Place-based Research Site Strategic Planning Survey
Results Summary

This document presents results from a survey implemented March 7 through April 10, 2012, that serves as part of a larger investigation of place-based research station functioning, needs and strengths. The survey obtained a 49% response rate from 227 respondents to 444 email solicitations. Only sites with U. S. A. mailing addresses were included in the quantitative results presented below. This summary is guided by questions from the OBFS grant proposal and steering committee suggestions.

Guiding Question Matrix		Question Coverage
I.	What are the basic descriptive features of place-based research stations?	3, 4, 5, 6, 7, 8, 9, 15, 17, 19, 21, 27

- A university or college setting is the most common configuration, accounting for 74% while an additional 14% are U. S. government
- Nearly 88% of sites are available year round
- Although sites report that researchers, including at the graduate level, and university students (over 90% of respondents) are the most popular audiences, education, kindergarten through adulthood (K-Gray), are also very popular audiences (over 60% of respondents) along with outside researchers (over 60% of respondents).
- Sites serving some combinations of land, freshwater lakes, or streams only accounted for 64.9% of sites. The remaining sites identified some combination of geographical feature that included estuaries or oceans.
- Most sites have access to multiple properties (ownership configurations) on which they may conduct scientific activities.
- Over 80% have access to electricity, internet access, support staff, while over 60% have access to laboratory capacity, equipment storage space, long term monitoring, classroom capacity, housing, refrigeration/freezer capacity, on-site maintenance/engineering capacity.
- Station director, maintenance staff, office staff, research technician are the most commonly reported positions on staff. However, the survey overlooks other support staff (food service workers, and researchers) commonly mentioned.
- Scientific and Educational missions are the most commonly reported although these mission statements frequently include multiple components.
- Infrastructure maintenance, updates, and expansions are the single most desired investment by far.
- Host institution (over 90%) and Government grants or Federal or state budget item (over 35%) are critical funding sources.
- Research institutions (88%), State agencies, Federal agencies, NGOs (71%) are frequently mentioned partners.

II.	What components of FSMLs, e.g., living facilities, information technology, environmental sensors, laboratory equipment, research vessels, are most critical to meeting those emerging trends?	8, 9, 16, 28

- Over 80% have access to electricity, internet access, support staff while over 60% have access to laboratory capacity, equipment storage space, long term monitoring, classroom capacity, housing, refrigeration/freezer capacity, on-site maintenance/engineering capacity.
- 56% of respondents identified scientific trends and 23% identified economic trends that impact their scientific activities. Climate, Technology, Social Process were mentioned most frequently.
- 93% (categories 3 plus 4) of respondents agree that specific interest in cross-site questions are critical investments.

III.	What is the current status of critical infrastructure components at FSMLs?	8, 9, 10, 11

- Between 26 and 37 % of respondents report that their electricity, internet access, support staff, are in excellent condition.
- About 90% of respondents consider these features functional or better and readily available: electricity, internet access, support staff, long term monitoring, research laboratory space.
- Most sites report that most infrastructure items mentioned in the survey are in functional or better condition.
- 20% of respondents report their laboratory capacity, equipment storage space, classroom capacity, refrigeration/freezer capacity, are less than functional.

IV.	What investments in FSMLs will yield the greatest returns in terms of research, education, and management?	8, 9, 10, 11, 19

- Over 80% have access to electricity, internet access, support staff while over 60% have access to laboratory capacity, equipment storage space, long term monitoring, classroom capacity, housing, refrigeration/freezer capacity, on-site maintenance/engineering capacity
- In one context (question), 20% of the sites responding indicate a need for critical infrastructure investment in lab, classroom and storage space as they are central features of the work that takes place on site.
- In another context, 35% of respondents mention infrastructure maintenance, upgrades and expansion as targets of investment. For expansion, respondents most commonly mention classrooms, lab space, and on-site housing.

