

An Operations Manual for Field Stations and Marine Laboratories

-Susan Lohr, Editor

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Executive Summary

A guide to operational policies and procedures for field stations and marine laboratories (FSMLs) is presented, funded by the National Science Foundation. The purpose of the guide is to provide some information about standard operating procedures at FSMLs across the country. At least 40 FSML directors were involved in the initial elaboration of coverage for the operations manual. The final product is a web-based document available online as a narrative that covers Planning, Administration, Programs, Facilities and Finances. Examples are provided for each section as part of the initial narrative. Further specific examples are solicited from individual FSMLs. These will be added to each section as web documents or linkages. There will be regular updates to the manual text as more information is received from FSML directors.

Update Schedule

When the main text of the manual is updated by the editor, the date and the sections involved will be added to this table:

Date	Sections

Introduction

In September 1999 at the annual meeting of the Organization of Biological Field Stations the assembled membership expressed an interest in generating an operations manual for field stations and marine laboratories (FSMLs). The purpose of the manual would be to assemble some fundamental principles regarding policies and procedures for administering FSMLs. The inclusion of specific policy examples from a wide variety of FSMLs around the country was of great interest.

On behalf of OBFS Susan Lohr submitted a grant request to the National Science Foundation, which was funded in 2000. At the annual OBFS meeting that year 34 FSML directors participated in a detailed discussion of content for the operations manual. An outline was generated and participants for a subsequent workshop to write parts of the manual were selected.

The workshop was held in Gunnison, Colorado from November 30 — December 3, 2000. Twelve FSML administrators participated in an intensive three-day effort chaired by Susan Lohr. Small groups were assigned to address the specific topics covered by the table of contents. There were numerous opportunities for cross-checking progress with all the participants. After many hours of productive hard work, drafts of some text for each topic section were completed by the end of the workshop.

Susan Lohr compiled and edited the rough drafts into text for the manual, and wrote a number of sections that weren't covered in depth by workshop participants. She added tables and figures and organized the content into the web publication. She will continue to edit the document in response to suggestions from users.

Workshop participants who initially authored each section were:

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This manual is dedicated to the memory of Tom Callahan, FSML mentor at the National Science Foundation until his passing in 1999. Tom would have written this manual with much greater brevity, in just a few lines. His rules for FSML administration were:

1. Treat everyone decently.
2. Laugh at yourself.
3. Know that everyone makes mistakes, so Get Over It!
4. Don't call the authorities unless there is either fire or blood.

How to Use This Manual

This web-based document is designed for maximum utility for field stations and marine laboratories. The main text contains initial conceptual content. The tables, figures, documents and linkages that follow each text section are intended to provide an infinite number of specific examples.

Suggestions for editing or content changes, and additions to the bibliography or list of organizations, should be sent to the editor, Susan Lohr, at slohr@frontier.net. Suggestions and comments will be incorporated approximately biweekly as needed.

Examples of policies, forms, procedures, operations manuals, or any other documents for sharing with other FSMLs can be provided as links at the end of each section. These should be sent to Mark Stromberg at stromber@socrates.berkeley.edu either as email attachments or as web links. Mark can incorporate any number of examples in this fashion.

Users of the operations manual can link to different sections by clicking on broad topics in the table of contents. After reading the general principles, most users will probably want to locate specific examples concerning their topic of interest. Contact the FSML directly that provided the example for further information, not Susan or Mark.

Mark will be setting up a chat room for interactive discussions of a less formal nature. Experiences, problems, questions, informal surveys, product information and other resources can be shared in the chat room format. Susan and Mark will monitor the content for substantive information that could enhance the main text of the operations manual. They will add to the manual as needed. Mark is also considering setting up a FAQ board with frequently asked questions .

Hopefully together we can all create a maximally flexible document that meets the needs of field station and marine laboratory personnel. Please consider participating.

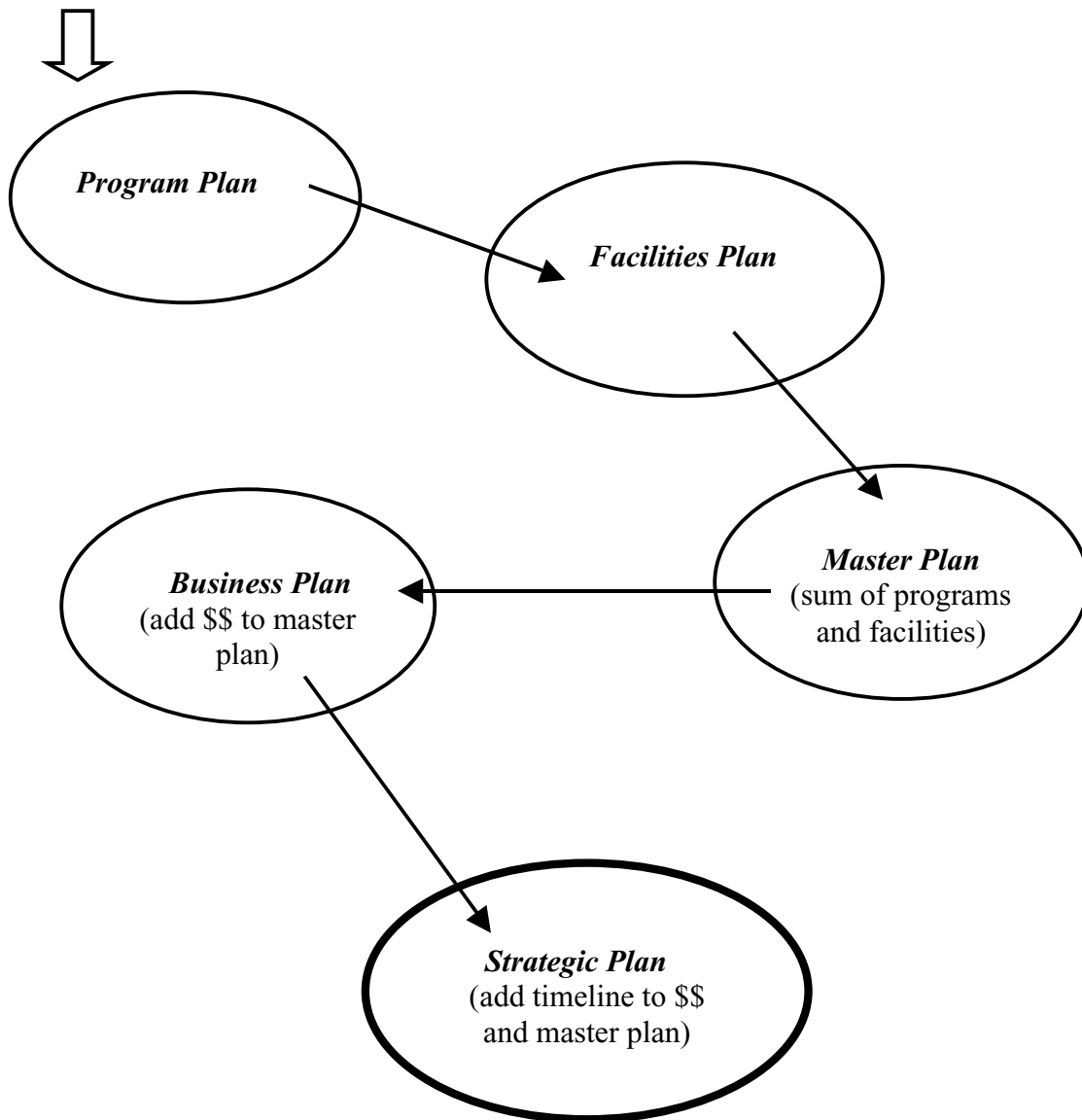
I. Planning

Good advance planning is essential to the success of a FSML. Some planning efforts should be obligatory and others are more *ad hoc*, depending on needs that arise over time. A basic planning principle is to include as many potential users or other interested parties as possible during the planning process. These parties are called *stakeholders* in planning jargon, and that is a good descriptive term because they have a stake or a vested interest in the success of the FSML.

The most important stakeholder is the governing institution or body, whether a university, museum or nonprofit board. The planning process should be sanctioned by the governing body. At least one representative from higher administration should be involved in the process, and preferably more.

FSML Planning Sequence

Begin here



A. Essential Planning (in appropriate chronological order)

1. Program Plan

This is the plan that provides academic content for FSML activities. It is sometimes called an academic plan. Types of programs to be considered include research activities, both visiting and in-house, educational activities, and outreach activities. A Program Plan should derive from a committee that is composed of all types of users of FSML programs. The committee should seek broader input during its deliberations.

2. Facilities Plan

This plan supports the program plan and evolves from it. Once the Program Plan is written and approved, a facilities planning committee should convene to address the best manner of providing appropriate facilities for programs. All staff and users of the FSML should be well represented, as should maintenance personnel.

3. Master Plan

This plan is a combination of the program plan and the facilities plan. Once facilities to be used, improved, or constructed are agreed upon, a committee should be formed to incorporate the facilities and programs into a single document. The Master Plan also includes an articulation of the mission, vision, goals and objectives of the FSML. All programs and facilities should fit within these overriding organizational guidelines.

4. Business Plan or Financial Plan

This plan lays out a financial road map for addressing the costs of programs and facilities. Examples for presentation of a business plan can be found in business software, such as Powerpoint. Usually this plan articulates principles such as 1) that there will be an annual subsidy from the governing institution, 2) cost centers for each program will be developed and income/expenses determined for each cost center, and 3) whether or not financial self-sufficiency is a goal.

Every FSML should develop a business plan that outlines responsible business practices for operating the facility and specifies the financial expectations for each contributing entity. Usually a step-wise procedure is used for creating a business plan that leads to cost-recovery for a field station. Here are some suggested steps to follow:

a. Recognize and quantify the fundamental institutional obligation.

There should always be a fundamental financial commitment to the FSML from the sponsoring institution. Such a commitment is expected by donors and by outside funding sources such as the National Science Foundation (NSF) and other granting agencies. This institutional obligation should be calculated and agreed upon early in the planning process. For example, this commitment might cover the provision of core staff and a maintenance budget. Other noncash institutional contributions may include insurance, legal assistance, development office assistance, physical plant personnel, and access to the many resources a university provides its various departments.

b. Cost center all activities.

Determine the full cost of providing research space, courses, housing, food service, annual utilities, maintenance and deferred maintenance, depreciation, etc. by assessing the expenses associated with each area. (See **Table I.A.4.b** for an example of an analysis of personnel costs over time.) Include opportunity costs also, such as giving housing to staff that might otherwise be occupied by a paying user. This process will enable the FSML to initiate a cost recovery system. The basic cost of providing the facility can be divided by the number of potential daily users to develop a station use fee. Eventually this fee will lead to reducing and

then minimizing the basic expense to the university for providing the FSML facility. Fees for use of specific FSML services such as courses or housing can be calculated by knowing the cost of providing those services. It is critical for the FSML to have the freedom to set usage fees and not be unnecessarily constrained therein by university policies.

- c. Determine which programs can legitimately recover costs.
There are a number of policy decisions that must be made to determine how to charge for FSML facility use. Should university faculty be charged for lab rental? Can faculty expenses be charged back to departments? If faculty have research grants, then they definitely should be charged use fees. Once areas of subsidy are recognized and accepted, space allocations need to be made for each type of activity, to avoid having all the space at the FSML taken up by subsidized programs, leaving no room for income-producing users.
- d. Develop programs that recover costs.
There are an almost infinite number of possible programs that will pay fees for use of the FSML, and will also generate revenue to offset the university's financial obligation. Some examples are summer courses for high school, undergraduate, graduate and professional scientists and students, intensive workshops, corporate training or retreats, conferences relating to science and policy, and sponsored research with grant and overhead income. Any proposed program should undergo an effort/return analysis, and decisions should tend to promote those programs that offer maximum financial return for minimum effort, as long as the mission of the FSML isn't violated. See **Figure I.A.4.d** for an example of an effort/return matrix.
- e. Grants, donations and gifts should be targeted in a focused development program.
Although fundraising shouldn't provide the basic operational income for the FSML, it certainly can be a significant component of overall financial health. Any opportunity to generate an endowment should be taken. For example, ideally a portion of funding for capital improvements would be set aside in a maintenance endowment to provide future annual income toward the expense of staff and materials for facility upkeep. Development consultants at the university will be very helpful in outlining realistic approaches to the wide variety of fundraising options available. Planned or deferred giving (wills, trusts, etc.) should not be overlooked.

5. Strategic Plan

This plan places the other plans in a timeline, so that anyone can pick a month in a given year and see what programs will be offered, what facilities will be needed for those programs, and what the financial picture will look like. This is the plan that prioritizes FSML activities. A strategic planning committee should create this plan by combining all other plans into a realistic schedule, usually monthly, that extends over at least a five-year period. The committee should have representatives from higher administration, FSML administrators, financial officers and program directors in order to generate the most realistic and achievable plan. The Strategic Plan becomes an operational road map. It is examined every year for accuracy, and adjusted as necessary so that a five-year timeline is always available for more specific operational planning. An excellent reference for FSML strategic planning is *Director's Guide to Best Management Practices* (Byrd 2000).

B. Other Plans

1. Construction Project Planning Process

A construction project requires a very specific and focused planning process that evolves from the FSML program and facilities plans. A construction steering committee should be formed that will see the process through from beginning to end. The committee should have representatives of FSML administration, persons who will be using the facility, and physical plant personnel who

will be maintaining the facility once it is built. During active construction weekly meetings will be necessary, and committee members may need to be released from other duties in order to give the construction process enough time and attention. See **Table I.B.1.a** for an example of a facility development process. See **Table I.B.1.b** for an example of tasks and personnel required for facility development.

2. Investment Plan

This plan is usually developed within the policies of the governing institution, and applies to endowments, held funds for capital improvements, and other savings funds. For a stand alone FSML this plan will need to be articulated before fundraising is undertaken in order to appear fiscally responsible to funders.

3. Safety Plan

In addition to a safety handbook that addresses specific issues, there should be a brief overall plan that articulates the FSML interest in addressing safety concerns, and states the principles that will be followed when a safety issue arises.

4. Emergency Plan

What to do in various emergencies. This plan is usually part of a safety handbook.

5. Land Use Plan

Often this plan is a unit within the Master Plan, but it should be developed as a stand-alone plan before being incorporated into the Master Plan. A Land Use Plan is a map with a narrative, and shows what activities are appropriate for what areas of the FSML property. Examples of uses to be considered for various locations include:

- a. Research — intensive, manipulated, experimental, observational? Lab buildings? Labs in cabins OK?
- b. Education — kids, visiting groups, college courses/class research projects?
- c. Public Use — nature center, tours, special events?
- d. Residences — centralized or dispersed? Bathroom facilities?
- e. Administration — offices, library, collections room, computer facility
- f. Maintenance — centralized? Shop, metal work, vehicle maintenance?
- g. Parking — public, in front of cabins, near lecture halls?
- h. Trails — walking or driving?

6. Fundraising Plan

This plan should show targeted donor audiences, funding goals from different sources, who does what regarding fundraising, annual campaign, capital campaign, etc. all set within a specific timeframe. See **Document I.B.6** for an example of a strategic fundraising plan.

C. Unintentional Consequences

One of the most common and insidious planning errors at FSMLs is an omission: not to plan for the long-term effects of a short-term program. Here are a few real-life examples of unintended consequences:

1. A limited term educational outreach program is very popular with the community around the FSML. When the program runs its intended duration and ends, the capacity to support the demand

is not there. Other examples include newsletters, open houses, annual reports, etc. that get started with best intentions, generate expectations, and then are terminated. Planning how to handle the consequences of program termination is important in order to minimize the adverse effects of disappointed users.

2. A three-year study that dramatically manipulates the land (adds nutrients, introduces non-native species/genes, etc.) can preclude future research opportunities, degrade natural habitat characteristics, or diminish the long-term ecological and research values of the research site.
3. The development of a computational networking environment or information management system without input from the users (i.e., the scientific community) can result in the need for a permanent full-time position (or more) to handle the resulting problems.

Tables, Figures and Documents for Section I — Planning

Table I.A.4.b — Personnel Costs Over Time (Source: *S. Lohr*)

Figure 1.A.4.d — Effort/Return Matrix (Source: *S. Lohr*)

Table I.B.1.a — Facility Development Process (Source *S. Lohr and P. Siri*)

Table I.B.1.b — Tasks and Personnel for Facility Development (Source: *S. Lohr*)

Examples (fill in list as examples are provided):

I.A.1 — Program or Academic Plans

I.A.2 — Facilities Plans

I.A.3 — Master Plans

I.A.4 — Business Plans

I.A.5 — Strategic Plans

I.B.1 — Construction Plans

I.B.2 — Investment Plans

I.B.3 — Safety Plans

I.B.4 — Emergency Plans

I.B.5 — Land Use Plans

I.B.6 — Fundraising Plans

Strategic Fundraising Plan, Gunnison Ranchland Conservation Legacy (*S. Lohr*)

II. Administration

A. Guiding Principles

FSMLs are diverse institutions. However, as relatively remote sites for conducting field research, research training and science education FSMLs share some fundamental similarities. Effective administration of a FSML will take into consideration the following general principles:

1. All administrative activities should evolve from the FSML mission, through the program, facilities, master, business and strategic plans. The FSML mission statement should reflect the mission of the sponsoring institution, and justifies the activities of the FSML to the sponsoring institution. The purpose of FSML administration is to manage the execution of tasks which arise from FSML plans.
2. Administrative policies must be derived from the sponsoring institution's policies. Additional policies will be required to cover activities and needs peculiar to the FSML. Independent FSMLs should develop policies that reflect their governing Board's philosophy.
3. The level of reporting within the sponsoring institution should be concordant with the administrative level at which the categories of activities in which the FSML engages are integrated within the sponsoring institution. For example, if the FSML engages in both outreach and research, the FSML Director should report at an administrative level which includes both outreach and research in its responsibilities.
4. A FSML is essentially a remote campus. A fully developed FSML performs nearly all the functions of a campus on reduced scale.
5. External participation through advisory committees and periodic external reviews can greatly enhance the stability and resiliency of the FSML's administration.
6. FSML administration does not occur in a vacuum. The FSML is nested within a network of administrative relationships (see Figure II.A). For these relationships to be sustainable, there must be an exchange of benefits. Each partner supplies something of value to the other partner. In addition to the mutual provision of some need, there is also an exchange of reporting. The largest percentage of administrative efforts are best directed towards those groups below the dashed line in the figure, as well as toward the sponsoring institution. However, to achieve sustainable growth, the FSML administration should allocate administrative responsibility to maintaining the other relationships as well.
7. The nature of administrative relationships varies widely among FSMLs. Some FSMLs are independent nonprofit corporations and have no sponsoring institution. For independent FSMLs, a Board of Directors often fills some of the roles of both the sponsoring institution and the community of donors. Some FSMLs have many neighbors who can support their mission politically and financially, while others are located in remote areas with low human population density and perhaps a poorly educated surrounding community. Many FSMLs serve only one or two of the three programmatic groups (research, education and outreach).

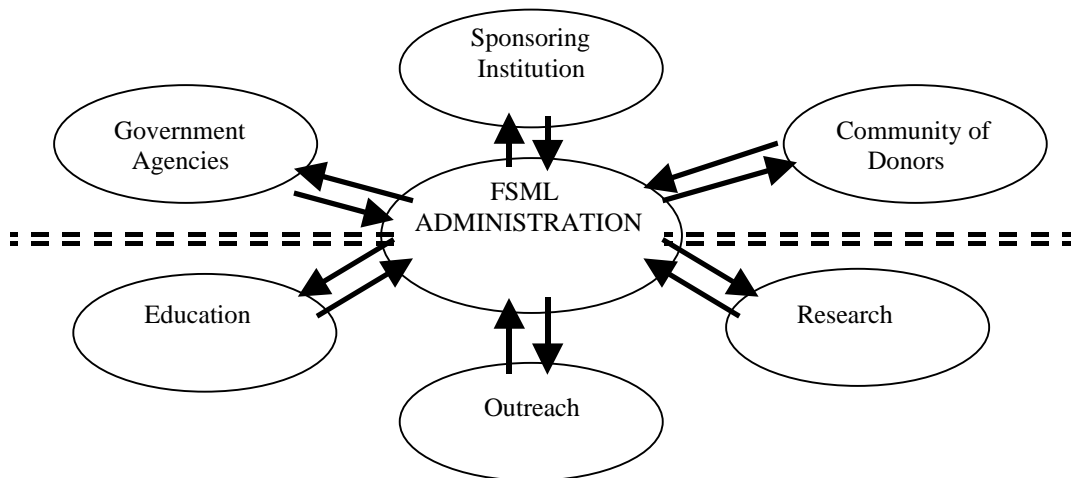


Figure II.A. FSML relationships. Those below the double dashed lines are groups for whom the FSML either provides direct administration or facilitates the conduct of the group’s activities. Those above the dashed line are entities that function either above or outside the FSML’s administrative jurisdiction.

B. Statements of Mission, Vision, Goals and Objectives

1. Mission Statement

Effective administration evolves from a one-or-two-sentence mission statement that is general enough to apply in perpetuity. A mission statement that is appropriately constituted is essential for guiding FSML program development. Here are some nonidentifying examples of FSML mission statements:

“The _____ is a living laboratory for the advancement of knowledge through ecological research, education, and stewardship of the natural world.”

