings are in such poor condition that preventive maintenance and recurring maintenance are not possible (Alcatraz Cell house for example). As we improve these facilities through capital investment, we do not have the operational funds to maintain the investment. We end up stretching already limited resources trying to do more with less or the same.
- Challenges from outside stakeholders.

- Just the rapid turnover of personnel is a challenge get them trained they leave, buy in from facility managers and above, buildings change hands with no notice, Communication between divisions, no time to do condition assessments, short staff.
- As stated above the lack of understanding of industry-standard asset management principles and the behavioral leap they must make from the mostly reactive maintenance approach with very little planned work to a new way of approaching and accomplishing a majority of planned maintenance activities in the park.
- Challenges: Staffing & Funding. None of which we have enough of to fully implement the PAMP. Also working with facilities that are already in a deferred state makes implementation difficult.
- Primarily, lack of funding. As funding continues to be inadequate, all assets will suffer and those that are not funded will continue to deteriorate and the costs for maintaining them will soar or they will fall in such disrepair that they may have to be removed as assets, which may not, in some cases be a bad idea.
- Management policies/decision can hinder implementation, full execution of the PAMP.
- Some of the challenges could potentially include things like new management not understanding the purpose or agreeing with the decisions that were made during re-optimization. Due to the high profile of GGNRA, the park may face pressure from partners, concessionaires, and the community to do things that may not line up with the PAMP. Also, as time goes on and Region and WASO get stricter about tracking PM Floors, and funding projects for more funding sources using the CIS score, GGNRA may want to change Optimizer Bands in order to get projects funded.
- The challenge for all parks is committing to the effort to plan, execute, evaluate, and make adjustments to the plan and trend over the long term. I believe that most park staff feels that this is just too onerous a task, but the value of the information does not become apparent unless the steps are taken. As an example, a person can have a doctor perform a physical testing one's various systems (respiratory, circulation, etc.) and get the results and recommendations such as changing a diet, getting more exercise, lose weight, etc., but this information and recommendations are of little value unless acted upon.
- Getting staff at all levels to buy into this process and accept it for what it can do for the agency not only now but for future funding Also the staffing needs to be looked at to see if we are really aligned correctly.
- GGNRA has so many historic structures to preserve, it is a major challenge. Will need to insure park owned buildings maintained by partners are fully integrated and prioritized.

- a) Reduction in staffing – when staffing levels are low, it is difficult to balance the need for data entry with the work that is needed in the field.
 - b) Requirements when PAMP were out of hand and ineffective. Our employees lost interest in tracking their time. For example, tracking grounds care activities (sweeping, mowing, weed eating) was a bit out of control.
 - c) Process did not evolve from the top (at the WASO level), we (FMSS team) had to develop our own mechanisms to track time that would alleviate the burden of work on our staff.
 - d) Lack of interest and understanding – people are not interested in PAMP. They do not understand what it provides and how it applies to the work they do (mainly operations).
 - e) Management does not consider this to be a valuable tool and is not focused on requirements.
 - f) Systems have made the work labor intensive. With FBMS, there is more to do and many ways to do it, but no clear path provided by WASO.
 - g) WASO is still working on the same issues that we have had since 2012 regarding FMSS/FBMS interface.
 - h) GOGA is extremely complex with over 1800 locations in its portfolio. Its geography also poses an issue.
- DM backlog, reactive rather than proactive maintenance approach. Aging systems, late preparation. Lack of funds. Condition Assessment needs; lack of time and personnel to perform. Another challenge was and may still be assuring that the labor force; those in the field are reporting their time to the appropriate work order. Change from reactive maintenance to proactive. The saying ‘Can’t teach an old dog new tricks’ comes to mind. For some field staff, there was a slight resistance to the change in how maintenance would be performed from what they had been used to. Again, they were used to a reactive approach. (I think I repeat myself in depth below). Aging workforce. Those here from inception (1972-2007) used to a reactive approach to maintenance in the park. Even with the precursor to PAMP and FMSS, I believe this was true, though those participating in this survey that came to the park long before me, may have more valid data on that subject. My feeling is that it was a challenge in and of itself to inspire the established, aging maintenance work force to almost overnight change the manner in which they approached maintenance activities in the park. They were used to going out and fixing what was broken, now they were being required to follow an established plan. I feel it took a long while for a paradigm shift to occur and the percentage of commitment to the PAMP rise to 100%.
 - We are a park that wants to be everything to everybody. It seems that there are no ideas for use that are turned down and a continuing allowance of single-issue use groups to determine priorities for maintenance (i.e. dogs and windsurfers). Also, the Conservancy does not support ongoing and recurring maintenance, and continues to grow the footprint in the park with zero understanding of our maintenance mission.

Question#5a: What suggestions do you have to improve PAMP planning efforts at the GGNRA?