V.	What are FSML's lacking in best practices in terms of management and operations?	15, 20

- Station Director, Maintenance staff, Office staff, Research technician are the most commonly reported positions on staff. However, the survey overlooks other support staff (food service workers, and researchers)
- Two commonly lacking management practices are: making a site specific data catalog publicly available AND depreciating the value of buildings and equipment as part of financial planning for the site (over 60%).

VI.	How do individual FSMLs define and measure success?	24, 25, 26

- Respondents consider these categories their most significant educational or research achievements: Research & Science, Education over 30% and 24 % respectively, but mention long-term funding, scientific infrastructure, collaboration & networking as well.
- Respondents consider these categories their most significant achievements in terms of public benefit: collaboration & networking (but likely not measured), research & science.
- In a standard context respondents report that these are their most common measures of success: scientific publications, number of students trained, number of use days.

VII.	What factors most threaten the long-term sustainability of the FSML?	12, 18

- Respondents consider support of the administration, use of the facilities by individuals from their own FSML to be critical for long term sustainability.
- In another context (question), respondents report that economic conditions and their business model assumptions may threaten their long term sustainability.

Place-based Research Site Strategic Planning
Survey Results

This document presents results from a survey that serves as part of a larger investigation of place-based research station functioning, needs and strengths. These results present findings from a 28 question survey administered to 444 email addresses on SurveyMonkey. The survey collected 227 responses, and after eliminating responses from those withdrawing consent and duplicate responses from single institutions, 218 cases remained for an overall response rate of 49.1%. The results below show the responses of only those sites that indicated the US was the country associated with their mailing address. However, for qualitative results, all sites (cases) contribute to results.

The first two questions in the survey were designed to gather directory type information, and those results will be presented elsewhere. The remaining questions are presented in the order presented in the survey with brief interpretive comments. The overarching questions which guided survey development depended upon multiple questions and using those questions more than once; however, those questions provided organization for the survey summary. A copy of the survey administered can be found in Appendix A.

Open ended question analysis used standard content analysis methods – categorization techniques. Each question generated multiple columns of data for various reasons. Most often this was due to the compound nature of the questions (asking for two of something or asking for two topics, e.g. educational or research achievements). Although compound questions can cause problems with analytical processes, in this case, they elicited a wealth of information that will guide more targeted, effective questions in the future. The text describes specific coding methods for each question along with their results. Appendix B shows detailed coding for each open ended question along with important distinctions in the coding scheme.

Table 1. Q3. Please indicate what type of institution hosts your place-based research station?

Response	Percent
State University/College	58
Private University/College	16
Federal Government	14
A stand alone not for profit	9
We have no host institution	2
Other (please specify)	5
State Government	2
Other Private Institution	0
Total N	**202**

Sixteen respondents answered using more than one identifier (15 respondents used 2 and 1 respondent used 3). Three comments associated with an Other response discuss such hybrid models. Future investigations should target such sites to determine if they have any added financial stability in difficult economic contexts and to determine if added management complexities are feasible in other contexts. Table 1 shows that some university or college setting is the most common configuration accounting for 74% of the responding sites.

Q3 "Other" Responses

1. The Nature Conservancy; jointly owned
2. binational organization, stand alone, not for profit
3. We are part of the University, but we are also on the property of a stand alone non-profit.
4. under the LA Board of Regents as an institution of higher education
5. Not for profit land trust
6. Organization for Tropical Studies, Not-for-Profit Organization, Costa Rica
7. fiscal sponsored nonprofit
8. Organization for Tropical Studies
9. Canadian University
10. Lake Sunapee Protective Association
11. MLML is the graduate program for 7 CSU campuses
12. A Consortium of academic institutions
13. 509(a)(3) Supporting Foundation
14. West Career & Technical Academy - a Clark County School District magnet high school

Table 2. Q4: What months is your facility actively being used in a typical year (check all that apply)?

Response	Percent
Open all year	87.6
January	0
February	0
March	3.0
April	8.0
May	12.9
June	13.9
July	13.4
August	13.4
September	11.9
October	9.0
November	1.5
December	0
Total N	**201**

Table 2 shows that nearly 88% of sites are available year round. The remainder of sites report a seasonal nature where they are closed December, January, and February or longer.