“The mission of the _____ is to provide a site and facilities for ecological and environmental research and research training.”

“The mission of the _____ is to develop knowledge and promote an understanding of general ecology through a program supporting research in the _____ watershed.”

“The mission of the _____ is to increase, through field research, understanding of the _____ ecosystem, and to foster ecosystem stewardship through training, education and outreach.”

“The mission of the _____ is environmental research and education concerning the long-term dynamics of the barrier islands, lagoons, marshes and watersheds of the _____.”

2. Vision Statement

A vision for a FSML is a more in-depth articulation of the mission and addresses a shorter time span. Each operational area of the FSML may have its own vision, goals and objectives to guide decisions and policies. Here is a vision statement that might evolve from one of the above mission statements:

“To use the site and facility to promote the integration of environmental and ecological awareness into every aspect of undergraduate education.”

There would be a similar vision statement addressing appropriate research for the FSML.

3. Goals

Programmatic goals evolve from components of the mission and vision, and are more specific. Here are two sets of goals that might evolve from the above FSML mission statements:

- a. *Provide a research climate that results in fundamental discoveries about ecological and environmental processes.*
 - b. *Ensure that faculty and students are the central element in fundamental field science investigations.*
 - c. *Promote participation in FSML programs by visiting researchers and students.*
 - d. *Establish a mechanism to communicate field science to the general public.*
-

- a. *Through research we will understand the long-term dynamics of the coastal environment.*
- b. *Through education we will foster environmental literacy.*
- c. *Through research and education we will advance the conservation of one of America’s premier natural treasures.*

4. Objectives

Specific objectives set the programmatic goals into a timeline, such as for one-, five-, 10- and 20-years.

- a. *To become fiscally responsible, with a business plan that emphasizes financial self-sufficiency to a large degree, beyond a fundamental financial commitment from the university. (One-year objective)*
- b. *To provide a physical facility that supports and encourages accomplishment of the mission and goals. (Five-year objective)*
- c. *To achieve national prominence as a coastal research center. (10-year objective)*

See **Table II.B.4** for an example of objectives set into a timeline.

The sum of mission, vision, goals and objectives statements provides a powerful tool for planing and administering a FSML. Opportunities that arise, such as the donation of a piece of property that has specific management restrictions attached, can be evaluated in light of these statements of purpose. Some opportunities should be declined if they don’t fit the mission of the FSML. Other opportunities can be pursued because of the manner in which they would enhance the mission of the FSML. Ignoring the power of articulating these statements of purpose means that administration of the FSML takes place in an *ad hoc* manner, and risks the consequences of managing in a vacuum without firm guidance. A number of benefits to leadership that evolve from understanding the institutional mission are articulated in “Director’s Guide to Best Practices” (Byrd 2000).

C. Governance of the FSML

1. There are two distinct models for FSML governance:

- a. Model I: Governance by a sponsoring institution, which is usually a university, college, museum, or larger nonprofit corporation. As of January 2001 approximately 85% of OBFS member FSMLs were part of a larger institution.

- b. Model II: Self-governance at an independent FSML, with no sponsoring institution. These FSMLs are usually nonprofit corporations with federal tax-exempt status. AS of January 2001 about 15% of OBFS member FSMLs were independent.

2. How is governance effected?

There are a number of questions associated with governance. Each should be answered in writing, and a process established for appropriate action.

- a. Who determines policy?
- b. Who hires and fires?
- c. Who evaluates the Director/Executive Director?
- d. Who controls the strategic plan, and other planning processes?
- e. Who approves the budget?

For Model I FSMLs, many of these functions are intrinsic to the FSML, although authority may lie with either the sponsoring institution. For Model II FSMLs, the Bylaws of the Board of Trustees dictate where authority rests. Some of the literature available from the National Center for Nonprofit Boards (www.ncnb.org) can help a Model II FSML understand the national norms for nonprofit governance. Another resource is the "Trustee Handbook: A Guide to Effective Governance for Independent School Boards" (De Kuyper 1998), sponsored by the National Association of Independent Schools (www.nais-schools.org).

3. Advisory Committees and Other Groups

Many FSMLs have found tremendous benefits in using advisory committees. Most common is a Scientific Advisory Committee, composed of scientists who conduct research at the FSML as a minority of committee members, other national or international colleagues, and persons with special expertise such as high-level regulatory executives. These committees meet at least once a year and address policy issues related to the scientific content of research or educational programs at the FSML. To be most effective, their advice is solicited in a proactive fashion rather than in response to one or more emergencies. And most important, their advice is taken very seriously.

Other advisory groups can be constituted to deal with fundraising, finances, endowments, capital projects, or any number of topics. Not only do FSMLs benefit directly from expertise that might otherwise be available, but there are benefits to be gained from having powerful individuals from other professions knowledgeable about and vitally interested in the activities of the FSML.

D. The Nature of the Directorship

1. The Qualities of a FSML Director

Directors of FSMLs are in unique positions within the sponsoring institution. Directors are often hired with a primary appointment as faculty or curator, and with a secondary administrative appointment. As a result, they have a large number of tasks to perform that are very different from people in the organization who have similar primary appointments (i.e., faculty colleagues). They may be expected to interact with the president of a university on one day, and to quickly repair a boat motor for a field class on the next.

In searching for the Director of a FSML, an organization should attempt to find candidates who have vision; administrative, supervisory, and fund raising experience; are interested in strategic planning and development of programs in education and research; and are broadly trained in the sciences. Specialized skills will include being an excellent communicator, being knowledgeable in database and information management, and having some experience in working effectively with the public, government organizations, non-government organizations and private foundations.

Successful directors are often personable, extroverted, high-energy people with well developed people skills. They will not be afraid to get their hands dirty during the operation of their FSML. Depending on the nature of the FSML, an effective Director doesn't necessarily need a Ph.D. A combination of experience, skills, knowledge and personality are often more important than academic credentials.

2. Managerial Responsibilities of a FSML Director

The managerial responsibilities of a Director will vary depending upon the scale of operations of a particular FSML. The range in scale of FSML operations is very great. Some FSMLs are complex, multi-million dollar operations employing dozens of people and having very large physical plants or large land holdings. At the opposite end of the spectrum are simple, low budget operations employing only one or two people that have limited physical plant and land holdings.

The most complex operations are for those FSMLs that mirror the mission and activities of their sponsoring institution and are located in remote locations. A good example might be a university-sponsored facility that is located far from urban centers but carries out most functions of the parent institution. This FSML would offer undergraduate or graduate instruction and curriculum development; would support housing and food services for faculty, students, and researchers; would equip and maintain laboratories, classrooms, and animal care facilities; and would provide informal educational and recreational activities for the residents of the facility. FSMLs such as this are, in fact, stand alone miniature university campuses that have all the managerial and administrative problems associated with a larger university campus.

In general, remote FSMLs will demand more resources and administrative effort to manage properly than comparable facilities located in close proximity to their home institution. The phrase "out of sight and out of mind" is particularly true for any remote FSML. Parent organizations must make greater commitments to remote FSMLs to ensure that they prosper. The Director is well advised to establish a strong presence within the sponsoring institution. One of the Director's critical tasks is to educate the administrator to whom he/she reports about the FSML. This education is most effective if it includes periodic visits to the FSML by the administrator to whom the Director reports. The Director should also consider visits from other key sponsoring institution personnel, so that they have a context for understanding the special challenges faced by the FSML staff with whom they interact. This can often lead to special funding allocations to address, for example, health and safety issues which arise during a tour of the FSML facilities by the sponsoring institution's health and safety director. The Director's efforts at establishing relationships with key administrators will with time lead to inclusion in the informal problem-solving and mutual support networks that, beyond the formal administrative structure, are usually the route by which needs are addressed and problems solved.

Since FSML Directors often have little or no prior administrative experience, the Director also needs to engage in self-education about the sponsoring institution's administrative structure and culture. Universities often offer workshops which can accomplish two goals: 1) rapid increase in understanding of administrative structure and procedures, and 2) a chance to establish a relationship with sponsoring institution unit administrators outside of the chain of command.

In most cases, the FSML Director will be a middle level manager within a larger organizational structure. The level of reporting within the sponsoring institution should be concordant with the

administrative level at which the categories of activities in which the FSML engages are integrated at the sponsoring institution. For example, if the FSML engages in both outreach and research, the FSML Director should report to the administrative level which includes both outreach and research in its responsibilities. In the case of a university-funded FSML, the Director should in general report to someone at the level of a Dean or above. In the case of an independent FSML, the Director will often report to a Board of Trustees or similar group.

The Director will have the following overall responsibilities at all FSMLs:

- a) integration of FSML activities both within the FSML and within the parent organization
- b) communication up and down lines of administration
- c) program planning

3. Models for the Directorship

The administrative activities at a FSML can be organized in a task tree as illustrated in Figure II.E.1. Depending upon the mission of the FSML and its scale, the proportion of these tasks which the Director executes vs. those which the Director delegates will decrease in proportion to FSML size and complexity. Regardless of size, the Director plays a critical role in the integration of tasks and information, in reporting to the sponsoring institution, and for budgetary and programmatic planning.

Many models currently exist for the directorship of FSMLs. The type of model often depends upon the size, location, financial health of the parent institution, and whether the FSML is public or private. FSML directorships include full-time appointments, partial appointments, rotating appointments, faculty who are tenured or tenure-track, or directors that are drawn from the business community because of their experience in the private sector.

It is a guiding principle that in *most* instances a FSML will only prosper if:

- a) The Director has a full-time appointment.
- b) The Director is a tenured faculty member (or equivalent) in the case of academic organizations.
- c) Every attempt is made to ensure that the Director is long-lived in the position in order to cultivate administrative and other beneficial relationships.
- d) The Director has business experience if the mission of the FSML demands a significant amount of interaction with the public or business community.

To reiterate, FSMLs will not prosper unless a Director can devote full and focused efforts toward development of their unit. We recognize that this is often not possible, and not desirable in some unusual instances, but then special attention must be paid to the establishment of an evaluation strategy and reward structure commensurate with the increased responsibilities of the Director of an FSML.

4. Evaluation of the Director

The parent institution should recognize the diversity of tasks and establish evaluation procedures that reflect that diversity. The Director may need release time from departmental teaching or committee responsibilities in order to achieve FSML administrative goals. Ideally, a percentage of effort to be allocated to research, administration, teaching and service would be part of both the Director's job description and the evaluation procedure. Most FSMLs could truly use a 100% administrative Director. If research is part of the Director's job description, then it should not exceed 25% of the Director's time in order for the FSML to be administered effectively. Teaching

and institutional service responsibilities should be minimal. This generalization doesn't apply to situations with enough financial resources to hire a multitude of assistants to the Director.

Annual performance evaluations of the Director can be difficult. For example, in many instances, a Director may be drawn from the faculty of a parent university. However, despite the multitude of tasks that a Director must perform, they are often simply evaluated along with their departmental counterparts with little attention being paid to their responsibilities as Director.

In the case of tenured faculty, evaluations of scholarly performance should be tempered by the fact that the Director has large temporal and professional commitments to the management of the FSML. These commitments are often far above and beyond the "normal" load of a colleague in one's own department, but are often ignored or perceived to be unimportant by an evaluating committee. A clear set of criteria must be developed for judging how well the Director has met the demands of FSML management, and rewards developed which compensate for the loss of research productivity associated with the unique job of being a Director.

As a principle, specialized evaluation procedures should be developed for the Directors of FSMLs. The annual review is an important process that not only aligns the priorities of the sponsoring institution with the FSML, but also aligns the performance of the Director with the mission, goals, and objectives of the FSML. Since no one at the sponsoring institution may have direct experience with FSML administration, it is highly desirable to establish periodic external reviews which include administrators from other FSMLs with established records of excellent administration. This recommendation is also important for stand-alone FSMLs, which often operate in administrative isolation from other similar institutions.

E. Organization

1. Staffing and Responsibility Assignment

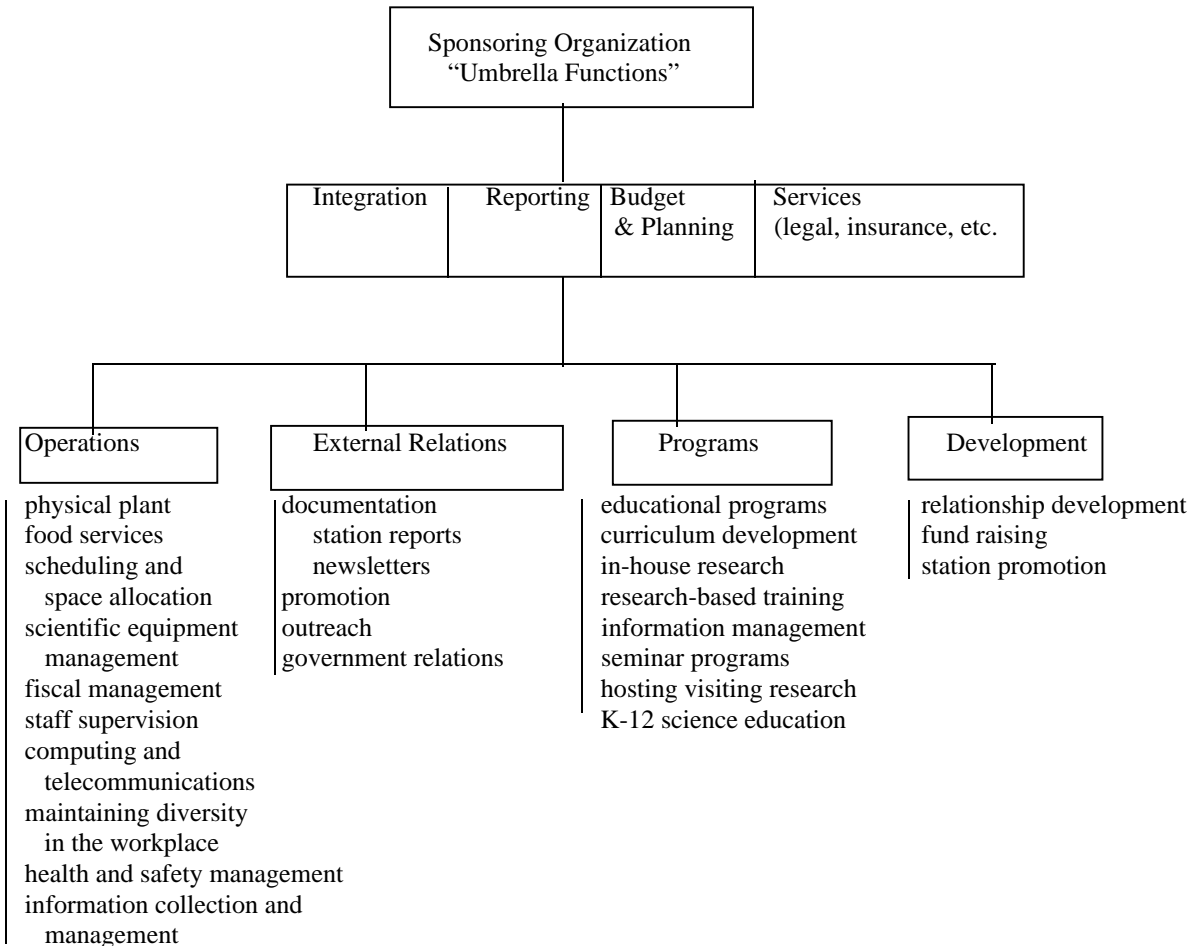
The administrative activities of a FSML can be organized in a task tree as illustrated in Figure II.E.1. The scale of the station's activities determines the level in the tree at which FTEs are assigned. For most FSMLs, the sponsoring institution provides a number of "umbrella functions". These might include ultimate fiscal responsibility, accounting and auditing, purchasing, risk management, human relations, legal services, and transportation services. However, the FSML, because of its remote location, often performs at least portions of these tasks or faces significant challenges in coordinating sponsoring institution functions with FSML on-site needs and functions. This situation creates inevitable dissonance in budget, reporting lines, and information flow. This dissonance leads to conflict, and can contribute to a 'them' vs. 'us' fingerpointing culture which greatly undermines effective administration. Understanding the source of the conflict in the manner described above can help to resolve these issues and find solutions.

In developing a task chart similar to Figure II.E.1 for a FSML, tasks not pertinent to the mission or situation should be removed and others unique to the facility should be added. For example, many nature reserves will not have dining services if they do not have a resident population of students or scientists.

Job titles at the FSML should describe the nature of the staff member's duties as closely as possible, while preserving future flexibility in responsibility assignments as the FSML and the staff member's capabilities grow. Official job titles with the sponsoring institution often will not match the FSML functional job titles, since the official job titles must be taken from the sponsoring institution's taxonomy of job titles. Due to differences in scale, the division of responsibilities among job titles will differ between the FSML and the sponsoring institution. This inevitably leads to substantial problems, including inappropriate actual activities in relation to job title, inappropriate pay scale associated with the level of responsibility and experience, inadequate

avenues for pay and position advancement. Ideally, the sponsoring institution will address this by adding a set of job titles specific to the FSML personnel.

Figure II.E.1. Task Chart for FSML



2. Organization Chart

Every FSML should develop an organization chart that links tasks that need to be performed to positions that people fill. There is no one typical organizational chart since FSMLs vary greatly in size of operation and number of personnel. See **Figure II.E.2** for a sample basic organizational chart for FSMLs.

The flow of information up the organizational chart to the sponsoring institution, and the flow of funds, expectations and information back to the FSML from the sponsoring institution, are critically important. Ideally, all information flow, budget lines, and reporting should be in parallel. When these lines are not parallel, administrators of units at the institution end up being

asked to fund staff or activities they do not ordinarily fund. For example, the Director of a moderately large field station reports to the Chair of Biological Sciences, and the operating budget of the field station is derived entirely through that department. This field station, like all field stations, requires custodial service. On campus, custodial service is performed through Facilities Management and is off-budget for the departments. The result is that custodial services are a source of constant conflict, with the Department believing that it is not their responsibility to fund custodial services, and Facilities Management seeing the field station as a remote outpost of the department, and not their responsibility.

The Director is the primary conduit for reporting to the sponsoring institution. Typically and ideally, the Director is responsible for all aspects of FSML administration, and is formally responsible for all reporting and information flow. However, because the FSML benefits from a number of umbrella functions performed by various units within the sponsoring institution, substantial amounts of informal reporting and information are exchanged laterally between personnel FSML and sponsoring institution staff. This is a necessary evil, but can cause serious difficulties for the Director if he/she is not kept apprised of developing issues that involve the lateral interchanges with the institutional administrative units.

The Director is responsible for the execution of all aspects of administration, but delegates execution to one or more staff members. In large FSML operations, authority for day-to-day operations is delegated fully to an Associate Director. This is critical if the Director is to accomplish the complex planning, integration, recruiting, fund raising, reporting, and public relations activities which are the most critical and least effectively delegated of the Director's responsibilities.