- I believe that the Park needs to do Comprehensive Condition Assessments on a periodic basis. This will help determine where it is possible to make small investments to prevent large failures on the Priority Assets. This may need to be supported by WASO or the Region as we don't have the staff to accomplish with current staff.
- Park management needs to take a more active role in the development of the PAMP. The need to help lead the effort and not treat it as a Facility Management only effort. All planning and development efforts should have the PAMP built into the framework from the beginning. Facility Management should no longer need to sound like a broken record at Project Review saying how we are going to maintain this... It should already be planned. Condition assessments should be more targeted so that data collected can be more easily assembled into projects based on available fund sources.
- Education, Education, Education!!! The more the Park Management Team understands the value they more they will adopt. We are slowly seeing all parks understand this complex asset management document. Remember NPS changes at Glacier Speed.
- Communication, more buy in of staff involved in the process, Facility staff have trained across divisions. Condition assessments and the time to correct old data.
- The plans are there. I suggest GOGA moves on to implementation. This horse has been beaten enough.
- Revisit the PAMP annually and fine tune the plan along the way. Continue to look for creative ways to secure funding and resources that can help you accomplish the work.
- For one thing - stop taking over new lands/assets as the Park is unable to satisfactorily fund the assets in its current inventory. Take a good look at the lowest rated assets - is it worth it to maintain/repair them or in some cases should the Park just let them go and perhaps (e.g., buildings) just demolish them. Also, has GOGA fully explored all avenues for additional/special funding?
- I believe that the FMSS team should get out in the shops more, go out in the field. The benefits are twofold: (1) gets the FMSS out to see what's really happening, (2) gives the field folks value added in seeing that FMSS folks care about what's happen

and can help them do their job more efficiently by prioritizing work and not working so reactionary.

- Make sure that the entire management team understands the purpose of the PAMP, and the benefits to it. Like I said above, the PAMP is often viewed as a paper exercise. If the staff can prove there is more of a benefit to the PAMP than that, it may help gain support from all divisions to utilize the PAMP as a planning document.
- All staff need to understand the value of using asset data for the purposes of planning and make a commitment to it.
- Get all park staff to buy into concept and realize that this is a plan for the park not just for maintenance; we need to be more inclusive for all divisions and then try to execute the plan and see how we do. It seems we cannot execute the plan because of so many other priorities in the park.
- Consider how PAMP and FMSS/FBMS are coordinated. These are useful tools, but there needs to be a balance of these planning tools and tracking systems with reality on the ground and unforeseen work that is both emergency and nonemergency.
- Reintroduce asset management and provide new supervisor or employee training on requirements.
- Include all divisions in the theory and ideals principles of the PAMP. Not limit just to the Maintenance Division. Contribute to PAMP and true maintenance and component renewal planning via project identification selection. Not just projects that seem like a good idea, but those that have a true need and will add value not only to the protection, preservation, operation of the asset, but to the park visitor's overall experience; visit to the park.
- Training and facilitation should not be led by in-park staff. Get outside facilitation (even from another division). We currently do not have Maintenance staff that is skilled and trained in how to deliver information and run meetings with actionable outcomes.

Question#5b: What suggestions do you have to improve PAMP implementation efforts at the GGNRA?

- Keep going with what we are doing which is some progress. Continue with a demolition plan on extremely low priority assets to reduce the Park inventory. Lease out buildings that are not needed by the Park to bring in additional revenue streams that can be used to enhance our budget allocations. Look for corporations, schools, unions or other avenues that may be interested in adopting a Park asset either as a

Philanthropic endeavor or as a training exercise. By having outside help, the existing budgets can be used to better serve the remaining priority assets.

- Get buy off from Park Management. Use the PAMP to support funding request needs especially for ONPS. Work more with staff not just supervisors to understand work orders and their value to aid in accurate recording.
- Educate, Educate, Educate. I could give more training but we are limited by time with all the work on our plate.
- Communication between Facility managers, project managers, park partners and stakeholders to establish who is where and what was done to buildings and when, to keep data up to date. GOGA is a fast paced dynamic park with multiple partners and lease holders etc.
- Implementation – start with a shop who has a supervisor that can effectively develop a realistic annual work plan. Assign one FMSS specialist to the group who understands how to make PMs, create work orders from PMs, who understands how the KIOSK works and who understands some basic FMSS reports to analyze the work reported to FMSS and communicate how the data and the work relate to the PAMP (like are you working on your priority 1 assets – if not, why not). Have that FMSS person stationed at that shop and with the same hours as the field staff. If there is no one there who can do that, then pick the FMSS specialist who can communicate the most effectively to get the necessary FMSS advanced training. Don't try to get it implemented to all groups – GOGA doesn't have enough expertise in either FMSS or Asset Management to pull that off. It's like trying to save the whole world when you only have the resources to save one city block. Start with the most promising city block – if that succeeds, you will more likely get more neighbors willing to try. If you start with the worst city block, you'll likely just get mugged and nobody else will want to try.
- Suggestions: Stay focused on what the objectives of the PAMP were and create a working environment that supports and embraces the concept.
- In my experience every park could use more training to fully understand not only what it does, but how to approach putting it into action.
- Reevaluate how the rating criteria is done. I guess this would be something that would have to be done on a national level, not just by GOGA for its assets. I totally understand the value of maintaining historical assets but it seems to me that, for an example, Alcatraz chews up a major part of the funding that could be used for a vast amount of other assets. As far as GOGA's PAMP goes, perhaps some of these (again as an example, Alcatraz) priority projects could be rated at a lower level to free up funds for other important assets that don't have the favor of being a historical asset

and rated higher. Another possibility, turn over more assets (e.g. buildings) to Park Partners and make them responsible for maintaining and repairing the assets.