Table 3. Q5: What audiences do you serve? (check all that apply)

Response	Percent
Academic Researchers	97.0
Graduate students	93.1
Undergraduates	92.1
K – 12	66.3
General public	66.3
State scientists	65.3
Federal scientists	62.4
Other (please specify)	19.3
Total N	**201**

This multiple response item shows that sites serve multiple audiences potentially complicating their work. Although sites report that researchers, including at the graduates level, and university students are the most popular audiences, education, kindergarten through adulthood (K-Gray), are also very popular audiences. Other scientists appear to be as welcomed as the general educational population.

Table 4. Q5 "Other" Responses (formatted for space savings)

Academic courses	All the above, but not open yet
BeachWatch	anyone engaged in research and education
consultants	Area/Regional Conservation Non-profits
Courses in biology	General public served by appointment, tours
Foreign scientists	High school students, grades 9-12
High School Students	international (Mexican public/scientists)
industry partners	International Researchers, interns, non-profit groups
international visitors	International research scientists
Interns, volunteers	K-12 special events via marine naturalist program
NGOs	Local (Costa Rica) governments, Central America
non-profit and public	Natural resource managers and professionals
NSF guest programs	Non governmental organization scientists
primarily undergrads	Non-Profit Arboretum partner serves general public & k-12
Private Companies	Natural Resource Professionals
private firms (occasional)	Professionals - land managers, foresters, etc.
Taxonomy Workshops	Regional Conservation Partners (NGOs, State Parks, etc.)
Teachers	Scouting groups and elderly
teachers	some regular public tours
Tribal organizations	St. Johns Riverkeeper, Inc.
volunteer groups	state and federal researchers
	private groups such as California Native Plant Society, Bug Guide

Q6: Chose the features that best describes your site. (check all that apply)
This question allowed multiple responses to the following categories: land, freshwater lakes, streams, estuaries, and oceans. The coding below results from a logical attempt to group responses in to either potential FSML or NAML members. Therefore, Estuarian sites could be categorized with FSML sites if they had no ocean, and with NAML sites if they had no land. Only 8 sites listed estuary with no other identifier; however, 21 sites listed some land feature, ocean and estuary.

Table 5. Base Geography Type

Response	Percent
Land, Freshwater lakes, Streams	64.9
Estuary, Ocean only	11.9
Land*, Estuary, Ocean	10.4
Ocean Only	5.9
Estuary Only	4.0
Land*, Estuary, no Ocean	2.5
Land*, Ocean, No Estuary	.5
Total N	**202**

*Land was coded any combination of land, freshwater lakes, streams

Table 6. Q7: Do you facilitate research and education on….(check all that apply)

Response (in percent)	**Yes**	**N**
property you own	72.5	189
public lands through the relevant permit	70.7	164
property you manage	68.7	166
private lands through arrangements with owners	53.7	147
other	36.4	55

Table 6 shows that most sites have access to multiple properties on which they may conduct scientific activities.

Table 7. Q7 "Other" Responses (formatted for space savings)	
Coastal ocean (public)	
coastal waters	open ocean
coastal waters	open water systems
estuarine and coastal waters	State land which they manage
fisheries	State Marine Protected Area
Great Lakes Waters	state university owned
Lakes and ponds	state waters (marine) by permit
National and State forests	waters of the state
National Park	the world's oceans (high seas)
National Park special lease site	U.S. Federal Government Property.
lands owned/managed by local land trusts	
coastal bays and inland waters, State and Federal Parks/wildlife refuges and conservation lands	
estuaries and oceans surrounding the region	
Ocean and shore-based research in State and Federal waters	
ocean waters regulated by states and federal government	
Our station is on land held in trust by Syracuse University (and therefore is private land managed by SUNY ESF AEC)	
Permanent sub-lease from an aquarium, that leases property from city	
Portion owned by UH Foundation and part owned by UH, all administered by HIMB	
Private Lands managed by local Land Trust	
public lake surrounded by our land	
Public land that needs no permit, open ocean within the US EEZ, open ocean outside the US EEZ.	
The land is owned by the California State University and the San Jose State University Research Foundation, to serve the mission of the Laboratories	
the ocean commons, state and federal waters	
US and Canadian Waters in the lower Bay of Fundy	
We are entirely within Capitol Reef National Park	