F. Staffing and Human Resources

1. Employee Handbook

An employee handbook is an essential item in a FSML's repertoire of administrative policies. It provides an important foundation of legal protection for not only the FSML but for its employees. An employee handbook describes some of the expectations that an FSML has for its employees. It also outlines the policies, programs, and benefits available to eligible employees. Once this document has been established, it is important to keep it up to date. Additionally, it is important that all employees are familiar with this handbook and have an individual copy for their reference.

a. Handbook basics

The establishment of an employee handbook can be a large task. However, software is available to make the task less daunting. Additionally, the available software provides valuable legal templates for many issues. A popular software package for employee handbooks is "Policies Now". It has a long-term track record, and is widely used by human resources professionals. As of the writing of this document, "Policies Now" can be purchased for under \$100. It can be found at www.amazon.com. Additionally, "Policies Now" offers handbook updates as new legislation comes into play. This service provides a valuable resource for keeping employee policies and forms up-to-date.

b. Handbook sections

Software such as "Policies Now" will assist with the development of the sections listed below. These sections are crucial portions of any employee handbook.

i. Acknowledgment form

Employee handbooks should be given to each employee for their reference. "Policies Now" provides an acknowledgment form that employees must sign upon receipt of their

handbook. This provides a written record of an employee's receipt of the handbook. It is their responsibility to be familiar with its contents.

ii. Introduction

An employee handbook should begin by providing an introduction to the FSML. It should also include an introductory statement which defines the intended use of the handbook.

iii. Employment issues

General employment issues should be discussed in this section, such as the employment selection process and job posting. More detailed employment issues include:

- Equal Employment Opportunity
- business ethics
- immigration law compliance

iv. Employment status and records

This section may deal with items such as:

- the various classifications of employees
- personnel files
- reference checks
- probationary periods
- performance evaluations
- job descriptions
- salary administration
- promotions
- new hire/rehire policy

v. Employment benefits

Employees are usually keen on keeping informed of their benefits, and this section provides useful information for FSML staff. Issues discussed in this area can include:

- vacation, holidays
- sick leave
- health insurance
- any other applicable insurance coverage (life, disability)
- pension

vi. Timekeeping/Payroll

This section provides information on the specifics necessary for payroll timekeeping. It can include information on:

- timesheets
- paydays
- payroll termination
- severance pay
- deductions

vii. Issues of the workplace

There are many critical issues involved in the workplace, and they can be effectively addressed in this section. These issues would include:

- safety
- use of telecommunications systems
- smoking policy
- use of equipment and vehicles
- business travel expenses
- computer policy
- professional memberships

- viii. Leaves of absence
The Family and Medical Leave Act (FMLA) is a federal law that is a requirement for certain employers. It provides for up to 12 weeks of unpaid leave during a 12-month period. To determine if a FSML is subject to the FMLA, please check the federal government's Department of Labor's website at www.dol.gov. Additionally, if a FSML would like to provide any other types of leave, it may define those leaves in this section.
- ix. Employee conduct and disciplinary action
It is critical to be able to provide written expectations of employee behavior and to spell out the steps involved in disciplinary action. Not only is it fair to provide employees with this information up front, it also provides a measure of legal protection for the FSML by making its policies clear and known. It is also crucial that all disciplinary actions be recorded in a written format, even if a verbal warning is given. A notation to the personnel file can be made. Again, this provides a measure of legal protection to the FSML, and it assures that everything is documented properly for the employee. Issues in this section include:
 - employee conduct
 - drug/alcohol use
 - sexual harassment
 - substance abuse policy
 - progressive discipline
- x. Miscellaneous
Each FSML will have a variety of miscellaneous items that should be conveyed to its employees. Such items can include:
 - recycling
 - political activity policy
 - suggestion program
 - housing facilities

2. Staff Management

- a. Staff challenges
There are a number of challenges that make managing staff at a FSML more difficult than in a more traditional institutional setting. These include:
 - i. All the tasks of a campus are being performed by a handful of staff.
 - ii. Staff easily feel overwhelmed by the number and kinds of tasks they must perform.
 - iii. Staff are simultaneously serving many of the groups represented by tasks in Figure II.E.1.
 - iv. Casual friendly atmosphere encourages direct interactions between users and staff.
- b. Factors limiting staff effectiveness
The following factors should be thoroughly understood by FSML management. They serve to limit considerably the potential effectiveness of staff time and energy.
 - i. Prioritization is difficult.
 - ii. Frequent interruptions mean more time is needed to complete routine tasks.
 - iii. Personnel often feel as though everyone is their boss.
 - iv. The majority of time may be devoted to serving one group, but evaluation may be based on other criteria.
 - v. There is often friction between staff and users because nothing can be done "right" (perfectly) in a remote field setting.
 - vi. There is often a lack of self-esteem within a harried and demoralized staff.

- vii. There is a seemingly endless amount of work, making a sense of accomplishment impossible.
- c. Approaches to maximize staff performance and self-esteem
Several approaches have proved effective at FSMLs for addressing some of these staffing issues.
- i. Each position should have a clearly written job description. Each employee should read and know their job description.
 - ii. Regular formal evaluations should be conducted, including:
 - Self-evaluation.
 - Open two-way discussion of problem areas.
 - Praise for areas of responsibility which have been well carried out.
 - Clearly stated areas in which improvement is warranted.
 - Clearly stated goals with a timeline and criteria for establishing whether or not goals are met.
 - Clear action items for the supervisor when a need for changes in supervisory approach arise.
 - iii. Regular group staff meetings, which include:
 - Some encouragement or 'cheerleading'.
 - Review of activities in recent past. Were goals achieved? If yes, praise. If no, what prevented them from succeeding?
 - Establishment of goals and priorities for upcoming time period, including:
 - Time lines for tasks.
 - Specific assignments of responsibility.
 - Review of necessary information to be communicated during and at completion of task.
 - What to do if things spin out of control.
 - Opportunity for conflict resolution.
 - iv. Protocol for user requests for staff service
 - Solicit input from users about the immediacy of need, but don't let users control priorities for staff.
 - Establish a 'nerve center' where requests are made. This would be a point person or request form.
 - Train staff to direct user to the appropriate protocol.
 - Back up the staff when user challenges the staff member's adherence to established priorities.
 - v. Providing opportunities for training and professional advancement.

G. General Policy Development

It may be helpful to consider the following questions when developing any policy or guidelines.

- 1. Are there any laws that may affect the development and implementation of a policy?
 - a. Are there, for example, state laws that govern employment policies? Note that public FSMLs may be subject to more regulations than private FSMLs.

4. Are there other factors, such as highly sensitive and unique habitat, that may necessitate formal use restrictions? For example, is the habitat sufficiently sensitive and unique (i.e., pygmy forest) to warrant a ban on manipulative research? Perhaps conservation easements or other preservation tools would be appropriate for some FSML lands.
5. Have there been recent changes in federal or state law that may necessitate developing new policies or revising existing ones? For example, changes in state law governing the possession of firearms on certain remote university/college properties may require new signs or rules about firearms that are consistent with the new law.
6. Have there been recent developments related to research that may necessitate developing new policies or revising existing ones? For example, where there is growing concern about the introduction of non-native genotypes, it may be appropriate to review and update existing policy on research.

H. Liability and Insurance

In our highly litigious society, institutions are concerned about liability issues. This concern may be heightened when the FSML sponsoring institution is either a large state university or is otherwise well endowed, because it can be viewed as having “deep pockets” by a potential plaintiff. In certain regions of the country where lawsuits are more prevalent, institutions are far more sensitive to this issue. Lack of institutional familiarity with the FSML program can sometimes lead to problems if administrators anxiously seek to curtail certain kinds of FSML activities in an effort to reduce exposure to liability. Even though the FSML Director should not be expected to understand the intricacies of tort law, nevertheless it may be instructive to understand how institutions seek to reduce liability risk, and to have a basic understanding of any laws that may provide tort immunity for the FSML. In addressing liability issues, keep in mind two key institutional resources: the risk manager and legal counsel.

1. Reducing liability risk

a. Development of safety protocols

The simplest way to minimize tort liability is to assess the particular risks at the FSML and develop appropriate safety guidelines or protocols. It is advisable to engage the institution’s risk manager in this process. That person could provide valuable assistance not just in the development of the safety rules but also in locating funds for necessary maintenance in the interest of reducing liability risk.

b. Use of waivers and releases

The use of releases or waivers for certain types of activities that are viewed as “high risk” is a common means of reducing liability risks and reducing legal costs that result from defending lawsuits, including frivolous lawsuits. These documents are intended to relieve the FSML and/or governing institution of liability for certain types of claims and lawsuits.

A signed liability release can assist with mitigating some of the risks associated with the remote sites and natural hazards that are part of most FSML experiences. Expert legal advice should be solicited in formulating a liability release. Every participant in FSML activities, including staff, visitors, researchers, family members, undergraduate or graduate students, field trip participants, and school children attending programs, should sign one.

2. Assessing Liability Immunities

Each state has a body of law relating to tort immunities. Sometimes these laws are focused on the immunities inherent in a nonprofit organization and sometimes the focus is the particular hazard, such as recreation, trails, natural features, etc. For example, usually the Board of Directors and administrative staff are indemnified from the consequences of decisions they make, except in cases of “gross *and* intentional negligence”. Every FSML Director should consult an attorney experienced with these issues to request a written opinion on the nature of tort immunities that might apply to the FSML activities. This written opinion will assist greatly in properly formulating policies, waivers, releases and other documents that seek to explain risk.

3. Insurance

Many FSMLs receive insurance and liability protection from their sponsoring institution. For those that have to purchase such policies themselves, they can be a massive annual expenditure. Independent field stations often pay in excess of \$25,000 each year for insurance policies that cover the liability of trustees, staff and other decision-makers for values up to \$5 million or more.

A number of universities are self-insured, and some field station consortiums have investigated this avenue. Those FSMLs that are covered by sponsoring institutions are more likely candidates than are independent FSMLs. The costs of just one nonfatal automobile accident involving students can rapidly exceed \$500,000.

I. Consortiums and Other Formal Associations

FSMLs are generally embedded in a regional landscape of mixed ownership and usage. Some of the individuals and organizations share objectives with the FSML, and partnerships can often be productive for the FSML. These partnerships often start out informally, but as investment and dependence on the shared enterprise or resource grows, it becomes increasingly valuable to codify the relationship, making the mutual expectations and responsibilities legally explicit.

1. Kinds of agreements

a. Consortiums

A consortium in a FSML context is a formally constituted group of universities, colleges, or other entities that utilizes FSML facilities for teaching, research, and outreach activities. Some examples that may serve as guides to establishing a consortium include Au Sable Institute of Environmental Studies, Hancock Biological Station, Highlands Biological Station, Iowa Lakeside Laboratory, Malheur Field Station, Pymatuning Laboratory of Ecology, and Reis Biological Station. Each of these stations and others can be contacted to determine how their consortium was established, what are membership requirements, how much dues cost, and what their members are entitled to do at the host station. Some general aspects of a consortium are briefly mentioned below.

There is no single model under which consortiums operate. However, all FSML consortiums do have at least three goals in common:

- i. increasing visibility
- ii. increasing activity
- iii. providing a source of operating funds.

In establishing any consortium, the mission of the consortium first must be defined and should be consistent with the mission of the FSML and its home institution. A consortium that is not in line with the mission of the host institution runs a risk of failure either by not being supported by the higher administration or by overwhelming the primary mission of the

FSML. The consortium should have some implied or explicit mission for biological or ecological research, education or research training.

In the simplest form, consortium members are entitled to conduct field trips throughout the year, teach summer classes, and conduct research. In most consortiums, membership implies an annual fee or at least some type of financial support from member institutions. In the Pymatuning example, support comes in the staffing of summer courses paid for by the member institutions. In other consortiums, members pay a set fee. At Hancock there are several levels of membership: full research/teaching members (\$1000/yr), teaching members (\$500/yr), and junior college members (\$250/yr). Junior college members utilize the facility solely for field trips throughout the academic year. Teaching members (primarily undergraduate universities) have a say in the summer courses to be offered and provide the instructor for at least one of these. Research/teaching members also are part of the summer teaching program. Further, they have use of research boats, general laboratory facilities, and assist in the acquisition of specific research equipment. Research/teaching members include not only Ph.D. granting institutions but also government agencies such as Tennessee Valley Authority and Kentucky Division of Water.

Revenues derived from consortium dues should be designed to meet basic member expenses, but memberships should be kept affordable. The real revenue stream from consortiums comes not in the dues but in the money that is generated in tuition/course fees (assuming that students register for courses through the station) and in room and board fees. If it is an active, well planned consortium, these fees can be extensive.

Establishing and maintaining a consortium requires quite a bit of work and planning, particularly in the early years. If in doubt, start small. A consortium can begin with two or three members, with perhaps no fee or a greatly reduced fee in the first year or two. Use those initial members to plan how to proceed, to determine the goals and mission of the consortium, and to plan one or two consortium activities. Initial activities could be a joint summer course, a symposium, or anything that might increase the visibility and activity levels of the station and the consortium. Let the initial group determine the structure and bylaws of the consortium. Involve higher administration wherever possible along with the provosts, deans, and chairs of the consortium members. Keep in mind that the consortium links not only the FSML programs of the members, but also the universities as a whole. Further, most often it is the dean or provost who pays the consortium membership, and that person must select from a number of consortium opportunities open to a university.

b. Use agreements

Use agreements are legal contracts. These contracts insure the long-term viability of FSML use of adjacent real estate, and are entered into with private landowners or non-governmental and governmental agencies. Important considerations include:

- i. Limitations on acceptable uses.
- ii. Limitations on landowner's rights to engage in activities which compromise FSML activities.
- iii. Duration of agreement.
- iv. Liability issues.
- v. Exchange of information regarding use and management changes.
- vi. Access.
- vii. Built structures and permanent equipment installations.
- viii. FSML's stewardship responsibilities.

c. Other formal agreements

There are a number of types of formal agreements, often individually called a "Memorandum of Understanding" that can be executed between a FSML and other public or private entities.

For example, The US Forest Service offers opportunities for such memoranda dealing with specific issues such as trails, research uses, etc. There are also “Special Use Permits” procedures for negotiating long-term research project rights on USFS lands. Similar opportunities exist with the US Fish and Wildlife Service and other state and federal agencies. Some activities in which FSMLs routinely engage are of great interest to public agencies, such as archiving and managing biological information. Providing archival resources for government agencies has given a number of FSMLs an advantage in dealing cooperatively with the government, especially for purposes of leasing research property.

J. Personal Behavior

The control of personal behavior falls squarely on the shoulders of the FSML administration. Issues surrounding personal behavior can be rather complex because of the isolated nature of many FSMLs. People living or working at remote sites are often not subject to the same peer constraints as provided by daily life at home. Less direct supervision of people occurs at FSMLs. Field facilities often have higher populations of less responsible college age or younger people. FSMLs often promulgate an atmosphere of informality and friendliness. Enforcement of rules and regulations at FSMLs tends to be less stringent. Those in charge of enforcing rules and regulations are often not present for extended periods of time, especially at the most remote facilities.

Many policies need to be formulated for the unique situations encountered at FSMLs. The following list are those behaviors for which policies should be developed at nearly all FSMLs. This list is not exhaustive. Some policies governing personal behavior may have already been addressed in detail by the parent organization. Most FSML policies will be developed by facility staff, faculty, and users.

Policies governing personal behavior need to be widely circulated and discussed. Each person using FSML facilities should sign a statement indicating that they have read the appropriate policies and agree to abide by them. Specific sanctions for noncompliance, such as expulsion, revocation of certain privileges, cutting firewood for everyone, cleaning latrines with a toothbrush, etc., should be stated in writing. Enforcement of policies falls on all station personnel including the Director, staff, faculty, and other FSML users.

1. Alcohol and Drug Use

Alcohol and drug use often underlie many problems encountered with personal behavior at FSMLs. Drinking and driving is of special concern. Local, state and federal laws govern alcohol use by age, and prohibit drug use. Policies may have been developed by the parent organization that cover the same territory. Making all station personnel and users aware of drug and alcohol policies in addition to enforcing these policies rigorously will go a long way toward avoiding problems with personal behavior at FSMLs. It is tempting to be lenient with alcohol use by students, staff or visiting researchers because of the remote nature of many FSMLs. However, in most states legally the Director of the FSML is *in locus parentus* and bears the same responsibility as a bar or restaurant owner for serving alcohol to intoxicated or underage persons.

2. Pets

Individual FSML policies vary. Most commonly, however, but pets are not allowed at field facilities because they disturb wildlife, interfere with research project design by introducing variables, disturb other facility users, and raise health and safety issues (bites, allergies, etc.). Most FSMLs do not have proper facilities for the boarding of domestic pets.

3. Recreation

Many recreational opportunities are available at FSMLs. Policies must be written to control recreational activities, especially in sensitive ecological areas. These policies will be necessarily linked to health and safety issues at a particular FSML (camping on the premises, swimming, boating, diving, trail use, mountain biking, climbing, hiking in remote areas, wildlife attacks, etc.).

Another type of recreation endemic to FSMLs is casual sexual activity. Some FSMLs provide free condom machines in neutral locations. Such an amenity could be mentioned in a personnel handbook. Otherwise, it is difficult to develop any formal policies for dealing with the many problems that result from this pervasive aspect of life at a FSML. A list of local counselors might come in handy for the inevitable questions about sexually transmitted diseases, depression, unplanned pregnancy, etc.

4. Firearms

The possession of firearms at a FSML will often be governed by its own rules, rules of the parent organization, or by local, state and federal regulations. At some FSMLs hunting may be allowed on land under control of the FSML or on lands adjacent to the FSML. Firearms may also be present on the premises for legitimate purposes such as protection from wildlife attack or predator control. Examine all local regulations concerning gun laws carefully, with an eye toward safety of people at the facility.

5. Vehicle Usage and Permits

Many types of vehicles are brought to FSMLs by users. Policies need to be developed to address their improper use (e.g., driving on off-limit roads) and where they can be properly parked. Many FSMLs discourage unnecessary driving and provide central parking areas.

6. Quiet Hours

Work at FSMLs is often informal but very intense. It is advisable to have a strong policy governing noise and quiet hours for those who go to bed early and get up early.

7. Visitors

Policies should be developed for registering visitors and for controlling their behavior. Unruly visitors and guests, who either do not know about behavioral rules or feel as if they are not subject to them, are just as annoying and disruptive as unruly residents. Visitors must be informed that they are subject to the same rules and regulations as FSML users. Many FSMLs simply do not allow overnight visitors.

8. Sexual Harassment, Discrimination or Bullying

There are federal and state laws that can help with development of policies pertaining to these issues. Unfortunately, due to the often hierarchical nature of relationships within a research team, the opportunity for abuses of power exists at FSMLs. These issues require very careful consideration and the solicitation of legal advice. FSMLs with sponsoring institutions can often use the institutional resources available to them to address these matters. Independent FSMLs might solicit assistance from other FSMLs of similar scope and size.

9. Computer, Telephone and Internet Use

The need for policies governing these activities at FSMLs has escalated over the past few years. The best approach might be to solicit examples of policies from other FSMLs, because the variety is tremendous. Issues to consider include how residents will receive phone calls or emails, how messages are provided to them, what phones are available for calling out, whether long distance service is offered, sign-up sheets for email access, how to apportion fairly a limited number of phone lines, whether computers are available for games or social contacts, etc. These issues can rapidly become extremely contentious.

K. Safety

Every FSML should develop safety procedures and provide them in writing to all users of their facility. The goal shouldn't be to "cover your ---", but rather to do the right thing because it's ethical. Often on-site training will be required for certain safety issues. Among topics to be considered for a safety handbook are:

1. Security, trespass and law enforcement
It is important to establish procedures for dealing with criminal activity before it happens. Calling “911”, having a “duty officer”, suggesting nonviolent confrontation techniques, etc. are all possibilities to be considered.
2. Fire safety
There should be established procedures for reporting fires, spreading an alarm, evacuation, etc. Again, a “duty officer” or staff person in charge will need to be designated.
3. Hantavirus, Lyme disease, poison oak/ivy, snakes, etc.
There are protocols recommended by the Centers for Disease Control for addressing hantavirus. Every FSML should post these protocols in every residence, and cite them in a safety handbook. Several hantavirus deaths have taken place at FSMLs in the past few years. Other safety precautions should be mentioned, and medical contacts listed.
4. Water treatment
Many FSMLs find that they are classified by their state government as a municipality when it comes to water supply. This classification is usually based on the number of simultaneous residents, and having a seasonal operation rarely justifies an exemption. A number of regulations pertaining to water treatment result from the classification. Even if a FSML is exempt from regulation for the purpose of providing domestic water, it is nonetheless important to be as certain as possible that the water supply is safe and free from contaminants. Keeping a record of regular water tests and their results is the first step in minimizing risk.
5. Disposal of waste
Sewage disposal is regulated locally. Many FSMLs use septic systems, and need to be sure they can locate the cleanouts and can show that there is no contamination from aging leach fields. Some FSMLs are experimenting with biological waste disposal. Other areas of concern are liquid laboratory waste, and hazardous materials disposal. A policy of “what comes in must leave with the researcher” is most common at FSMLs, but compliance is often poor. This issue must be specifically addressed in a researcher code or handbook, and enforcement must be strict. One FSML Director inherited a secret cupboard with ancient lab chemicals from seven decades of noncompliance, including a 5-lb. disintegrating box of cyanide from 1929. Disposal was a nightmare. After a highly dangerous four-hour drive on mountain roads, it was accepted by a sympathetic researcher who slipped it into her department’s official hazardous waste disposal process. This is not the recommend manner of handling hazardous waste disposal!
6. Scientific diving
Scientific diving is a serious safety issue for freshwater and marine laboratories. Whether or not to offer a scientific diving program is an important administrative decision. Here is a brief overview of some of the issues to consider.
 - a. Criteria
Scientific diving means diving performed solely as a necessary part of a scientific or educational activity by employees whose sole purpose for diving is to conduct scientific research tasks. Scientific diving does not include tasks associated with commercial diving, nor recreational diving outside the auspices of a scientific diving program. The Occupational Safety and Health Administration (OSHA) promulgated rules governing scientific diving (reference: Federal Register 47 FR 6335367 of 26 November 1982 and 50 FR 1046 of January 9, 1985). Federal law does not similarly govern recreational diving. To avail themselves of the exemption from the OSHA Commercial Diving Standards, scientific diving programs at

research institutions, state agencies, universities and colleges must fit the definition of scientific diving, have a diving program that includes a safety manual, and have a Diving Control Board with autonomous authority of the operational aspects of the diving program. Diving programs should be very criteria-oriented. Scientific divers, based on the nature of their activities, must use scientific expertise in studying the underwater environment and therefore are scientists or scientists-in-training. The purpose of a scientific dive project is the advancement of science, and thus information and data resulting from the project are non-proprietary.