- Every new person that comes to Facilities or any division should get a PAMP 101/FMSS introduction. Explain the PAMP and value, and how that ties into FMSS and project funding.
- Training & education. Make sure that the whole management team support maintenance and the execution/implementation of the PAMP.
- As stated in 5a, the park staff (from the Superintendent on down) need to understand the value of the process and make sure it is incorporated in the work management process and that all make the commitment to do so. It should be used in determining individual performance annually.
- Get Facility Managers and Supervisors to agree to implement this plan and really try to. Use the PAMP as part of their performance and use this document as a tool that it was intended to be.
- Hold facility staff accountable for preventative maintenance work. Consider the newly constructed Point Bonita suspension bridge. Is the contractor's PM Plan being followed to wash down and paint? Some corrosion already evident after 3 years.
- Make sure that the systems we are using work well. I am not sure how this can be done, unless there is management support. It is difficult to engage them in this discussion. Even after reviewing the PAMP and working to execute it for 3 years, I found it to be very difficult, because in order to do this, there has to be support from within our maintenance division and other park divisions. There is poor communication and often times, processes are bypassed without any thought about PAMP and the need to document work done. There is some cooperation, but it is just a small piece of this process.
- The inclusion of not only all maintenance personnel, but all Divisions, all the way to the Deputy and General Superintendent.
- It currently lives only within the minds of Maintenance leadership staff. We erroneously believe that simply referencing it in meetings, or simply telling people we have a PAMP constitutes training and understanding.

Question#6: Please add any additional comments regarding the PAMP and/or PAMP implementation at GGNRA.

- I think GOGA has always been the first PWR park to volunteer for these National Efforts. If that same commitment continues the park is will see some positive

changes/results. It's a work in progress and you can only eat the elephant one bite at a time.

- I think PAMP should be a standard across the park service with one set of rules for all parks, or give the parks the latitude to make PAMP a useful tool for the future, at this moment it seems some parks do this that or the other, some don't do it at all? I really believe Communication is the key to a good PAMP, and buy in by those in upper level management across all divisions. I do not think there is going to be a time when you can say here is my PAMP. The PAMP is a plan that is ever changing.
- It's hard work and sometimes exhausting to continue but it's important. We can't fall back into old habits of being unaccountable for accomplishments nor can we spend funds on things that are better left alone or less important to the Parks mission.
- The PAMP neglects assets that do not rate in the high priority category- I have always felt that, for an example, if you have a number of important assets that did not rate in the highest priority category and these lower assets would require X amount of \$ to be brought up to an "acceptable" level, fund them to do so. Yes, this would affect the funding of some higher rated assets but it could possibly prevent those lower rated assets from falling in further disrepair and causing them to possibly decay beyond repair and/or cost much more to address their needs for repair in the future.
- I believe we have plenty of park service/Federal employees that are able to be the behind the scene experts. I don't believe we need to pay a contractor (Booze Allen) the amount of money we are paying to do what they do. From a budgetary stand point and looking to save dollars. Often times a suspense is sent to clean up some data. I can't tell you how many FTE's it took to do some of these data calls, but not value added in doing so, when the contractor could have written a script to reprogram the data fields required to update/change this information. The FMSS software/FBMS software needs work to exchange data fields. Within FMSS, when generated a PM work order which ties to the location/asset record which has the UOM/quality in the parent records, but does not carry over/generate when the work order is created. This is a data hit on the scorecard that should not be a hit. Or better yet, have the contractor script this to auto-carry over. Go to FBMS only. It can be set up for the functionality of FMSS if we want to. That way we are only maintaining one system.
- Continue to try to incorporate the document into daily decision making, as well as long term project decision making. The PAMP is supposed to be a tool to help parks, not hinder them.
- The real value for the NPS is realized when it is done so across the entire system, at all 406 park units. If GGNRA can be successful in the implementation, then it can serve as a benchmark for the rest of the Service.

- My belief is that the PAMP was never really and is not today a document that is accepted by the park it is only something that is mandated. We need to really take this planning effort seriously and see if it can produce for us what it was intended to do. We need to really look at how we are inputting our data and collecting our data and managing this process to insure it becomes meaningful for us.. We should be using this document to tell our story based on the data that has been collected to date.
- I feel it is established, but remains a work in progress. Remaining aligned with our PAMP while keeping up with changes in business practices does present a challenge. I feel that we are always changing and updating, rather than just doing. I think we can all agree that if we were relieved of perpetual data calls, we could spend more time fine tuning the established PAMP.
- Unless Facility Managers are put in a chain of command that aligns them under Regional Facility Management Leadership, they are beholden to the political leanings and needs of Superintendents. Until then, they have to complete the Superintendent's assignments and vision, which will most often be away from the prioritized realities of the PAMP.