The term infrastructure of place-based research stations can be narrowly or broadly defined. The following long inventory of broadly defined infrastructure items was presented to respondents in two questions for display purposes. Combined results provided in Table 8 are sorted to show what features were critical most often to respondents. Detail in this chart may be important to managers who have intimate knowledge of these operations or who may need to make financial decisions.

Table 8. Q8 & Q9: What are critical infrastructure components at your FSMLs?

(in percent)	Critical	Available but Not Critical	Not Available	Total N
electricity	86.7	7.7	5.6	196
internet access	82.6	9.7	7.7	195
support staff	80.9	8.0	11.1	199
laboratory capacity	68.3	15.6	16.1	199
equipment storage space	66.3	27.6	6.0	199
long term monitoring	63.1	23.1	13.8	195
classroom capacity	60.8	20.6	18.6	199
housing	59.4	13.2	27.4	197
refrigeration/freezer capacity	58.4	28.9	12.7	197
on-site maintenance/engineering capacity	58.3	22.1	19.6	199
specialized equipment	57.3	25.1	17.6	199
teaching equipment	52.3	33.5	14.2	197
archived data	49.0	37.5	13.5	200
access to online journals	45.7	35.5	18.8	197
hazardous & toxic materials (MSDS) management	42.1	33.0	24.9	197
species lists	41.9	45.5	12.6	198
eating facilities	41.5	28.2	30.3	195
automated sensors	39.9	33.7	26.4	193
mapping systems	37.2	41.8	20.9	196
data feeds to/from automated sensors	36.8	33.2	30.0	190
live animal facilities - vertebrates	27.4	15.7	56.9	197
live animal facilities - invertebrates	27.4	22.3	50.3	197
access to physical journals	8.3	40.9	50.8	193
remote data acquisition	36.9	32.8	30.3	195

Table 9 shows the same infrastructure items but asks respondents to report on the condition of the infrastructure. Keep in mind that a measure of need (group consensus) was set in the previous question. Therefore, when only 8% report that access to physical journals is a critical part of their infrastructure, few would report that it is in excellent condition because it is not valued as a critical feature of their operation. Similarly, other items should be compared to their critical necessity. The response pattern for questions 10 and 11 is called a semantic differential scale. In this case, a central semantic anchor is provided to aid reliable response patterns. Often this sort of analysis will combine multiple categories as an indicator of quality. In this case, the best indicator of condition of infrastructure would be the combination of the 2 and 1 categories and the inverse. Cells highlighted show the items where over 20 % of respondents report that feature to be less than functional. Each of these highlighted cells is considered a critical feature by over 50% of respondents except for archived data (considered critical by 49% of respondents). Although managers of these facilities may not be surprised by the findings, the results appear to show that managers feel that few of their infrastructural elements are in

excellent condition although often functional or better. Lab, classroom and storage space are central features of the work that takes place on site, indicating a need for critical infrastructure investment in 20% of the sites responding. Such investment would not address new technological investment, only those fundamental broadly defined infrastructure items addressed in this list.

Table 9. Q10 & Q11: What is the condition of infrastructure components at your FSMLs?