- b. Establishing a scientific diving program
To apply for Organizational Membership with the American Academy of Underwater Sciences (AAUS) a member organization scientific diving manual must be created. This manual will provide for the development and implementation of policies and procedures that will enable an organization to meet requirements of local environments and conditions, as well as to comply with the AAUS scientific diving manual. A member organization's scientific diving standards shall include, but not be limited to:
 - i. The complete AAUS Standards for Scientific Diving Certification and Operation of Scientific diving programs (1990) or another member organization's manual which meets or exceeds this manual.
 - ii. Provide documentation of the following topics for each diving mode utilized:
 - Safety procedures for the diving operation
 - Responsibilities of the dive team members
 - Equipment use and maintenance procedures
 - Emergency procedures
 - iii. Establish a Diving Control (safety) Board, where the majority of its members being active divers, which shall have, at a minimum, the authority to:
 - approve and monitor diving projects
 - review and revise the diving safety manual
 - assure compliance with the manual
 - certify the depths to which a diver has been trained
 - take disciplinary action for unsafe practices
 - require the maintenance of a diving activity log for all qualified divers
 - assure adherence to the buddy system (a diver is accompanied by and is in continuous contact with another diver in the water) for SCUBA diving
 - iv. All dive team members shall have experience or training in the use of tools, equipment and systems relevant to assigned tasks, techniques of the assigned diving mode, diving operations and emergency procedures.
 - v. All dive team members shall be trained in CPR and first aid (American Red Cross standard course or equivalent).
 - vi. Dive team members who are exposed to or control the exposure of others to hyperbaric conditions shall be trained in diving-related physics and physiology.
 - vii. Each dive team member shall be assigned tasks in accordance with the employee's experience or training.
 - viii. Each dive team shall have a designated person-in-charge who shall be at the dive location in charge of all aspects of the diving operation affecting the safety and health of all the dive team members. This person shall also have experience and training in the conduct of the assigned diving operation.

- ix. The designated person-in-charge will be responsible for implementing the Safe Practices Manual. This will include:
 - Safety procedures and checklists for diving operations
 - Assignments and responsibilities of the dive team members
 - Equipment procedures and checklists
 - Emergency procedures for fire, equipment failure, adverse environmental conditions, and medical illness and injury.

- x. The designated person-in-charge will also be responsible for pre-dive procedures, which include providing:
 - a list of emergency phone numbers for the closest decompression chamber
 - a list of accessible hospitals
 - a list of physicians available
 - notice of means of transportation and the nearest U.S. Coastguard Rescue Coordination Center
 - maintenance of first-aid supplies
 - the planning of a diving operation, which will include the assessment of surface and underwater conditions, thermal protection, dive team assignments, physical fitness of dive team members and repetitive dive designation or residual inert gas status of dive team members.

- xi. The designated person-in-charge will also conduct post-dive procedures which will include a check on the physical condition of the diver, instruct the diver to report any physical problems or adverse physiological effects and to warn the diver of the potential risks in flying after diving.

L. Legal Issues

Many sections of this handbook address legal requirements for a variety of FSML operations. When considering contracts, agreements, and other documents that obligate the FSML in a legal manner, it is important to understand the lines of authority within the FSML sponsoring institution or independent board of directors. It is also important to learn which administrator has the authority to approve and/or execute (sign) an agreement, and bind the institution under that agreement. The Director should learn what types of legal documents, MOUs, and other documents s/he may sign, and it is advisable to have that understanding in writing, in a letter of delegated authority. If a Director signs an agreement for which s/he has no the authority, the contract could, in certain cases, be held unenforceable.

M. Regulatory Environment

The regulatory environment at FSMLs is significant. Due to the health and safety requirements common to science instruction and the concomitant liability in dealing with students and the public in field environments, or where hazardous materials may exist, FSMLs are facing a growing number of new regulatory issues.

1. Policies

FSMLs do not operate in a vacuum. Institutional policies and state and federal laws set limits on the development and operations of FSMLs. Within the limits of these externally imposed constraints a FSML must set its own policies to govern the behavior of users and the appropriate use of its facilities. Specific facility policies should address the following, as a minimum.

- a. Environmental health and safety
- b. Land use

- c. Equipment and vehicle use
- d. User behavior

2. Regulations

Regulatory issues will need to be considered during routine operations and also during planning processes at FSMLs. Some of the regulations to be addressed are:

- a. State and federal requirements relating to water supply and waste disposal, health, safety, labor, taxation, ADA compliance, personnel, and environmental quality.
- b. Special regulatory agencies, such as coastal commissions, conservation resource conservation districts, etc.
- c. Local regulatory issues such as water conservation, sewage disposal, weed control, zoning, building codes, and inspection procedures, licensing of vehicles and vessels, licensing of contractors.
- d. Fire safety regulations and the institutional, local and state levels.
- e. State, federal and local requirements relating to animal care and use of animals for research and teaching.
- f. Diving safety regulations from the American Academy of Underwater Sciences (AAUS).
- g. Vessel safety regulations from the U.S. Coast Guard.
- h. Licensing regulations for contractors.
- i. Licensing of vehicles and vessels at the local, county or state level
- j. Permits for research or educational activities on federal or state lands
- k. Miscellaneous scientific conduct permitting issues, such as bird-banding permit requirements, weed control regulations, trapping regulations, etc.

N. Ecosystem Impacts

Many administrative decisions about programs and facilities, and especially policy formulation, can have both direct and cumulative impacts on the ecosystem of which the FSML is part. It is important to assess these impacts and decide which are acceptable and which are not. FSMLs usually are good about addressing the impacts of research activities on ecosystems, but typically ignore ecosystem issues stemming from educational, outreach and facilities management activities. Often the preparation of a land use or zoning plan brings impact issues to the forefront.

Policies to minimize damaging ecosystem impacts will need to be developed. Issues such as pets, exotic species introduction, foreign soils involved in landscaping or construction, trails and roads, transportation and deliveries, recreation, weed control, green architecture, etc. should be examined from an ecosystem impact perspective.

O. Land Management and Stewardship

Land ownership confers certain responsibilities on a FSML involving stewardship and management of land resources. Leases of land for research or educational programs may or may not involve stewardship and management obligations. Those FSMLs with significant acreage to manage find that monitoring the condition of the land and managing it to retain certain ecological values can be time consuming and expensive.

The Land Trust Alliance (www.lta.org) offers a number of resources that can assist with designing stewardship and management plans. Also, baseline monitoring protocols have been developed by the Long-Term Ecological Research Program funded by NSF (www.lternet.edu).

As is true with assessing ecosystem impacts, issues surrounding land stewardship are often ignored or given low priority. Unfortunately, inattention to stewardship can reduce significantly the research and

educational resource values of a FSML over time. Hopefully FSML planning processes will provide land management issues with the explicit visibility that is appropriate to the importance of carefully stewarded land resources.

P. Volunteer programs

Most FSMLs rely on volunteers in some fashion. Board members, committee members, friends of the FSML groups, teachers and parents who accompany field trips, formal docent programs, and research intern programs are examples of volunteer programs that have been successful at FSMLs.

Managing volunteers can be extremely staff-intensive. They need to be recruited, trained and encouraged. Certain tasks are not appropriate for volunteers because of the inherent unpredictability of most volunteers as far as always being able to give their time. Some FSMLs make extensive use of volunteers but also devote a staff position to their management.

At a minimum, a FSML can keep a list of task that need accomplishing to have handy when a volunteer appears. Examples of appropriate tasks include newsletter mailings, library journal reshelving, filing, moving offices or labs, monitoring stream quality, bird-banding, data entry, giving tours, etc.

An emerging area of volunteer use is with research interns. These are students who need a summer research experience and are willing to pay their expenses in order to volunteer as a member of a research team. Some FSMLs coordinate the selection of these interns in a competitive process, and match them with scientists conducted research at the FSML who need summer assistance.

Q. The FSML Network

The informal network of FSMLs across the country and around the world has always been useful to individual FSML Directors who need assistance with some aspect of administration. In recent years efforts are being made to formalize the network and make the connections among FSMLs explicit. A 1995 workshop attended by 33 FSML directors urged that a functioning network would provide tremendous benefit not only to FSMLs but to the nation's scientific agenda (Lohr et al. 1995). A 1999 workshop began the process of formalizing the network (Stanford and McKee 1999).

Numerous advantages accrue to individual FSMLs from being a functional node on the FSML network. Sharing of administrative information, such as this manual provides, is only one benefit. Data-sharing greatly increases the intellectual importance of the science being conducted at FSMLs. Visibility to funding agencies and politicians is enhanced. Legal and insurance issues can sometimes be resolved better as part of a larger network.

There are two organizations that facilitate the FSML network. These are the Organization of Biological Field Stations (www.obfs.org) and the National Association of Marine Laboratories (www.naml.org). The LTER Network Office (www.lternet.edu) is available to provide specific information on the hardware and software requirements for connectivity that permit maximum participation in a more formal network. The LTER Network Office staff are also accumulating information about policies and procedures that need to be developed in order to best utilize the power of the network.

R. Public Relations

An area of administrative effort that rarely receives the explicit attention it needs is public relations. An understanding of the larger community context in which a FSML is set can be critical to FSML survival. An investment in good public relations over time can be repaid hugely when there is a crisis

threatening the FSML. Additionally, ongoing good relationships with local and regional residence can help achieve a number of goals for a FSML, from permits for roads or buildings, to leveraging funding opportunities.

Few FSML Directors are skilled at public relations. Sponsoring organizations such as museums or universities have PR departments and officers, and these people can provide needed expertise. Independent FSMLs might have to contract for PR expertise, but a few hours invested in getting expert help reviewing PR opportunities and designing a few programs can be extremely beneficial.

S. Other Administrative Policies

There seem to be an infinite number of ways that time gets wasted at a FSML. One example is in responding to telephone or written inquiries about the facility, or to information requests such as “what is the recipe for hummingbird food?” Some of these situations need explicit administrative policies, but it can be tempting to go overboard and create a specific policy for every situation. Next the FSML will have to hire a “Policy Officer” just to keep track.

Experienced directors urge perspective regarding creating policies in response to routine situations. Often finding the right staff person can solve or minimize the problem. Also, judicious use of the internet can help greatly with processing some requests. Simply refer the questioner elsewhere...

T. Emerging Administrative Issues for FSMLs

There are a number of emerging issues that should be addressed by FSML administration. These topics are increasingly complex and require gathering a great deal of information before making administrative decisions about policies and procedures. The network of FSML colleagues can provide valuable information based on recent experiences with a number of these topics. Other scientific societies are also addressing these issues and have developed protocols and other archives of information.

The following list provides some examples of emerging issues. These are worthy of consideration for a variety of reasons, including increased regulatory compliance, liability concerns, safety issues, or rapidly advancing technology. Some of these topics are hot enough that there are new funding opportunities made available to FSMLs to address them.

1. Invasive species and control measures relating thereto.
2. Protected species.
3. Tissue repositories.
4. Emerging infectious disease and other pathogens.
5. Local and national resource management issues affecting land use or coastal planning.
6. Global change.
7. Environmental education and appropriate sites for conducting programs.
8. Long-term monitoring programs that generate increased information management requirements from the accumulation of massive amounts of data.
9. SCUBA compliance with AAUS.
10. Small boat procedures and regulation by the U.S. Coast Guard or other agencies.

U. Record-Keeping

Archiving administrative records should become an established routine for FSMLs. What to keep will depend on the nature of the FSML and whether there are responsibilities for generating academic transcripts. Long-term research records are especially important, as are lists of programs, person-days of attendance, and of course financial records. Some of the documents rarely considered but with

tremendous importance are road records, deeds, title insurance policies and any restrictions relating thereto, and easements. Every FSML should achieve the venerable age of 100 years, and old maps and field notes will be very important to future users. Each FSML needs to determine policies about record-keeping and maintaining archives.

Tables, Figures and Documents for Section II – Administration

Table II.B.4 – Reasonable Objectives Over Time (*Source: S. Lohr*)

Figure II.E.2 – Basic Organizational Chart (*Source: S. Tonsor, D. Biesboer*)

Examples (fill in list as examples are provided):

- II. General Operations or Administrative Handbooks
 - University of Oklahoma Biological Station – Policies and Procedures (*Source: L. Weider, UOBS*)
- II.B. Mission Statements, Visions, Goals and Objectives
- II.C. Governance, Committees, Advisory Groups
- II.D. Directorship (Job Descriptions, Evaluations, etc.)
- II.E. Organization Charts
- II.F. Staff Structure, Employee Handbooks, Evaluations, Contracts
- II.G. Policy Compilations
- II.H. Liability Releases, Insurance Coverage.
- II.I. Consortium Agreements, Memoranda of Understanding, Special Use Permits, etc.
- II.J. Personal Behavior Policies (Alcohol, Pets, Recreation, Firearms, Vehicles, Visitors, Sexual Harassment, Computers, etc.)
- II.K. Safety Manuals, Hantavirus, Water Treatment, Diving, etc.
- II.L. Policies or Procedures Relating to Legal Authority Issues
- II.M. Regulatory Lists and Responses
- II.N. Ecosystem Impact Analyses
- II.O. Land Management and Stewardship Policies
- II.P. Volunteer Programs
- II.Q. FSML Network Requirements
- II.R. Public Relations Plans
- II.S. Other Administrative Policies

III. Programs

Programs at FSMLs encompass research, educational and outreach activities, and the technical requirements to support these activities. Ideally, planning processes dictate which programs will be pursued at a FSML, but in practice the process for adding programs is often quite *ad hoc*. An overall plan that allocates percentages of administrative effort, financial obligation, facility allocation or person-use days to each of these program types can be very helpful in determining whether a new program opportunity should be pursued.

Some FSMLs convene an advisory committee that helps determine content, policies and procedures for FSML programs. These committees are sometimes called “Scientific Advisory Committees” or “Academic Advisory Committees”. In the narrowest application they may address only one type of program, such as a “Research Committee” or a “Curriculum Committee”. However, FSMLs that have set up a broader advisory committee highly recommend the greater issue coverage because single program are not considered in isolation, but rather are examined holistically in the context of overall FSML activities.

These committees meet once every year or two, are composed of professionals from beyond the confines of the FSML, and when most effective are asked to consider planning issues proactively rather than in reaction to a specific event. For example, as part of a long-term planning effort a Scientific Advisory Committee might be convened for a two-day meeting to address whether a FSML should offer formal undergraduate research training programs. Committee members would consider the financial, social and academic advantages and disadvantages of starting and maintaining such a program, and would give the FSML Director the benefit of their collective experience and judgment.

A. Technical Support

1. Libraries

a. Issues

The library needs of FSMLs vary from those facilities with only a few feet of library shelf space to full-fledged libraries with full-time staff. A wide range of materials is appropriate, from a few field guides to:

Maps

Books, monographs and journals

Photos, slides and aerial photos

Access to digital versions of photo archives, journals, books, monographs, maps and all other library materials

Internet access to university library catalogs and indexing or abstracting services

There are costs associated with shelf space, room space, journal binding, subscriptions, cataloging and computational support for data access. An alternative to acquiring paper copies of journals is a subscription to electronically published and distributed journals. The field of professional librarianship offers expertise in the form of journals, monographs and consultants who can assist a FSML with determining the appropriate level of library operation and expense to serve users.

b. Staffing

Library staffing can range from some volunteer time, to part-time secretarial help to full-time professional librarians and assistants. FSMLs may be able to obtain advice

and support from campus libraries. Universities with library science degree programs may have students who need to perform internships. Cooperative arrangements with other libraries may provide internet access to digital versions of journals, citation search engines (Biosis, SCISearch), interlibrary loan, etc.

c. Facilities

There are a number of specialized storage requirements for library materials. The advent of compressed shelving makes having a library in a small space much more feasible. Storage of some materials, especially archives, may generate specific requirements for temperature and humidity control.

d. Policies

i. Lending, loaning, depositing and disposing of library materials

Often the material at FSMLs is only available for use in the library and is not checked out, particularly at small field stations. At larger FSMLs there may be reading rooms, etc. where the material can be checked out if there is staff available for monitoring. All materials that are deposited in the library should be given to a designated staff person in order to minimize chaos. Donations of journals should be controlled through accurate record-keeping of who donates and when each issue is acquired. The exception to controlling lending and depositing is the unmonitored free-for-all paperback lending library.

Many FSML libraries exist solely because of the generosity of donors providing journals and books. However, some gifts are of only marginal utility. Someone within FSML administration needs to have the authority to accept or reject library donations. Additionally, there should be a written policy for deaccessioning materials. Some books and journals are decades old and cover a span of only a few years, and would better be given to a large university science library than taking up important space at a FSML. These difficult decisions need to be made from a well considered written policy agreed to by donors, users and administrators of the FSML library.

ii. Copies of theses, dissertations, coursework papers and scientific papers

A bound copy of any thesis or dissertation based on field work conducted at a FSML should be deposited with the station. Students and visitors should be advised of this requirement to provide copies. Additionally, an archive should be created of any papers resulting from coursework projects.

iii. Bibliography and repository of publications

FSMLs are encouraged to compile a bibliography of all publications resulting from work conducted at the FSML. At least two copies of journal articles as well as other printed materials resulting from work at the FSML should be provided to the Director or the library. Compliance with this requirement should be a condition of continuing to work at the FSML. The cumulative body of knowledge about the FSML that results from these studies is of great importance to future scientific users.

iv. Donations of books

There is a cost associated with storage of books. For public relations reasons, donations should be encouraged, but some selection of donated material is required. A letter acknowledging a gift of books or journals that meets IRS

requirements for charitable donation substantiation should always be provided to the donor.

2. Collections

a. Issues

i. Databases

For each collection of items, a database should be prepared. A wide range of collection database software is available. Most FSMLs with collections would benefit from developing partnerships with museums and following museum protocols such as those established by the American Association of Systematics.

ii. Legal issues – permits for collection and possession

Usually regional, state and federal permits are required to collect plants and animals, even if they are not listed as threatened or endangered species. Researchers should provide copies of current permits with the FSML research application forms. Often a FSML provides list of contacts in appropriate government agencies to facilitate the permit process. In some cases, it may be possible for a FSML to apply for a general permit to cover all research and teaching activity admitted or approved by the FSML. Some states require that either original permits or copies of permits be in the physical possession of collectors when they are collecting. Old specimens at FSMLs may now require possession permits. Examples of likely materials include eagle feathers, skeletal remains of native peoples, etc.

b. Staffing

Keeping track of new collections and materials to be lent can require a great deal of staff time. Collaboration with regional museums and herbariums should be developed. Perhaps volunteer labor for preparing or cataloging specimens can be found through internship programs.

c. Facilities

Facilities to store plants, animals and other specimens can be very expensive. Before committing to storing samples, a FSML should develop a long-range plan for space allocation and maintenance expenses. Tissue, soil and other collections may require expensive storage in ultra-cold freezers that require continuous electric supply. Formalin and other fluids used in collections may require special building permits and fire prevention structures. There are a number of references available describing how to store various types of plant and animal materials as well as soil, air and water samples. The proper storage of scientific collections can be very expensive and highly technical. Many FSMLs are unable to provide adequate storage opportunities for individual scientists and suggest that home institutions might be more appropriate venues to meet specimen storage needs.

d. Policies for lending, loaning, depositing and disposing of specimens

Similar to the situation for library materials, policies need to be developed and understood by all with regard to how collection materials are used. Specimens need to be tracked by staff if they are to be removed from the storage facility and loaned to scientists or other institutions. Policies should be developed for acquiring specimens and for removing them from the collection.

3. Information Management and Computer Facilities

a. Issues

i. Cost

Costs associated with computing and information management can be significant. For FSMLs, several good reviews exist. The issues were defined and documented extensively in the workshop summary "Data and Information Management in the Ecological Sciences: Synopsis from a Field Station Perspective" (Swain and Michener 2000). The full report, called "DIMES", is also available (Michener, Porter and Stafford 1998).

ii. Connectivity

Connectivity is a very quickly evolving landscape of options. Costs are dropping and satellite technology can soon deliver good connectivity almost anywhere. FSMLs should contact their supporting institution or the OBFS liaison at the LTER office for the latest options. Often university or other sponsoring institution connections can be extended to FSMLs at reasonable costs. Independent FSMLs might investigate the possibility of securing connectivity through a nearby university or public agency.

iii. Power and lightning protection

Issues relating to the determination of power sources for computing systems are discussed extensively in the DIMES report. It is particularly important for FSMLs to have uninterrupted power supplies attached to their computers and other equipment to minimize damage associated with electrical voltage fluctuations. Some of the best lightning protection at field stations is installed at Archbold Biological Station in Florida. The Archbold system was partially funded by NSF and details about the system are available directly from Archbold staff.

iv. Maintenance and replacement

The average lifetime expectancy of a computer, either desktop or laptop, is three to five years. Budget plans should reflect limited period of utility. Short lifetime also apply to servers, hubs, routers and other network components. Printers and other peripherals may have even shorter lifetimes.

v. Information back-up

Administrative and research information at a FSML should be backed up on a regular basis and stored in two or more locations, ideally with one off-site.

vi. Functions

There can be a wide range of hardware and software at a FSML. Resources can be as basic as one PC for administration with a 56K modem on a single phone line, or as complex as a network across all the FSML facilities, an elaborate GIS lab, and fast internet connections. More elaborate systems will require some professional information technology assistance on the site as well as sufficient building space and bandwidth. It is difficult to define a minimum installation for a FSML, but the ability to provide e-mail and web access is reasonably important. The ability to grow can be severely constrained by limited bandwidth availability.

vii. Audio visual resources

Basic audio visual resources at a FSML used to include simply slide or overhead projectors and an array of computer printers and photocopiers. Today, digital photography, use of a laptop computer and a digital projector of at least XVGA quality can all greatly improve the teaching and outreach capacity of a FSML. As more outreach goes online, images from websites and digital projectors can

be shared. By skipping the processing of film slides, presentations can be quickly assembled and shared over the internet.

viii. Distance learning and conferencing

Distance learning opportunities are embraced philosophically by some FSMLs and rejected by others. Issues to consider include the ability to reach a wide audience versus the fundamental experience gained by being outside in the field. The debate is moot for many FSMLs, however, because both distance learning and conferencing capabilities require at least partial T1 bandwidth, or at two 156K ISDN phone lines.

ix. General principles

Here are some general principles that result from direct experience at FSMLs:

- It often pays not to be at the cutting edge of technology. For example, the latest release of a software or hardware product is often rife with bugs or other problems. Furthermore, cost is at a premium for the cutting edge product. Compatibility is often an issue. Sometimes the most recent version of software is not compatible with earlier versions. However, being more than a year out of date can reduce effective communications with other scientists at other institutions.
- It is better to err on the side of more frequent back ups.
- Ease of use, access to service, and customer support are high priorities in purchasing hardware and software, particularly at remote FSMLs. It is better to purchase off the shelf, integrated components as opposed to on-site programming and fabrication.

b. Staffing

It is important to establish how much staff time can be allocated to support the information management needs of either visiting scientists or FSML research and administrative staff. Often considerable effort is involved in just maintaining basic infrastructure. Software updates generate a continual demand for time and support, but are necessary to keep up with the larger research community. At many FSMLs, anywhere from 10-25% of the research budget must be allocated to computing and communication support. Additional staff time must be spent consulting with visiting and resident researchers and staff to confirm the nature of information management needs over time.

Many FSMLs begin with a half-time position dedicated to information management, and let the need drive the increase in staff allocation. Funding can be derived from research or station fees, or indirect cost recovery mechanisms. Managing administrative and scientific information is not an optional activity at a FSML, but rather is a fundamental and integral part of FSML administration.

c. Facilities

Facilities can range from a single PC with a modem to a local area network linking dozens of computers to the internet. The greater the investment in computer hardware, the greater the need to invest in lightning protection, uninterruptable power system and related infrastructure and support staff. It may pay to have a private consultant work with new FSMLs or with FSMLs contemplating upgrades of computers and computational network infrastructure. For example, fiber optic networking requires specialized equipment and tools. A great deal of expertise is

available to FSMLs from the OBFS liaison position at the LTER central office at the University of New Mexico in Albuquerque.

d. Policies

i. Providing consulting expertise

Each FSML should develop specific policies regarding how much FSML-paid information management staff time is allocated to consulting with staff and visiting researchers. Perhaps fee-based consulting can be provided within the FSML to help offset other information management expenses.

ii. User fees

Many FSMLs have found that a reasonable fee for visiting researchers to provide access to e-mail or the internet is acceptable (eg. \$20/user/month). Several FSMLs embed this expense in fees for general access to station facilities. Fees should reflect costs for internet access, telephone billing, etc. Additional fees may be necessary to cover supplies, media, etc. Using locking software to limit one or a few workstations to only e-mail, telnet and browsers can greatly reduce staff time to maintain computers and monitor usage. Often visiting users are unaware of how much more it costs in rural areas to secure connectivity. Internet service providers in rural Colorado, for example, pay nearly four times what ISPs in Denver pay for phone line availability.

iii. Software installation

A policy needs to be developed to prevent violation of copyrights of software on multiple machines. Installed software cannot be copied or downloaded onto other machines. The FSML as the “umbrella” organization bears the burden of violation prevention and must have a written policy in place to minimize liability exposure to copyright lawsuits.

iv. Virus protection

A policy should be implemented to install virus protection on all machines and update virus definitions on a regular basis. Web-updated virus protection software is ideal for FSMLs.

v. Access

A policy addressing access to computers, information databases and networks should be developed by every FSML. The terms of the policy will depend on FSML size, staffing and facilities. In many cases machines, software and data files can easily be password protected. Expertise is available to FSMLs from the LTER main office.

vi. Data sharing

Each station should have a clear policy on data ownership and data sharing. There are emerging rules concerning the sharing of data collected with federal research grant funds. The LTER office can provide the most recent information.

vii. Data catalog

OBFS is developing a process whereby a brief summary of each data set developed at every FSML is compiled for an OBFS data catalog. The National Association of Marine Laboratories (NAML) is also addressing institutional data sharing. Each FSML should develop a policy to encourage all scientists and students to catalog their data sets.

viii. Data repository

Over time, it may be useful for FSMLs to archive copies of raw data and metadata (Michener et al. 1997). Each data set should be described in the FSML data catalog.

- ix. Citation policy for data use
FSMLs should have a policy stating that all publications will provide adequate acknowledgment of station support and complete citations for any FSML data used.
- x. Back-up and archiving
FSMLs should have a policy mandating backing up and archiving administrative and research data. Ideally, data should be backed up frequently and at least one copy stored off site.

B. Research

1. Issues

- a. Research resource allocation
FSMLs need to determine the relative allocation of resources to researchers from the sponsoring institution and visiting researchers from other academic institutions. FSMLs should recognize that the National Science Foundation tends to decline funding requests from FSMLs that do not show significant use (undefined, but approximately more than 25%) by the broader scientific community beyond the sponsoring institution. Many FSMLs are strongly supportive of extensive use of their facilities by outside researchers because of the cross-fertilization of ideas that occurs in a diverse research community. Procedures should be developed to allow decisions about resource allocations to researchers when demand for housing, labs, research sites and other facilities exceeds capacity.
- b. Manipulative or non-manipulative research
FSMLs need to define which parts of the land under their influence or management shall be dedicated to manipulative or non-manipulative uses, recognizing that manipulative uses of the land may preclude other future ecological or genetic studies. All manipulative studies should be mapped so that future research conducted on previously manipulated sites can consider effects of past manipulations. If manipulative studies are conducted, plans should include some long-term markers for the manipulated sites. Also, the manipulated sites should be surveyed with GPS and entered in a GIS. Paper maps of manipulated sites can be archived as well.
- c. Zoning of lands
Zoning allows stations to provide a variety of exclusive and non-exclusive uses of land under their management or influence. Each station should develop a map that is clearly understood by all which shows places that can be used by the general public, by teachers and students, lands exclusively used for research and land that can support combinations of public, teaching and research. Additionally, there should be a functional mechanism that makes it easy for researchers to mark their study plots on the map each field season. Annual updating of research sites maps should be required of all scientists and students at a FSML.
- d. Long-term or short-term studies
Long-term studies can preclude the use of some land for other uses, potentially for a very long time. All long-term studies should be clearly mapped and marked so that future researchers using that land understand where the previous studies have been conducted, and what associated historical data may be available. If long-term studies

are conducted, plans should include some long-term markers for the research sites. Long-term study sites should be surveyed with GPS and entered in a GIS. Paper maps of long-term sites can be archived as well.

- e. Use of public lands
FSMLs may have cooperative use agreements or informal use agreements with a variety of private, state and federal lands. Each FSML should encourage a cooperative effort in tracking research with appropriate land management and resource management agencies. Formal agreements can be negotiated and working groups formed to include representatives of landowners and land managers for the geographic area of shared research interests.
- f. Type of research program
Most FSMLs host research conducted by scientists at a variety of stages of professional development. These levels include projects conducted by high school students, undergraduates, graduate students, professional scientists, and public agency personnel. Each of these levels involves relatively less or more supervision from the FSML administration. Other administrative implications include who is responsible for research behavior (eg. a minor cannot legally sign an agreement to abide by a research code).
- g. In-house grants, cost sharing, student support
FSMLs can provide in-house grants, cost-sharing and student support if funds are available. Even small amounts of money can make a huge difference to the success of undergraduate or graduate student research efforts. FSML grants can be used to encourage different elements of the overall research programs, if certain areas need bolstering. For example, grants could be provided to continue annual stream water monitoring efforts by independent graduate students. A postdoc position could be awarded to initiate a watershed monitoring program involving undergraduate research interns. If the sponsoring institution awards grants, it could consider providing the FSML with housing and facility maintenance costs to defray the operating expenses incurred by those who are awarded such support.
- h. Focused research themes versus general research programs
FSMLs will need to determine the degree to which the station will support a wide diversity of research topics. These research program issues should be addressed through an ongoing planning process. For example, it is possible for a small group of scientists in a relatively narrow field of study to make a long-term commitment of lands to manipulative study thus precluding many future opportunities for more diverse research uses.
- i. Compatibility of research projects
Consideration should be given to the nature of proposed research and its impact on other current research projects. For example, a study that proposes to introduce a population of honeybees or another pollinator would be devastating to long-term studies of plant-pollinator interactions in the same area. As more applied projects are conducted at FSMLs, issues of compatibility with observational science will become more contentious.

2. Staff

- a. Stations without research staff

Many FSMLS only have staff who facilitate the research efforts of others, not staff who conduct research. Providing facilities for visiting research can require housing

interns, technicians, scientists and families and providing laboratories or other resources for these research teams.

Often a FSML creates a part-time staff position called “Research Coordinator” to focus on addressing the many needs of visiting research programs. For example, a large research group wishing to work at the FSML may develop a grant proposal for submission to a funding agency such as NSF. A staff member of the FSML should review the proposal at an early stage so that compatibility of the research, housing and other facility needs of the research program are addressed well before the project is funded. Once funding is received, an obligation has been created on the part of the FSML to provide the necessary resources for the length of the project.

b. Stations with research staff

FSMLs with in-house research programs (hereafter called sponsored research) will need to determine the relative allocation of resources their scientific staff. Any funding received by sponsored research programs generates an expectation that the necessary resources required to conduct an effective research program will be provided to the scientific staff. They will naturally assume that they have the highest priority for space allocation.

3. Facilities

a. Facility development

Decisions about facility development should be based on a plan that considers long-term carrying capacity in the context of the mission, vision, goals and objectives of the FSML. In the context of a facilities plan the relative allocation of space and other resources for research, education and outreach can be addressed.

b. Facilities needed for different research programs

Many different research programs can be pursued at a FSML. It is easy for some research users to share spaces with other programs, but other programs require segregated facilities. A recommended parameter when considering how to allocate research resources is to ask how the program in question affects other people. Is it a nocturnal research project? Will there be 10 people preparing samples in a lab at late hours, playing music while they work? Will soil samples be heated, generating offending odors? Are *emeriti* researchers who spend hours writing in their office being asked to work next to a large, noisy lab with many undergraduates coming and going? Does a research team need to be near outside faucets, greenhouses, controlled plots, animal handling facilities, etc? All of these issues will arise later in the midst of a hectic field season. Careful consideration in advance when planning space assignments can make everyone much happier.

Another facilities question is the degree to which staff from sponsored research projects can share resources with visiting researchers. This issue may be difficult to resolve, because in-house staff are in their labs daily and use resources regularly, while visitors come and go and may not be as knowledgeable about nor careful with research equipment. On the other hand, the mixing of scientific staff with visitors creates a synergy that is one of the most productive attributes of science conducted at a FSML. Thoughtfulness and consideration on the part of the FSML will go far toward minimizing potential conflicts.

c. Animal holding facilities

A FSML should decide whether animal holding and manipulation will be permitted. Most FSMLs feel an obligation to provide this service for research users of their facility. The U.S. Department of Agriculture regulates animal holding for research and teaching purposes. The local USDA officer should be consulted when planning animal facilities, because s/he will have to inspect the FSML animal facilities for compliance with federal regulations. The scientific societies have developed protocols for handling regulated species for field and laboratory experimentation. FSMLs with animal handling research projects can choose to admit those projects themselves and assemble an animal welfare committee in compliance with USDA regulations, or they can require that every researcher provide evidence of compliance with their home institution's animal handling procedures.

4. Research Policies

FSMLs need to develop a variety of policies relating to research programs. Consideration should be given to how research users at FSMLs are included in planning efforts that lead to policy formulation. Types of research policies that will be required at most FSMLs are listed below:

a. Facility allocation

Each FSML should develop policies and procedures for allocating station resources for both the short- and long-term. It is especially important to be prepared for how to respond to a greater demand for research space than can be accommodated at the FSML. Consideration needs to be given to resource needs for long-term baseline monitoring studies (meteorological, permanent vegetation productivity plots, mapped forest stands, etc.), short-term research projects (individual and small-group, 1-3 year projects, extramurally funded, Master student projects, etc.), and collaborative large-scale studies (e.g. National Acid Deposition Program, phylogenetic studies, etc.)

b. Research fees

FSMLs should develop procedures for setting fees that will assist with recovering operational costs associated with research use. Examples of fees include laboratory rental, station use fees, computing fees, overhead charges for grants run through the FSML, etc. Some FSMLs embed these fees in one overall charge and others allow extremely detailed itemization. The mechanism for collecting the fees and sanctions for nonpayment should be articulated in a manner that every user must read and abide by. Some FSMLs convene a laboratory management committee to address conflicts concerning user fees, scheduling issues, etc. for research facilities.

c. Research codes

Many FSMLs have a research code that governs research conduct. The code usually evolves from a mater plan and specifies what kinds of research are allowed at the site. Restrictions on research topics (e.g., non-native species/genes, transgenetics, etc.) are listed. Priorities for space allocation are stated. Expected standards of behavior are articulated. Requirements such as registering research plots on a map, providing copies of all necessary federal and state permits to the FSML office,

depositing raw data in the FSML information archive, depositing voucher specimens in the FSML collection, depositing any publications resulting from research conducted at the FSML in the library or administrative office, etc. are listed in the research code. Usually researchers must sign that they have read the research code and agree to abide by it as part of the FSML application and admission process.

d. Research application and review process

FSMLs usually develop a formal application process that includes a form to capture information on users (name, contact information, sponsor, funding amount, duration, facility requested, land requirements, proposed locations, etc.). The application requires that users read and agree to the FSML research code. Proof of federal and state permits is often required at the time of application. Mention of any hazardous materials is required. Animal care and use applications may need to be appended, or evidence of animal protocol approvals from home institutions may need to be provided. Decisions on research project approval should not prevent or impair the future value of the FSML as a natural system, unless there is a conscious desire to make significant changes.

Formal approvals of research projects need to be specific as to their extent. Is the project admitted for three years? Five years? Forever? When is a new application required? What facilities are promised to the research project, for how long a time?

e. Termination of research projects

FSMLs should develop policies and procedures to ensure that all research materials are removed at the end of a field study. Some examples of materials often left behind include hazardous chemicals, rebar, PVC pipes, trailers, fences, flagging, wires, sensors, etc. Securing compliance with material removal requirements is very difficult and will require attentive administrative staff. In the most egregious cases, granting agencies such as NSF can be notified.

C. Education

1. Planning

Planning efforts provide an important context for considering which educational programs are appropriate to a FSML. Plans should:

- Articulate a vision statement for FSML education and training.
- Assess strengths, opportunities, weaknesses and challenges.
- Determine appropriate categories and scales to be included in the definition of “education” programs.
- Evaluate the role of the FSML in each of the contemplated educational activities. For example, will the FSML conduct the program? Simply host it?
- Develop programmatic guidelines for time and resource allocation.
- Identify funding resources.
- Associate timelines with various projects.

2. Program scales to consider

- a. Undergraduate education
The role of the FSML in undergraduate educational offerings should be defined. This role can range from merely offering a site for visiting classes, to sponsoring a full range of undergraduate courses from the sciences, arts, humanities or other disciplines. The level of facility use can vary for each type of undergraduate program. Uses include being a field trip destination, providing space and resources for resident courses, supporting independent studies and summer projects, participating as a required curriculum component for some majors, or providing research training in the field. Priorities will need to be determined for the variety of programs offered, and also for the source of the program (home institution, consortium members, other colleges or universities, etc.)
- b. Graduate education
Many FSMLs provide facilities for graduate students to undertake thesis or dissertation projects. Sometimes the student's major professor is not in residence, and the student is an independent researcher. Formal FSML educational offerings at the graduate level include specialized seminars and training in specific advanced field or lab techniques.
- c. Pre-Kindergarten – 12 (PreK-12)
Consider the definitions of education that are appropriate for the FSML. Some less formal PreK-12 programs are considered to be outreach programs. The role of the FSML in formal PreK-12 education should be carefully defined, since these programs can easily come to dominate the daily life of a FSML. Roles can vary from a partnership with school districts or individual schools, to curriculum development, to providing natural resource case studies for already established programs (Riverwatch, Project Wild, etc.), to providing a field trip destination, or to facilitating a weekend outdoor experience. There are also opportunities to receive NSF funding for providing high school students with research training opportunities.
- d. Teacher training
FSMLs host teacher training programs at a number of levels. These include providing specialized training for college or university faculty, often related to new field science techniques that can be adapted to undergraduate teaching or research labs. FSMLs also participate in PreK-12 teacher training in conjunction with Schools of Education. A third category of teacher training is providing opportunities for teachers already in service to expand their knowledge. There are a number of funding opportunities at NSF for teacher training at all of these levels. FSMLs can also participate in programs such as Project FIRST (see link on the OBFS home page).
- e. Public education
This category includes activities that are generated by a public school system, or in partnership with one. Activities that are solely generated by the FSML in order to inform the public about FSML activities are usually categorized as "outreach" and are discussed in the following section. There are a number of opportunities for FSMLs to participate in public education, such as:
 - Natural history tours (partnering opportunities)
 - Interpretative programs (docents, community ambassadors)
 - Public workshops, training (e.g. bird ID, medicinal plant use, plant pressing, papermaking)
 - Volunteer activities (e.g. stream restoration, exotic removal, monitoring, plant propagation)

Many FSMLs enter into these activities to generate some revenue, and find they are ultimately overwhelmed with requests to accommodate school groups. A careful watch should be kept on what percentage of FSML resources are devoted to participation in public education, since conflicts with research use of space and facilities are common.

f. Resource management professionals

A number of FSMLs have developed seminars or workshops for professionals who manage resources at public agencies or for large corporations. These seminars can be quite lucrative, but require a significant expenditure of administrative effort. Issues to consider include determining the role for the FSML, the nature of partnerships and how they are formally constituted, responsibilities for marketing, and responsibilities for curriculum content. Successful workshops include focused efforts addressing reasonably specific local or regional natural resource needs. There are also opportunities to provide professional certification and training in research techniques such as water quality monitoring, bird-banding, etc.

3. Staffing

There is an infinite array of staffing configurations for FSML education program. The first step is to identify the role and responsibilities of the FSML in each program, based on FSML priorities and funding resources. Who provides instructors? Who develops curriculum content? Who coordinates educational programs? Who gives tours or intercepts program participants in other ways? Who markets the programs? When programs evolve from partnerships with other entities, it is especially important to articulate these roles clearly.

Identify strategic projects that have clear timeframes and expectations. Differentiate between short-term and ongoing programs. Define roles for short-term staff projects. Roles include:

Title	Status	Responsibilities
Academic Program Coordinator	Full time/Part time Staff Position	Coordinate research and educational user community, administration, provide proposal support
Reserve Manager	Full Time/Part Time Faculty Member	Facility management, public relations, research liaison
Scientific Staff/Faculty	Adjunct Faculty, Instructors	Conduct biological research, publish, teach graduate students, obtain extramural funds
Environmental Education Specialists	Contract, Short-term	Develop and implement an environmental education curriculum
Volunteers	Temporary, Unpaid	Docents, Teacher's Aide
Volunteer Coordinator	Contract, Short-term	Coordinate Volunteers, Events

4. Facilities

Educational facility needs should be integrated with long term programmatic objectives. Identify appropriate facilities and land resources for each type of educational program. For example, resident courses will need housing, dining facilities and classrooms.

Resource management professionals will need conference room facilities. Natural resource interpretation training may use trail networks, restoration sites and disturbed areas for reference comparisons.

a. Space considerations for education and training programs include:

- Classrooms (smart classroom, AV access)
- Teaching labs (wet lab, darkroom, mud room, etc.)
- Computer facilities (machines, LANs, GIS)
- Library facilities, electronic access
- Study areas, conference areas
- Recreation, informal gathering areas
- Public interpretative areas, displays
- Food service facilities
- Overnight housing/dorm facilities
- Campout facilities

b. Equipment considerations include:

- i. Whether equipment is provided by the FSML or brought by visiting faculty or researchers
- ii. Whether equipment is site-specific or shared open-access equipment. Lab equipment that can be shared includes TEM, spectral photometry, analytical genetic equipment, etc. Field equipment that is open-access but site-specific includes various arrays of tower instrumentation.
- iii. Spatial configurations, such as the proximity of educational facilities to research labs, quiet areas, housing, roads, etc.

5. Policies

FSMLs usually develop a number of policies relating to educational programs. Careful and comprehensive advance planning for programs will help avoid the many crises that seem to arise on a daily basis during a busy field season.

a. Policies governing the development of facilities

Siting of buildings, land use plans, appropriate locations for different teaching activities, master development plans approved by local government, etc. are among the policies that govern facility development. All of these policies should sustain the core values of the FSML relative to its mission. Are interactions between user groups to be encouraged or discouraged? Is the general atmosphere to be quiet and serious or recreational?

b. Policies governing the use of facilities

Applications for each type of program should be developed. Each application will be tailored to the nature of that program. For example, a request to use facilities for class research projects on weekends might include requests for the number of students, the name of the instructor, the responsible department or other entity, a list of use fees, an agreement to provide products such as student papers resulting from the program, requirements for documentation-sharing with the FSML, a listing of site use priorities, statement of animal care policies, etc.

c. Codes of conduct

A number of FSMLs request students participating in educational programs to sign codes of conduct. Make sure the signatures are legal, i.e. with a parent or guardian signing for students under 18. Also, make sure that disciplinary action that might be

taken if the code is violated is stated in writing and includes a description of the disciplinary process.

d. Policies for instructors

Instructors conducting educational programs at FSMLs need to be apprised of appropriate field behavior. Some FSMLs use their research code for this purpose, and ask that instructors sign it. Issues to be considered relate to manipulative experiments, collections, transgenetics, introduction of species, appropriate locations for research plots and large equipment (greenhouses, tanks, screen rooms, etc.), hazardous material use and disposal, permits of all types, and any government requirements at the local, state or federal level.

e. Procedures

Procedures for educational programs should be clearly defined in order to implement apply the appropriate policies. Project-based procedures will provide tracking, timelines for development, implementation, documentation and closeout processes. Teaching classes will involve not only the project-based procedures, but also an awareness of daily schedules, access to vehicles, knowledge of which FSML staff can assist, etc. It is important that communication be as direct and comprehensive as possible. Program participants need to be forthcoming about the procedures their program will involve, and FSML staff need to be explicit about expectations for adherence to various FSML policies.

D. Outreach: Public Relations, Community Relations and Professional Service

“Outreach” has many definitions. It is important that the FSML’s definition of “outreach” matches the definition of “outreach” used by the sponsoring institution or funding source. NSF defines education as the transfer of scientific information. Transferring information to the general public is usually considered outreach.

If the FSML is a land grant institution, an extension component is often considered “outreach”, as can be K-12 activities. Some public professional activities of FSML administrators or staff (e.g., Board of Editors, Scientific Staff for Multiple Species Conservation Planning) may be important parts of a FSML program.

A vision statement for outreach activities should be developed as part of the master planning process. Determining the nature and extent of outreach activities appropriate to the FSML will involve an assessment of strengths, opportunities, weaknesses and challenges. Evaluate the proposed FSML role and identify appropriate categories and scales to be included in outreach. Build programmatic guidelines for time and resource allocation. Use planning tools like the effort-return matrix. Identify clear funding resources and timelines associated with various scales and projects.

The desired return from outreach activities should always be weighed against the effort of time and expense involved. Many outreach activities involve great expenditures of effort for little potential return. Note that the benefits can be enhanced by making sure the names and contact information for all public participants in FSML activities are captured. It is remarkable how often this small task is ignored, and there are potentially huge benefits to fundraising and other support opportunities.

1. Scale of Outreach Activities

Here is a list of examples of outreach activities at FSMLs. The scale of the program can be simple and involve little expenditure of time or funds, or it can be quite large and complex.

- a. Public reception – create an easily located reception area and staff it so as to impart information about the FSML cheerfully, yet control general public access in the manner appropriate to the specific FSML.
- b. Media liaison – either tracking content or creating content for TV, radio, newspapers.
- c. Develop marketing and recruitment strategies for FSML programs.
- d. Service organizations – provide canned slide shows and other talks, host Eagle Scout projects, talk to Scouts, the Elks, Nature Centers, Garden Clubs, etc.
- e. Local conservation organizations – provide speakers, host tours or workshops.
- f. Lecture series – create a lecture series for the public.
- g. Local and state government - serve on advisory committees, maintain appropriate relationships with elected officials.
- h. Federal government - serve on advisory committees, maintain appropriate relationships with elected officials, provide scientific expertise for national initiatives.
- i. National scientific organizations - serve as expert, editor, reviewer or committee member.
- j. Host regional, national or international scientific conferences.
- k. Technology transfer – provide advice about the application of basic science.
- l. Public tours of FSML property and activities.
- m. Virtual tours - web cams (See: <http://www.jamesreserve.org>).
- n. Community days - participation in clean-up events, Earth Day activities, local parades.
- o. Schmoozing activities – lunch w/ donors, neighbors, cocktail parties (hosting / going), get-togethers, friendship-building and awareness-raising.
- p. Liaison with home institution key figures – invite to the FSML and get to know on campus the staff from the public relations office, the media office, the development office, the campus relations office, and other key faculty and administrators.
- q. Host retreats for university departments, corporations, public agencies and others.

2. Staffing

When staffing outreach programs, identify the critical programmatic goals and direct staff and volunteers so that staff are engaged in highly productive efforts. Recognize that

there is great volunteer potential for many outreach programs, but volunteer supervision is time-consuming.

Issues to consider when staffing outreach efforts include:

- a. Identify appropriate staff for public relations and tours.
- b. Coordinate with public relations, development, media and legislative relations personnel at the sponsoring institution. Some of these functions may be entirely handled by these departments, obviating the need for FSML staff. In that case, regular communication of FSML needs, and effective monitoring of and feedback regarding institutional efforts are duties that must be assigned to FSML administrative staff.
- c. Provide staff for coordination of volunteers.
- d. Identify the level of service activity and desired outcomes of involvement for FSML scientific experts (committee meetings, science panels, advisory groups).
- e. Recognize opportunities for technology transfer and desired outcomes of involvement for FSML scientific experts.
- f. Assign a point person for information flow in and out of FSML. Duties would include generating template letters, providing canned descriptive material, tracking outreach effectiveness, etc.
- g. Assign staff for event planning and coordination.
- h. Identify strategic projects that have clear time frames and expectations. Differentiate between short-term and ongoing programs. Define roles for short-term staff projects.
- i. Where appropriate, capitalize on FSML education and research programs. Coordinate these programs with outreach activities for added value.
- j. Determine the proportional allocation of staff time to outreach.
- k. Decide which voice speaks publicly for the FSML and don't deviate. Staff can give tours, answer questions, and interpret programs to the public, but position statements and policy determinations should come from a high administrative level within the FSML. For example, in public hearings regarding adjacent land use changes, only one voice should provide the official FSML position.

3. Facilities

Developing facilities for outreach program requires careful planning. Some of the issues are:

- a. Public use of roads, trails, parking.
- b. A public intercept space, such as a reception area.
- c. Creating nature trails, board walks, kiosks.
- d. Signage. Note that there may be local regulations about signs.

- e. Gift shop or other area for retail sales.
- f. Access to a museum or interpretive area.
- g. Gathering spaces for socializing, with amenities such as good views, a fireplace, barbecue area.
- h. Core values – ADA compliance, green materials, appropriate technology, fire safety, low water use.
- i. Local zoning regulations and access issues.

Some FSMLs build a nature center in an area away from active research areas to accommodate most outreach programs. Boardwalks can also minimize the impact of public visitors on research areas.

4. Policies

- a. Develop and maintain a communication system with the sponsoring institution's key administrators to share information regarding outreach activities (e.g. observe university protocols for contact with elected officials).
- b. Develop policies relating to liability and safety, such as a response time policy for emergencies in conjunction with fire or ambulance services.
- c. Develop policies relating to the compatibility of recreational activity with FSML programs.
- d. Develop policies regarding the amount and type of public access.
- e. Develop application procedures and behavior expectations for all users.
- f. Create a tracking system for outreach activities so outcomes can be determined. It should be FSML policy to evaluate the effectiveness of outreach activities. Otherwise they become a black hole for time and money, generating expectations over time that cannot necessarily be met.
- g. Develop a policy for follow-up and thank-you procedures.

E. Social Interactions

FSMLs often become communities of people with shared educational backgrounds and expectations. Especially when they function as a remote "campus", collegial relationships of the residents can be enhanced through some facilitation of social interactions. A specific policy for FSMLs to encourage social interactions could be developed or at least recognized in the planning process.

FSMLs should encourage the development of social interactions across social strata. This can be done in a number of ways. FSMLs could organize discussion groups for ongoing research and education, or have weekly or more frequent informal opportunities for the FSML community to meet. Actual examples from FSMLs around the country include wine-tastings, barbecues, musical concerts, coffee houses, afternoon teas, golfing tournaments, knitting

clubs, language groups, no-talent shows, and sweat lodges. Some of these events can be open to the neighbors of the FSML and to interested stakeholders.

Extensive formal facilities are usually not required to promote the social atmosphere at a FSML. However, recreational areas such as volleyball courts, horseshoe pits, barbecues, decks and porches, fireplaces, ramadas, or a student lounge should be considered in the facility planning for the FSML.

Tables, Figures and Documents for Section III – Program

Examples (fill in list as examples are provided):

- III. General Program Policies
 - III.A.1. Library Staffing, Policies, Facilities
 - III.A.2. Collections Staffing, Policies, Facilities
 - III.A.3. Information Management and Computer Staffing, Policies, Facilities
 - LTER Data Sharing Policy (*Source: W. Michener, LTER Network*)
 - III.B. Research Codes, Applications, Lists, Facilities, Policies, Fees
 - Research Use Application (*Source: M. Stromberg, Hastings Reserve*)
 - III.C. Education Programs, Policies, Applications, Forms, Fees
 - Class Use Application (*Source: M. Stromberg, Hastings Reserve*)
 - III.D. Outreach Programs, Policies, Applications, Forms, Fees

IV. Facilities

A. Guiding Principles

Planning, construction and maintenance of physical facilities constitute a significant component of FSML operations. While it is true that bricks and mortar facilities are not necessary for good science, it is equally true that environmental science cannot thrive without various kinds and degrees of field support. Well managed habitat and field sites are critical for successful field science endeavors. See **Figure IV.A** for a conceptual model illustrating the relationship between facilities and stewardship.

Experienced FSML directors suggest that there are some fundamental underlying principles that should guide facilities planning and development. These include:

1. If you can't maintain it don't build it.
2. Temporary facilities are permanent.
3. Don't expect user fees to fully cover operational costs.
4. Facility design requires flexibility to meet changing programs and technologies and the resulting impacts (i.e. more people = more poop). Consider that there might be a limit to the carrying capacity of the FSML.
5. Green technologies are desirable but the capital outlay and operational and technical requirements should be factored into any decision to use these construction techniques.
6. Volunteers are not free and cannot be relied upon for operations.
7. Deferred maintenance is often the most overlooked component to operations.
8. Facility planning requires personnel with appropriate skills and experience.
9. The operational seasonality of a FSML needs to be incorporated into facility planning.
10. Access to skilled maintenance assistance options, whether on campus or in town, needs to be factored into facility development considerations.
11. Keeping a written history of facility construction is of utmost importance. Maps and construction plans that show the location of septic cleanouts and foundation drains or illustrate wall interiors, etc. can save untold future anguish. Documenting the process that led to construction is also important. Some FSMLs have historic structures, and records relating to them assist with securing funding for renovations. Since several FSMLs are over 100 years old, and hopefully all will eventually reach that age, current modern structures will one day be historic, and written records provide an important archive.
12. Most FSMLs own the land on which their facility and research areas are located. However, some lease part or even all of their land resource. Additionally, some manage their own land or leased land, and some do not. Each of these ownership configurations affects the nature of facility development.

B. Buildings

Buildings refer to physical structures, whether permanent or temporary. See **Table IV.B** for some field station facility suggestions. The following categories describe facility functions requiring specific design criteria. Some of these uses may overlap depending on site- and program-specific considerations.

1. Research Facilities

Laboratories, lab/offices, greenhouses and other research facilities may need to accommodate a variety of equipment and uses requiring sufficient space, electrical service (120 TO 440v), water supply, waste discharge and other utilities. Specific research and sample preparation needs should be taken into account. Perhaps certain sample processing would be better done at a campus or other laboratory with more reliable quality controls. Sample archiving may require special storage such as cryopreservation. Reliable power backup systems are important. Laboratory safety features should be considered, such as showers, fume hoods or hazardous waste disposal.

Some field labs can be primitive, without water or even power, whereas others need a full array of utilities. Animal care and use facilities are of critical importance at FSMLs. Another consideration is whether research space is to be shared or private. The provision of storage for research gear is important. Does the FSML provide research equipment or do visiting researchers bring everything they need? All of these issues describe different levels in the spectrum of FSML facilities, from primitive field research sites to technologically sophisticated research centers.

2. Education and Training Facilities

Attention should be paid to the specific kind of educational exercises to be conducted. Appropriate facilities include everything from formal large lecture classrooms to small research labs for individualized training in specific techniques. Different educational programs will determine lab bench/counter configuration and utilities needs such as gas, air and distilled water. Research training materials such as field guides and laboratory manuals may be housed in teaching labs or a library.

3. Support Facilities

Facilities that support research and educational programs include animal care facilities, museum collections, herbaria, climate controlled environments, libraries, seminar rooms, meeting rooms, computer rooms and storage areas. Some of these facilities may have special needs, such as separate HVAC systems or humidity control features. Air handling systems will require special attention as FSMLs engage in increasing amounts of research involving invasive species, including microbes, in containment facilities.

4. Administrative Facilities

Administrative offices are technically support facilities for research and educational programs, but often are considered separately as administrative areas on a land use plan. A FSML will need a reception area, director and staff offices, an area for office equipment functions, and appropriate storage for the accumulated history of applications, forms, decisions made, maps, plans, etc.

Other necessary administrative functions include those related to buildings and grounds maintenance, construction, fabrication of field equipment, docks, vessel repair, vehicle maintenance, etc.

5. Housing

Consideration of housing needs requires attention to station use patterns (research use vs. classes of various levels), type of clientele (resident vs. visiting) and level of service (individual or shared space/camping vs. apartments, kitchens or none). Length of stay patterns (short- vs. long-term) are also important variables to consider.

The configuration of housing is currently a topic for dynamic discussion among FSML directors. Many FSMLs have turned away from the traditional dormitory housing in favor of more flexible offerings appropriate to site and climate. For example, a small cabin can house one person desiring solitude, two unrelated students, or a couple, whereas a dormitory can be difficult for student or researcher couples. Family housing has become more important as an amenity for attracting teaching faculty, long-term visiting or staff researchers, or older students.

Construction costs and operating and maintenance requirements are considerations for planning housing. Some “green” technologies are labor-intensive and require knowledgeable residents in order to function, such as “Earthships”. Other more traditional construction can result in high on-going utility expenses. Any planning for housing facilities should take into consideration these secondary expenses.

6. Food Service

Whether or not to provide food service is a significant decision. Most FSML directors suggest that food service provision is an operational nightmare and should only be done if absolutely necessary. However, a dining hall can be a “cash cow” if the problems of reliable food delivery, storage and refrigeration, staffing, and inspections as a commercial kitchen can adequately be overcome.

Like housing and laboratories, a dining hall represents a demand for reliable electricity and heating or cooking fuel. Utility expenses should be considered during cost evaluation, and also in designing mechanical systems to increase efficiency and reduce expenses.

7. Public Spaces

Spaces to which the public will have access range from reception areas to picnic facilities to specialized interpretive facilities for public educational programs. These public uses need careful design and siting considerations to mirror the FSML mission and vision, as well as to minimize conflicts with researchers and students. Design criteria for public spaces are often different than those for research settings. Often crowd control architecture is a consideration.

It is easy for a FSML to make large expenditures for elaborate structures to handle public program needs because there are numerous donation opportunities available for these programs. However, usually informal public education constitutes only 15% or less of a FSML’s activity in a year. Designing public facilities to be flexible enough to accommodate other FSML programs is one way of utilizing these funding opportunities effectively. For example, a donation might be secured to fund a lecture hall for programs and evening events that interpret science to the general public, but the same facility would be available for class meetings, invited symposia, or scientific seminars.

8. Aquatic and Marine Facilities

A FSML with aquatic and marine activities requires some specialized facilities to handle research, teaching and equipment needs. Wet labs need water supplies, purification and treatment systems, and disposal systems (drained floors or water tables) requiring attention to corrosion resistant materials. Many other issues relate to docks, such as road access, proximity of maintenance areas, and whether gas tanks, electricity, water, or storage are nearby. Diving activities require another set of facilities, such as dive lockers, training pools, gas mixes, and numerous safety features.

9. Roads, Parking and Trails

These transportation issues often generate the most over-looked and underestimated space requirements and environmental impacts. Many FSMLs want to minimize the number of roads on their property, but access for construction vehicles, parcel truck deliveries, food service deliveries, heavy research equipment, etc. is important to consider. Parking areas need to be established in appropriate areas. Perhaps there is no parking in front of every building, but loading and unloading is acceptable.

Trail location and maintenance involves another set of potentially contentious issues. Is only foot traffic allowed? Can bicycles use foot trails? Is walking only allowed on established trails or does it matter? Must pets be on leashes? Are trails private or open to the public? Should researchers set up plots along trails? Are trails maintained for horses? Are motorcycles or motorbikes allowed on trails? All of these policies affect the nature and location of trails at a FSML.

10. Security

Like parking, security is often overlooked during FSML facility design phases. Security can take numerous forms from fencing and signage to dogs and intrusion sensors. Keying systems for buildings and gates are valuable places to invest funds during design and construction.

C. Communication and Connectivity

Information acquisition and management require a full range of facility design considerations. Individual software platforms can support multiple functions, with the potential to integrate building, environmental and research information. Designs for new buildings and for remodels should incorporate redundant wire and fiber optic conduits or cable trays and chases to accommodate future change. The evolution of digital technology for voice communication allows for other connectivity options. Sensors for fieldwork and remote sites, including offshore moorings, can now utilize packet cell technologies for efficient real-time data acquisition. Graphic user interface (GUI) software provides new opportunities to economically support public education and outreach with local area networks or web-based data displays. All of these emerging capabilities are especially useful to FSMLs, which typically need to interpret local research and education activities with minimal or non-existent staff.

Technology developments need to be factored into the skill base of station personnel. For example, a few years ago building mechanics did not have to cope with digital devices. Now air, water flow and temperature sensors and controls are routinely based on programmable logic controllers. These same devices can be used to continuously monitor and control

individual research projects. Station management needs to understand the increasing sophistication of their facilities to properly recruit, train and supervise employees. One positive feature of digital skill development is that FSML facilities staff and research data managers can begin to assist each other to some degree.

Storage, backup and protection devices have to be planned and designed to support FSML activities and the uncertainty of climate and extreme environments usually found at field sites. Station remoteness also influences the frequency of power interruption and repair response time. Specialized equipment, such as back up power generation and appropriately sized uninterruptible power devices are often critical to a FSML's research resources.

Connectivity planning considerations include:

1. Internet wiring plans for locating hubs, hublets and routing devices.
2. How to accommodate cable or fiberoptic runs for current and future needs.
3. How to accommodate the internet access needs of users. For example, if a station has overnight accommodations is it feasible or desirable to provide LAN or WAN ports in housing?
4. How much data infrastructure is feasible before an onsite network administrator (full- or part-time) is required?
5. Can a LAN and environmental sensors serve as fire or intrusion alarms?
6. Can programmable logic controllers and environmental sensors serve as a remote interrogation capability for researchers at their home institution?
7. How can a FSML participate in regional or national information acquisition and management initiatives? What is the best configuration for becoming a node on the national FSML network?

D. Equipment

Equipment inventory at a FSML ranges from hand tools to vessels and vehicles to multi-user research equipment. Equipment accessible to users is a major benefit to FSML clients, if it is properly maintained and policies are in place to make certain that it is available when users need it. In the case of multi-user equipment (e.g. chromatographs, gas analyzers, autoclaves, air stations/SCUBA cylinders, lawn mowers, field vehicles etc.) FSML administrators are faced with decisions requiring a balance between offering the right array of instrumentation versus the cost of acquisition, service contracts and eventual replacement.

FSMLs should be responsive to user needs that allow their time at the station to be efficient and productive. Sometimes items as mundane as screwdrivers and handsaws can make the difference between a week well spent and a week wasted. Hand tools have a remarkable ability to walk and can require a frustrating amount of time to locate if policies are not effective in maintaining a useful accessible inventory.

Major classes of station equipment include:

1. Vehicles and vessels.
2. Tools and shop support.
3. Multi-user research equipment.
4. Administrative, computing and office support.

E. Habitat Resources

FSML resources include the inventory of land, water and marine habitats accessible to the station. Habitat resources vary widely among FSMLs. Some FSMLs own large areas of essentially undisturbed habitat, but others may own no land at all. FSML administrators need to consider how current user activities will affect future use and site potential. There are, however, a few general considerations that should be followed by FSMLs irrespective of ownership of the land that is used for research and teaching:

1. Research and teaching should not foreclose future options for use of the land.
2. The future should be viewed through the lens of cumulative impacts.
3. All sites are not appropriate for experimental manipulation or perturbation.

These issues can be addressed in Stewardship Management Plans, Zoning and Land Use Plans, and through careful consideration of access infrastructure.

The availability of water and the infrastructure costs of supplying potable water to a FSML are essential considerations for locating facilities and determining a carrying capacity for the station. An additional consideration is that water exploitation and management may also have a significant impact on the habitats surrounding the FSML.

Habitat resources vary from small to extremely large parcels of land. The stewarding of these resources needs careful attention from FSML leadership. Usually a number of conservation values important to the general public, beyond the scientific community traditionally served by the FSML, are inherent in the FSML habitat resources. Information and resources are available from local and national land trusts that will assist with preserving and managing land resources. The use of conservation easements, stewardship management plans, baseline documentation reports, and other standard land trust documents can be appropriate to FSMLs. The Land Trust Alliance provides a great deal of very useful information and guidelines (www.lta.org).

F. Operations and Maintenance

FSML operations and maintenance often represent the single largest category of ongoing administrative expense. Efficient building and energy systems design can make or break a station financially. Intelligent and creative design can also increase user investment in a station, assisting with generating a loyal and dependable client group over time. Good design and pleasant climate control increases the enjoyment of the FSML experience.

Energy efficient systems allow station research and education staff to illustrate conservation and stewardship values. There are increasing opportunities for securing funds from foundations that support new construction or renovation that addresses energy conservation or uses alternative technologies.

For the purposes of planning an expenses analysis, the following categories are often used to describe operational or maintenance activities:

1. Annual Maintenance
This category refers to the yearly support necessary to keep a FSML operating. These funds are structured into annual operating budgets and typically provide support for

facilities and custodial personnel, and for replacement of non-capital items such as plumbing and lighting fixtures, door/ window hardware, etc.

2. Deferred Maintenance

Routine projects that aren't addressed by annual O&M budget allocations are called deferred maintenance. Examples include painting or staining of exterior exteriors, reroofing or other major roof repairs, paving or graveling of roads and driveways, and other significant maintenance activities that don't occur annually. This category maybe funded out of FSML reserves, a specified fund accumulated for this purpose, or from emergency funds.

3. Minor Capital Projects

These are one-time projects of a significant nature requiring special appropriations up to \$250,000 that may need a focused budget category or perhaps a campaign or grant proposal to fund. Examples include replacement of small boats, or research or administrative vehicles, and renovation or replacement of buildings such as cabins, sheds, shops or other small buildings. Larger capital construction is considered separately in most budgets.

4. Recurring Expenses

This category may include snow removal, road or dock repair, or similar activities in response to seasonal wear and tear which are predictable in occurrence but variable in severity. There may be overlap with annual maintenance operations. Some FSMLs may include recurring expenses with annual costs. The advantage of creating distinct accounts is that if unused funds can roll over to successive fiscal years then the station may be equipped to deal with severe storm events and the resulting high costs of appropriate response and repairs.

5. Utilities

These include electrical, water, gasoline, diesel (for generators or pumps), propane or natural gas. Underground tank storage for fuel is an important siting and environmental compliance consideration. FSMLs can often benefit from special utility configurations. For example, boilers specified to operate on both diesel or propane can provide a backup fuel option if deliveries of one commodity are interrupted or road conditions create access problems. Consideration should be given as to whether utilities are buried or not, whether they services all areas of the central FSML facility or not, whether docks are served by utilities, etc.

G. Facility Policies

Policy needs have been mentioned throughout the foregoing discussion of FSML facilities. It is important for the FSML administration to incorporate users and their needs into the operation of a safe working environment. Most FSMLs develop a "User's Manual" or similar handbook that incorporates facility policies. Specific FSML policies should at a minimum cover the following considerations:

1. Environmental health and safety.
2. Land use.
3. Equipment and vehicle use.
4. Administrative support.
5. Public access and behavior.

6. User behavior.

In addition to the many other aspects of appropriate resident or visitor behavior, FSML users should be educated as to their individual role and responsibility regarding emergencies, including:

- a. How various functions are monitored for failures and how to respond, both during weekday times when stations typically are staffed and during evening and weekend hours.
- b. The location of emergency response equipment (e.g. fire suppression gear, first aid).
- c. Primary and secondary contact information for which type of emergency.

H. Site Issues

1. Site Selection for New FSMLs

A number of new FSMLs have been established over the past few years. Some have the fortunate opportunity to consider a variety of sites for their new facility. Experienced FSML directors offer some suggestions for issues to consider during the site selection process.

- a. Type of programs that will be conducted at the FSML.
- b. Ability to separate spatially any incompatible uses (eg. research labs from housing, classrooms from research labs, children's activities from research labs, etc.).
- c. Access for construction vehicles and delivery vehicles.
- d. Easy access for FSML users to research areas.
- e. Minimal impact from natural disasters (flooding, storm surge, landslides, etc.).
- f. Reasonable access to laundry, mail and package delivery, food supplies, a labor pool, and other operational services.
- g. Compatibility with neighboring properties.

2. New Sites for Existing FSMLs

Some existing FSMLs may need to select new sites for expanded operations, or may be offered properties for acquisition. In addition to many of the above considerations, the FSML administration should consider how management of the new site will fit into current operations, and what additional resources may be needed. The financial and logistical impacts could be greater than the potential benefits for some sites in comparison to others.

3. Appropriate Land Holdings for FSMLs

Often FSMLs are offered donations of real estate for the purpose of research or education. It is tempting to accept any and all properties, but careful evaluation needs to be made of the potential liabilities and other impacts. Sometimes the best option is to sell the gift, but donors can place restrictions that prohibit property sales.

Another issue to consider is the likelihood of a FSML becoming a large landowner with all of the stewardship obligations that are entailed. Perhaps another organization such as The Nature Conservancy or a local land trust would be a more appropriate owner, and lease arrangements for scientific use of properties could be made.

Local residents can become irritated if a nonprofit such as a FSML or its sponsoring institution acquires land that is then removed from the property tax rolls. Many FSMLs make payments in lieu of taxes (called PILT) to offset their local financial impact.

Tables, Figures and Documents for Section IV – Facilities

Figure IV.A – Conceptual Model of the Relationship between Facilities and Stewardship (*Source: P. Siri and S. Lohr*)

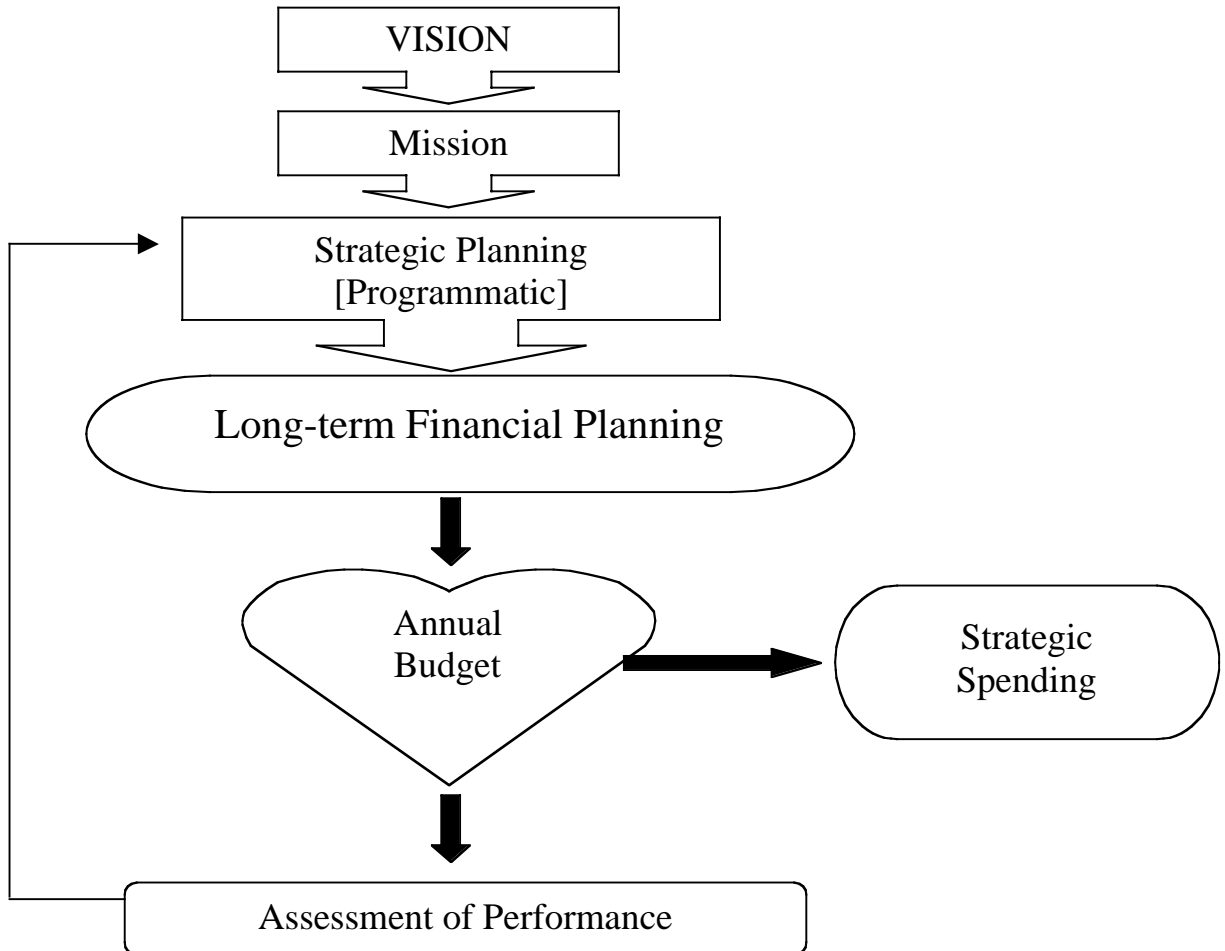
Table IV.B – FSML Facility Suggestions (*Source: S. Lohr, R. Lawrenz, P. Siri, S. Tonsor, D. White*)

Examples (fill in list as examples are provided):

- IV. General Facilities Handbooks
- IV.B. Building Design Criteria (Including Green Architecture)
- IV.C. Communication and Connectivity Specifications or Criteria
- IV.D. Equipment Lists, Specification, Criteria
- IV.E. Habitat Resources
- IV.F. Facility Maintenance
- IV.G. Facility Policies
- IV.H. Site Selection
- IV.I. Regulatory Environment

V. Finances

Effective long-term financial planning and control supports the vision, mission and program of a FSML. The relationships between these are schematically illustrated below:



Many FSMLs are part of a larger institution that provides financial services. Nonetheless, each FSML should understand the basic underpinnings of its financial services. Some directors even conduct “ghost” accounting themselves to be certain they thoroughly understand the financial picture presented by the governing institution. General knowledge of standard accounting practices is essential for FSML directors, since they bear the proximate, if not the ultimate, fiduciary responsibility for the financial health of their organization.

For those FSMLs that need to establish their own financial services, and also for those that wish to gain a greater understanding of FSML finances, the following items are offered for consideration.

A. Cost Centers

Cost center structures provide the framework for the control of finances for various areas of operation. Cost centers evolve from the activities at a FSML, and are composed of a

sequence of numbers that categorize the information relating to that subject area in a multi-level format.

Cost center structures denote several levels of function. These structures can be unique to individual FSMLs. The first number denotes a higher level division among units. The next number, or set of numbers, provides information on the next level of detail, such as whether the cost center relates to assets, programs, operations, grants, or funds. The next number, or set of numbers, designates the activity involved, such as research, support, education, general and administration. A sample cost center structure can be found in **Table V.A.1**.

B. Chart of Accounts

A chart of accounts provides a framework for the delineation of assets, liabilities, revenue, and expenses. Charts of accounts are composed of a sequence of numbers that categorize the information relating to the subject area in a multi-level format.

Chart of accounts structures delineate different levels of function. These structures can be unique to individual FSMLs. After the establishment of a cost center structure, the chart of accounts should be developed. In the following example four spaces are used to define the account number structure. The numbering system is as follows:

1000= Assets

1000 through 1299 is for current assets in order of liquidity.

1300 through 1399 is for various receivable accounts in order of liquidity.

1400 through 1499 is reserved for inter-fund account usage.

1500 through 1599 is for inventory goods.

1600 through 1799 is for capital purchases. Numbers ending in 0 are permanent capital assets. Numbers ending in 2 or 5 are for current year purchases only. This organization shows current capital purchases in the cost center where the purchase was made. Permanent capital assets are in cost center 1.00.0000. At the end of each year, the controller makes a recurring journal entry to transfer current capital purchases to permanent assets.

1800 through 1999 is used for accrued depreciation expense.

2000=Accounts Payable

2000 through 2199 is for various non-payroll payable accounts.

2200 through 2799 is for the myriad of payroll related payable accounts.

2800 through 2899 is for large payables on time, such as leased vehicles and insurance.

2999=Suspense and Variance - a default account for out of balance transactions.

3000=Equity and Fund Balances

3000 through 3499 is for various designated fund balance accounts.

3500 through 3599 is for various equity accounts.

3600 through 3689 is reserved for program inter-fund usage.

3690 through 3699 is for surplus or (loss) balance forward to the next year.

4000=Cash Income

4000 through 4199 is for donations of cash, goods, and services.

4200 through 4299 is for grant and contract reimbursements, overhead recovery and fees.

4300 through 4399 is for interest and dividend income.

4400 through 4449 is for realized capital gains.

4450 through 4499 is for unrealized fair market value gains.

4500 through 4599 is royalty income.

4600 through 4699 is retail income.

4700 through 4799 is agricultural income.

4800 through 4899 is facilities income.

4900 through 4999 is proceeds from capital sales and reimbursed claims.

5000= Non-Cash Income

5000 through 5999 is intra-company income.

6000=Payroll Expense

6000 through 6299 is salary and wage expense.

6300 through 6399 is fringe benefit expense.

6400 through 6999 is contractual expense.

7000=Other Expense

7000 through 7099 is tax expense.

7100 through 7199 is reserved for expansion.

7200 through 7299 is professional fee expense.

7300 through 7399 is travel expense.

7400 through 7499 is reserved for expansion.

7500 through 7599 is supplies expense.

7600 through 7699 is agricultural supplies.

7700 through 7799 is rental and lease expense.

7800 through 7899 is maintenance expense.

7900 through 7999 is occupancy expense.

8000=Non-cash Expense

8000 through 8099 is intra-company transfers and expense

8100 through 8199 is intra-company grant expense.

8200 through 8299 is intra-company core expense.

8300 through 8399 is intra-company overhead expense.

8400 through 8999 is reserved for expansion.

9000=Non-cash Expense

9000 through 9499 is reserved for expansion.

9500 through 9699 is year-end expense.

9700 through 9799 is cost of sale adjustment expense.

C. Budgets

The development of a budget provides crucial information for a roadmap showing where a FSML stands financially, compared to desired goals. This roadmap begins with the organizational mission and programmatic planning, which all naturally flow into the budget. The goal of the budget is to support the FSML mission.

1. Budgeting process

It is important to be able to view where you are at present in order to forecast a budget for the coming year(s). This assessment should be done for each cost center. It's helpful to begin with the current annual budget and a view of the year-to-date figures. Then the figures for the coming year can be forecast, keeping in mind the goals and projects (taken from the long-term strategic plan) of the subject cost center. Additionally, it's very useful to include a justification by each line item. This justification assists with planning for the coming year, and with ascertaining that the projected budget reflects the necessary elements delineated in the FSML strategic plan.

Aside from individual cost center budgets, it is important to have a master budget that gives an overall financial picture of the FSML. This budget should include all areas of anticipated revenues and expenses. By projecting annual operating budgets on a long-term basis, an FSML can take a proactive approach to providing support for its strategic plan. Most budgets are zero-based, which means that every item is justified and not

simply carried over from one year to the next. Standard accounting procedures mandate that the revenue in a budget equals the expenses. If deficits are present, they are shown as shortfalls, and budgets are developed for the funding sources to cover those expenses. Remember that budgets can be revised during the fiscal year, with proper justification. Ultimately, the annual budget is reviewed and approved by the FSML Board or appropriate governing administrator.

2. Budget structure

A budget lists line items. Some examples of common line items in budgets are:

<u>Revenue</u>	<u>Expenses</u>
Contributions	Salary (include annual salary increases)
Endowment income	Fringe benefits (note: normally a fringe benefit rate is calculated to include Social Security, Medicare, workers' compensation costs, any unemployment tax, any health care costs, any insurance costs, any pension costs. Usually, fringe benefit costs are calculated separately for full-time and part-time staff, as different benefits apply to each group. The total of fringe costs are taken as a percentage of the total full-time salaries or part-time salaries.)
Operations income	
Program income	
Interest income	
Grant income	
Overhead	
	Travel
	Supplies
	Maintenance
	Utilities
	Equipment

See **Table V.C.2** for a sample budget proposal.

3. Capital budgeting

Capital budgeting is as important as operations budgeting. The process of budgeting for capital improvements ties directly into overall strategic planning, and provides for long-term control of resources. Since the budgeting process must take place far in advance, estimations of acquisitions must be made. Additionally, many capital purchases should be run through an analysis of a lease versus purchase option. For more information on lease versus purchase options, see

http://www.onlinewbc.org/docs/finance/lease_cost.html.

4. Three- to five-year budget forecasting

Long-term budget forecasting provides a plan for expected revenues and expected expenses based on proposed operations of the FSML. It is critical to project expenses over a long-term period so that the necessary revenue streams can be identified beforehand.

D. Grants and Contracts

In the simplest situation, researchers secure their own grant money and pay for FSML facilities and services based on a fee structure. In this case, the FSML has no involvement with any grants or contracts secured by the researcher.

More commonly, a FSML seeks grants or contracts to support staff scientists or other activities, or it even “runs” grants and contracts on behalf of visiting researchers. In this case, grants and contracts often have project years that do not coincide with the FSML’s fiscal year. For instance, a FSML may have a calendar year fiscal year, and receives a federal grant for a two-year period (24 months) that begins on October 1. The first year of the grant would be appropriately prorated for the last three months of that fiscal year. The second year of the grant would be prorated for a full year. And the third year of the grant would be prorated for nine months of that fiscal year, thus completing the 24 months. Additionally, it is important to track the grant/contract’s project year budget. This would cover the project across the fiscal years of the FSML and ensure that expenses do not exceed revenues.

Independent FSMLs that handle grants can often negotiate overhead rates directly with the funding source. FSMLs with governing institutions usually have to negotiate indirect cost recovery with their own home institution, from within institutionally mandated overhead rates. An awareness of all of the contributions the home institution makes to the operation of the FSML is useful during these negotiations. For example, many FSMLs that are part of universities or museums receive support in the form of liability insurance, legal defense, accounting services, development offices, public relations services, physical plant personnel, and administrative staffing. Knowing the value of these contributions as related to the provision of the on-site administrative presence for which grant and contract overhead amounts are intended can be critical to successful negotiations for indirect cost recovery.

E. Cost Recovery Policies

Some FSMLs need to recover 100% of the cost of their operations, and others are subsidized at some level by a governing institution. Regardless of whether there is a subsidy or not, every FSML needs to know exactly what its expenses are, and where the funds come from to meet those expenses. Subsidy decisions should be conscious, not subliminal. Cost recovery should be custom tailored for each FSML. However, there are a number of guiding principles that are useful when establishing cost recover strategies and policies.

1. Determination of activities for which fees to recover costs should be applied
 - a. Facility use: lab space, office space, classroom space, lodging, dining, other.
 - b. Equipment and instrumentation: analytical chemistry instrumentation, diving gear and air, microscopy time.
 - c. Transportation: vehicle use, boat time, snowmobile, etc.
 - d. Infrastructure costs: phone, fax, photocopying, Internet, computing, database user fees
 - e. Education: tuition, laboratory fees, personnel costs (faculty, teaching assistants, etc.)
 - f. Outreach: personnel time, materials and supplies, facility use, per sample contract costs, consulting fees

2. Determination of appropriate usage fee. (Note: As a precedent, it is better to have a set fee and make a waiver or offer a scholarship, rather than not having a fee).
 - a. Important not to set fees so high that they discourage use or limit research productivity.
 - b. Consider introductory offers of fee waivers or reductions for first time users or those working to obtain preliminary results for preparation of research grants.
 - c. Consider fee waivers for students in the form of scholarships.
 - d. Consider quantity discounts for frequent or heavy users.

- e. Have fees that take into account costs of service contracts for instrumentation, materials and supplies, and replacement costs of equipment when ultimately needed.
 - f. Consider setting up different usage fees depending on the user, i.e. internal versus external users; academic fees versus corporate/industry fees).
3. Consider setting up designated accounts for each major type of fee.
 4. Negotiate cost sharing on grants and contracts if applicable.
 5. Establish indirect cost rates for grants, contracts, gifts, to provide relief from overhead costs. See federal guidelines on Circular A-122 "Cost Principles for Non-Profit Organizations" at (www.whitehouse.gov/OMB/grants/index.html) If indirect cost rates are set by upper administration, negotiate appropriate return to FSML for overhead costs incurred.

F. Software Tools

The use of spreadsheets and accounting software greatly increases the ease of establishing, tracking and forecasting finances. There are many useful spreadsheet programs available for purchase. Microsoft's Excel and Corel's Quattro are two examples. Once familiarity is achieved with the use of one spreadsheet program, those skills are easily transferable to other spreadsheets.

Additionally, there are several very helpful accounting programs that can assist FSMLs who must (or wish to) track their own accounts. Some examples of accounting software include:

Infinity Power by DataPro (www.dpro.com)
SBT Pro Series by ACCPAC (www.sbt.com)
MAS 90 Accounting Software (www.2020software.com)
Accware Online (www.2020software.com)
Accubooks 2000 (www.accubooks2000.com)
Quickbooks by Intuit (www.quickbooks.com)
Peachtree (www.2020software.com)

G. Financial Reports

Financial reports provide periodic updates on the financial position of individual cost centers as well as the overall financial condition of the FSML. Whether an FSML is part of a broader system where financial reports are produced for them, or whether they must produce reports themselves on a monthly basis, it is helpful to review a comparison of budgeted income and expense to the year-to-date actual income and expense. This review is referred to as an income and expense statement. In order for these statements to be meaningful, it is important to accurately record the income and expenses as they arise.

1. Income and expense statements

Income and expense statements should be prepared monthly and should note the year-to-date income and expenses, the annual budget, and the percentage of actual funds as compared to budget. Any large percentage deviations (anything more than 10% off of where it should be) should be looked at carefully. Most frequently a deviation represents a timing issue within the fiscal year. Additionally, consolidated income and expense statements can be developed. These statements can provide an overview of several related cost centers.

While the detail of each individual account number within each cost center is important, ultimately the bottom line number can often be the most critical figure. At the end of

each income and expense statement, there is a line showing the net surplus/net deficit. This figure will ultimately show the user how much they have left to spend, or if they are overspent **Table V.G.1** provides an example of an income and expense statement.

2. Balance sheet

The creation of a balance sheet is also important for a FSML that must track its own assets and liabilities. All of the accounting software examples mentioned above provide the capability to track assets and liabilities, using the cost centers and chart of accounts that were discussed previously, to produce balance sheet reports. Ideally, total assets will be increasing from year to year. These reports show the overall financial condition of the FSML. **Table V.G.2** provides an example of a balance sheet.

H. Financial Policies

Financial policies are put into place largely to allow management to monitor operations, identify and control risks, and generate pertinent information, both financial and non-financial, for guiding actions dictated by the strategic plan. The nature of policies depends on a number of factors, including size, complexity, organizational structure and management philosophy. Many FSMLs are under the auspices of a larger institution that determines these financial policies. However, it is still important to understand the basic underpinnings of these policies. See **Figure V.H.** for an example of Financial Operating Policies. For those FSMLs that need to establish policies on their own, the following issues are offered for consideration:

1. Internal controls

Internal controls provide for the validation, accuracy, and completeness of financial operations. All financial transactions should be reviewed by an informed individual, and a determination should be made as to their validity. All financial documents should be part of a controlled system of numbering and filing. Financial documents should be rigorously checked for accuracy and completeness by an informed individual.

2. Segregation of duties

Where possible, it is strongly recommended that there be a separation of fiscal duties, so that no one piece of paper is handled from beginning to end by one person. Given staff constraints, this may not always be possible. However, it is always advisable to have some sort of a check and balance system in place when dealing with financial documents.

3. Authorized signatures

For each cost center, there should be an authorized signer, who is usually the individual responsible for that cost center. A dollar limit should be set for each authorized signer, based upon their needs and responsibilities. However, an upper limit for management review must be set. **Table V.H.3** shows a sample signature matrix.

The authorized signer for checks is most often the Executive Director. For the purpose of internal controls, it is advisable that the individual in charge of the accounting function for the FSML not be an authorized signer for checks. Often there is an upper limit for the authorized signer of checks. Consideration should be given to establishing a dollar level whereby two signatures would be required for disbursements in excess of such dollar level. Usually anything above \$5,000 would require a second authorized signature from a list of designated secondary signers.

4. Cash

a. Cash management

It is important to maintain an effective system of cash management that anticipates cash needs and plans adequately to satisfy them. Cash is required to pay for all assets and services purchased and to meet future obligations as they come due. A sufficient level of cash should be kept available to meet those requirements. Therefore, it is important to be able to forecast revenue and expenses in order to meet cash needs.

b. Cash receipts

Control should be established over all cash and checks received, and they should be deposited promptly into the proper bank account. Cash receipts should be protected from misappropriation. When cash or checks are received by mail, the individual receiving and opening the mail should prepare a list of receipts, to include the name, amount, any invoice number, date, and total. A separate individual should be responsible for the recording and deposit of these receipts. In the case of donations, it is important to provide acknowledgment to the donor within a reasonable period, such as two weeks from receipt of the donation.

c. Bank accounts

Financial accounts should only be opened with the approval of the appropriate designated individuals, usually a Board President and Treasurer. All bank signature cards should include their signatures. The Executive Director should also be a signatory on the general checking account and any payroll accounts. No more than \$100,000 total should be kept in any single financial institution, including all branches thereof. This is the limit of funds that the FDIC guarantees in any single bank.

5. Purchasing

The determination of needs for goods and services should be made by appropriate personnel and according to guidelines for the individual FSML. For instance, many guidelines include the requirement of three bids for any purchases over \$5,000. Exceptions to this policy may be made on a case by case basis. Purchase requisition forms should be completed. See **Figure V.H.5** for an example of a purchase requisition form. Proper approval should be obtained. It is important for the authorized signer to review any purchase requisitions that he/she did not originate.

a. Purchase orders

Purchase orders should be produced based on the purchase requisitions. See **Figure V.H.5.a** for a sample purchase order. Records of purchase orders should be kept either in a spreadsheet format, or more formally within the appropriate accounting software.

b. Receipt of goods

The physical receipt of all purchased goods should be the responsibility of either the person who placed the order or a designated receiving department. The receiving function should involve inspection of goods for conformity with specifications on purchase orders. Receipt and acceptance of a shipment should be documented on a receiving report or on the packing slip which should then be routed to the person who produced the purchase order, so that he/she may record this receipt, and to the accounting department for payment.

6. Accounts payable

The recording of assets or expenses should be performed by an employee independent of the ordering and receiving functions, if the size of the FSML allows for this segregation

of duties. The amounts recorded should be based on vendor invoices for the related goods or services. The vendor invoices should be in agreement with an approved purchase order. Additionally, evidence of receipts must be available before a vendor may be paid.

7. Payroll

Files should be maintained in which employee pay history is documented and withholding authorizations are kept. Payment for wages and salaries should be made only to employees at a previously authorized rate of pay. Some FSMLs have formal employment agreements with of work performed. Timecards or timesheets should be kept that show the time devoted to various tasks for various cost centers. See **Table V.H.7** for an example of task activity codes. See **Figure V.H.7** for an example of a timesheet. It is important to be familiar with federal and state wage and labor laws as they apply to exempt and non-exempt personnel. It is equally important to understand thoroughly the federal and state laws regarding what constitutes compensation for salaried or contracted personnel, and what role the provision of housing, meals, vehicles, etc. plays in compensation. Information on these issues can be obtained at www.shrm.org and at the U.S. Department of Labor's website at www.dol.gov/elaws.

8. Funds and reserves

An operating fund should be maintained for daily expenses that meet most projected routine expenses. An operating reserve fund should be established that can cover three to six months of operating expenses without additional revenue. Additionally, accounts can be established to hold funds for specific projects or purposes that must be spent in specific locations, or for known upcoming projects for which matching funds must be accumulated. Each state may have different regulations regarding held institutional funds for private or nonprofit corporations. It is advisable to check with the appropriate Department of State.

9. Property, physical plant and equipment

All additions to property, physical plant and equipment should be properly authorized. These items include the following broad asset types:

- a. Land
- b. Buildings and production facilities
- c. Machinery and equipment
- d. Furniture, fixtures, and office equipment
- e. Computer equipment
- f. Vehicles

Accurate records should be maintained of the cost and accumulated depreciation of property, physical plant and equipment. Repair expense should be distinguished from expenditures for improvements, additions, renovations, alterations, and replacements. Expenditures are repair expense if they do not materially add to the value of the property and do not materially prolong the life of the property. Repair costs that increase the value of property, prolong its life, or adapt it to a new or different use are capital expenditures. Examples would include replacing a roof, reconditioning machinery, or replacing a vehicle's engine.

10. Depreciation

There are some generally accepted depreciation methods that can be used to allocate an asset's cost (less salvage value) over its useful life. They include:

- a. Straight line – an equal amount of the cost of an asset is allocated to each accounting period in its useful life
- b. Half year convention – an equal amount of the cost of an asset is figured for each year of its useful life. In the first year, half of the amount is charged, and an additional year is used at the end of the useful life for the other half. Each year in between is charged the full amount.
- c. Declining balance – a larger portion of the asset's net cost in the earlier periods of its useful life and a smaller amount in the later periods

For further information on depreciation, please see <http://www.conetic.com/fjpmann/fjpmann00000029.html> and <http://www.bized.ac.uk/stafsup/options/deprec.htm>

11. Inventory Identification

At the time of acquisition, all assets should have been identified, tagged, and entered into the detailed fixed asset ledger. The tag should be placed in a visible area. The tags provide a clear method of tracing the asset to the fixed asset ledger. A physical inventory should be performed on an annual basis to match the tagged assets to the fixed asset ledger.

12. Disposal

No item of property, physical plant or equipment should be removed from the premises without recording the disposal in a written format. The item should also be removed from the appropriate asset account, and the related accumulated depreciation (including depreciation to the date of disposal) should be removed from the allowance for depreciation account. Additionally, the profit or loss, adjusted for the cost of removal, should be recorded as an income (gain) or expense (loss).

I. External Audits

An external audit can provide an independent opinion as to the condition of the finances of the FSML. The retention of an external auditor can provide a valuable resource of information during the fiscal year. Issues relating to accounting, or to the management of accounting procedures, can be addressed by an external auditor. Additionally, when submitting proposals for funds to various agencies, it is helpful to have a report of an independent auditor to accompany the grant proposal. This report gives the potential funding agency or foundation assurance that the funds they provide will be properly managed.

External audits may be conducted by local CPA firms or by larger regional/national firms. There are varying levels of detail that the firm may be contracted to provide. To begin with, usually the Board of the FSML appoints an audit committee. This committee then reviews proposals from potential auditors solicited by the FSML. The level of detail required is set, and a fee is negotiated. Once a firm has been selected, it is useful to establish a close working relationship with the auditor who will be reviewing the finances of the FSML. This person will be available to guide the FSML through various scenarios and ultimately, to the proper financial procedures.

J. Endowments

Endowments may be available for or accumulated by FSMLs. Endowment funds can be used in a variety of ways, depending upon the terms of the endowment. There are also different formats in which endowments can be made. The format is often determined by the donor.

1. Investment

Once an endowment is established, the Board Treasurer usually develops an investment policy for the long-term maintenance of these funds, which is formally adopted by the Board. A written investment policy is crucial to successful perpetuation of endowment funds. The Board usually delegates supervisory oversight of the endowment to a finance committee within the Board. An investment policy usually includes:

- a. Delegation of authority
- b. Standards (state standards, if applicable)
- c. Investment objectives
- d. Risk tolerance
- e. Asset mix
- f. Short-term reserves
- g. Gifts (if applicable)
- h. Asset quality
- i. Asset diversification

See **Figure V.J.1** for a sample investment policy.

2. Long-range investment strategy

The Board Treasurer and the finance committee should decide upon an investment management strategy. The selection of the investment manager should be made by this group. The criteria for an annual review of the investment manager should also be established.

3. Protection of principal

The principal amount used to establish an endowment is to remain protected. The only funds to be used are those that are generated through investments. A portion of the income from each endowment should be retained each year as a protection against inflation, so that erosion of the principal doesn't occur. For example, if an endowment earns 5% as a 10-year average, and if inflation averages 2%, a long-term strategy might decree that 3% of each endowment is available annually for distribution.

K. Funding Sources

A variety of different funding sources and strategies are employed by FSMLs. In general, funding sources can be separated into two major categories, internal or external. The major funding sources within these categories are briefly described below. See **Table V.K** for a list of potential funding sources.

1. Internal funding sources

a. Annual budget

FSMLs that are affiliated with universities are often provided with an annual budget that covers basic operational costs (e.g. personnel, operations and maintenance). These budgets are usually determined on an annual basis and are often related to contributions that the FSML makes towards supporting the mission of the university. Development of a strategic plan by a FSML that clearly delineates specific objectives, directly links these with the budget, and demonstrates the ability to use

funds for leveraging additional funding is valuable for soliciting internal institutional financial support.

- b. Cost recovery and indirect cost return
All FSMLs should develop cost recovery and indirect cost return strategies and policies. The idea behind cost recovery is to recover actual costs that are incurred through activities at FSMLs. Usually the goal is to have user fees recover reasonable expenses, but not necessarily generate institutional profits. The goal of indirect cost return is to provide support for direct overhead costs incurred by the FSML.
- c. Endowment income
The establishment of an endowment to support activities at FSMLs is an important potential source of a sustained long-term revenue stream. Significant fundraising efforts are often required to obtain the principal for an endowment. Restricted or unrestricted endowments can be established. Restricted endowments are designated for specific activities, such as student internships, an endowed faculty chair, a visiting scientist program, etc. Fundraising for unrestricted endowments that permit flexibility in spending the endowment income is often more difficult, since there is not a specific project or intended use that a donor can associate directly with the gift. Individual giving is usually the major source for the establishment of an endowment.

2. External Funding Sources

- a. Local, regional, state and federal agencies
Almost all scientists are engaged with proposal writing to obtain funding for research projects. In the environmental area, common funding agencies include NSF, DOE, EPA, NASA, ONR, etc. In addition to obtaining funds for individual research projects there are numerous opportunities for graduate student training grants, educational reform, interdisciplinary centers, postdoctoral and graduate fellowships, instrumentation and facilities development.
- b. Foundations
There are a large number of foundations that are possible funding sources for activities being carried out at FSMLs. Foundation grants or gifts are possible to obtain for education, research and outreach. In some instances it is only possible to apply for foundation support if you have been “invited” to do so. This often requires initially establishing a relationship with the foundation. However, there are also many foundations that can be applied to for funding based on an announced program or acceptance of letters of inquiry.
- c. Contracts
Funds obtained under contracts are usually tightly restricted and designated for the accomplishment of specific tasks. Contract funding is frequently obtained from industry, but there are also opportunities from local, regional, state or federal entities. There are several considerations in relationship to contract funding, such as possible limitations in publication of results, duration of the contract, or potential applied nature of research. FSMLs should consider the desired percentage of funding from different external sources to achieve an overall balance that reflects the goals and mission of the FSML.
- d. Individuals (planned giving, endowment, gifts)
Acquiring resources from individuals is an important opportunity for FSMLs. If affiliated with a university or museum, cultivation of individuals and actual gift requests are usually coordinated and facilitated by institutional development staff. Regardless of the specific type of FSML, fundraising from individuals requires

establishment of a relationship with the individual. It is beneficial to have the potential donor visit the FSML for first-hand exposure to the exciting activities that are ongoing. Stewardship related to individual donors is critical for long-term fundraising success. Alumni, employees, community members and other friends are the most likely individuals for giving.

e. Annual campaign, memberships

The ability to raise funds routinely on an annual basis can be accomplished through an annual campaign and/or memberships. An annual effort is a way to begin the establishment of local friendships while building a sense of community. Such an effort also serves as a way to introduce people to the activities and benefits provided by the FSML. Through the involvement of the community in public events such as tours, public seminar series and volunteer opportunities, memberships and annual giving can serve as a forum for outreach. Annual campaigns also constitute a mechanism for establishing relationships that over time can develop into potential major donations.

f. Congressional appropriations

An opportunity that should be explored by FSMLs is the possibility of congressional appropriations. A number of factors influence whether trying to secure this type of funding is feasible. These factors include university priorities, relationships that have been established with senators and congressmen, and potential impacts for the state and nation. Securing this type of funding requires a significant amount of lobbying, the ability to provide compelling explanations in relatively simple terms, strong relationships with appropriate officials, and quite a bit of luck.

g. In-kind gifts

A possible funding source can be in the form of in-kind gifts from industry, which might donate equipment, instrumentation, computer hardware and software, etc. Establishment of corporate and industry relationships enhances such possibilities. The ability to use in-kind gifts for training or education of a large number of students strengthens such requests.

3. Fundraising Policies

Some thought should be given to how donations are solicited, cultivated and acknowledged. FSMLs within larger institutions can benefit greatly from establishing a good working relationship with their institution's development office. Ideally one specific development officer will become responsible for providing fundraising assistance to the FSML. Stand-alone FSMLs will need to consult references within the fundraising and philanthropic fields to locate effective policies and philosophies.

Tables and Figures for Section V – Finances

Table V.A.1 -	Cost Center Structure (Source: S. Pettine)
Table V.C.2 -	Budget Proposal (Source: S. Pettine)
Table V.G.1 -	Income and Expense Statement (Source: S. Pettine)
Table V.G.2 -	Balance Sheet (Source: S. Pettine)
Figure V.H -	Financial Operating Policies Source: S. Lohr)
Table V.H.3 -	Signature Authorization Matrix (Source: S. Pettine)
Figure V.H.5 -	Purchase Requisition Form (Source: S. Pettine)
Figure V.H.5.a -	Purchase Order (Source: S. Pettine)
Table V.H.7 -	Task Activity Codes (Source: S. Pettine)
Figure V.H.7 -	Timesheet (Source: S. Pettine)
Figure V.J.1 -	Investment Policy (Source: S. Lohr)
Table V.K -	List of Possible Funding Sources (Source: S. Lohr)

Examples (fill in list as examples are provided):

- V.A. Cost Centers
- V.B. Charts of Accounts
- V.C. Budgets
- V.D. Grants and Contracts
- V.E. Cost Recovery Policies, Fee Structures
- V.F. Financial Software Tools
- V.G. Financial Reports
- V.H. Financial Policies, Purchase Orders, Requisitions, Inventory Control, etc.
- V.I. External Audits
- V.J. Endowment Documents
- V.K. Lists of Funding Sources

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Organizations

Aspen Publishers, Inc. Address: 200 Orchard Ridge Dr., Suite 200, Gaithersburg, MD 20878. Telephone: (800)234-1660, fax: (800)901-9075, website: www.aspenpublisher.com.

CompassPoint Nonprofit Services. Address: 706 Mission Street, 5th Floor, San Francisco, CA 94103-3113. Telephone: (415)541-9000, website: www.compasspoint.org. The organization's Nonprofit Genie on the website is a source for answers to frequently asked questions (FAQs) about nonprofit management.

The Foundation Center. Address: 79 Fifth Avenue, New York, NY 10003. Telephone: (212)620-4230, website: www.fdncentr.org. The Foundation Center publishes *The Foundation Directory*.

The Grantsmanship Center. Address: P.O. Box 17720, 1125 W. Sixth St., Fifth Floor, Los Angeles, CA 90017. Telephone: (800)421-9512 or (213)482-9860, fax: (213)482-9863. The Grantsmanship Center offers courses in grant proposal writing at various locations nationally each year. For a free subscription to *The Grantsmanship Center Magazine* write to List Manager at the above address.

Institute for Conservation Leadership (ICL). Address: 6930 Carroll Ave., Suite 420, Takoma Park, MD 20912. Telephone: (301)270-2900, fax: (301)270-0610, email: icl@icl.org, website: www.icl.org. The ICL offers programs on executive director development, strategic planning, board development, fundraising, and other programs.

Land Trust Alliance. Address: 1331 H. Street NW, Suite 400, Washington, DC 20005. Telephone: (202)638-4725, fax: (202)638-4730, email: lta@lta.org, website: www.lta.org.

Long Term Ecological Research Program, Network Office. Address: Dept. of Biology, University of New Mexico, Albuquerque, NM 87131-1091. Telephone: (515)272-7316, fax: (505)272-7080, email: Office@LTERnet.edu, website: www.lternet.edu. OBFS liaison at the LTER Network Office is Dr. William Michener.

National Science Foundation, Field Station and Marine Laboratory Program. Address: Dr. Gerald Selzer, BIO/DBI, National Science Foundation, 4201 Wilson Blvd., Arlington, VA 22230. Telephone: (703)292-8470, email: gselzer@nsf.gov, website: www.nsf.gov.

National Association of Marine Laboratories. Website: www.naml.org.

National Center for Nonprofit Boards (NCNB). Address: 1828 L Street NW, Suite 900, Washington, DC, 20036. Telephone: (202)452-6262 or (800)883-6262, fax: (202)452-6299, email: ncnb@ncnb.org, website: www.ncnb.org.

National Association of Independent Schools. Address: 1620 L Street NW, Washington, DC 20036-5605. Telephone: (202)973-9700, fax: (202)973-9790, website: www.nais-schools.org.

Organization of Biological Field Stations, Address: P.O. Box 247, Bodega Bay, Ca 94923, website: www.obfs.org.

Resources for Global Sustainability. Address: P.O. Box 3665, Cary, NC 27519-3665. Telephone: (800)724-1857, fax: (919)363-9841, email: rgs@environmentalgrants.com, website: www.environmentalgrnts.com. This organization publishes the *Environmental Grantmaking Foundation Directory*.

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