(in percent)	5 Excellent	4	3 Functional	2	1 Poor	Not Available	Total N
electricity	37.0	36.0	16.5	3.5	1.5	5.5	200
internet access	30.1	25.5	23.5	8.7	2.6	9.7	196
support staff	26.4	31.5	19.8	7.6	6.1	8.6	197
laboratory capacity	11.6	22.2	29.8	10.1	10.6	15.7	198
equipment storage space	6.1	19.4	37.2	19.4	12.2	5.6	196
long term monitoring	19.9	21.9	25.5	13.3	5.1	14.3	196
classroom capacity	12.6	17.2	31.8	11.1	9.6	17.7	198
housing	13.6	23.1	24.1	5.0	6.5	27.6	199
refrigeration/freezer capacity	6.5	17.6	39.2	15.6	7.5	13.6	199
on-site maintenance/engineering capacity	13.3	23.6	31.3	6.2	8.7	16.9	195
specialized equipment	11.3	24.2	27.8	10.3	7.2	19.1	194
teaching equipment	6.2	25.8	30.9	12.9	6.7	17.5	194
archived data	10.3	19.1	37.1	12.9	7.7	12.9	194
access to online journals	27.4	19.8	26.9	3.6	3.0	19.3	197
hazardous & toxic materials (MSDS) management	14.4	18.0	33.0	7.2	3.6	23.7	194
species lists	12.0	22.4	41.1	10.9	3.1	10.4	192
eating facilities	16.2	15.7	31.0	7.1	3.0	26.9	197
automated sensors	12.1	16.2	28.3	11.6	3.5	28.3	198
mapping systems	7.8	20.2	32.1	14.5	4.1	21.2	193
data feeds to/from automated sensors	10.1	14.6	25.8	9.1	7.6	32.8	198
live animal facilities - vertebrates	7.1	10.2	19.3	5.1	1.5	56.9	197
live animal facilities - invertebrates	7.1	13.6	20.2	5.1	2.5	51.5	198
access to physical journals	4.6	11.3	19.0	8.7	10.8	45.6	195
research laboratory space	17.2	18.2	29.3	9.6	9.6	16.2	198

Table 10: Q12: What site features are most.... (check all that apply)

Response (in percent)	**critical for long-term sustainability**	**Not critical**	**Not Applicable**	**Total N**
support of the administration	90.8	4.6	4.6	196
use of the facilities by individuals from your FSML	88.2	8.2	3.6	195
operational revenue	79.3	12.6	8.1	198
use by individuals outside your FSML	66.3	31.6	2.0	196
federal support	63.8	29.1	7.0	199
private donors	60.0	27.7	12.3	195
state support	57.6	29.3	13.1	198
ability to manage landscape/land use change	52.0	32.1	15.8	196
ability to manage ocean resource/use change	16.6	29.5	53.9	193

Long-term sustainability often depends upon management and financial features in addition to infrastructure. Table 10 attempts to address some of these managerial features. Note the difference in the ability of sites to manage usage change between land and ocean sites. A proper interpretation of the ocean resource question would standardize by number of respondents. For example, since 54% responded it was inapplicable, three of eight respondents think managing ocean resource use and change is critical. Table 10 shows that most sites depend upon multiple sources of financial support.

Table 11. Q13: What site features are most...

Response (in percent)	**vulnerable in the next 5 years**	**not vulnerable**	**Not Applicable**	**Total N**
operational revenue	75.8	18.0	6.2	194
federal support	65.1	19.5	15.4	195
state support	60.2	18.9	20.9	196
support of the administration	54.4	42.5	3.1	193
private donors	53.9	26.2	19.9	191
use by individuals outside the institution	35.9	60.0	4.1	195
ability to manage landscape/land use change	29.5	49.2	21.2	193
use of the facilities by individuals from the same institution	22.6	74.4	3.1	195
ability to manage ocean resource/use change	10.5	30.0	59.5	190

Table 11 shows that 60% or more of respondents' report financial support as top concerns. One in four respondents thought that ability to manage ocean resource use and change is vulnerable.

Table 12. Q14: How many staff (full time equivalents) does your site employ?

Response	Percent
0	8.4
1-10	59.9
11-30	13.9
31-70	8.9
71-150	5.0
151-250	1.0
251-500	1.5
500 or more	0.0
Total N	**199**

Despite having used a pilot survey, this question did not develop significant variability. The majority of sites (83%) employ less than 30 FTEs. Consider the volume and quality of science so few people generate.

Table 13. Q15: Indicate which positions your site lists as employees.

Response (in percent)	**Percent of Cases**
Station Director	72.9
Maintenance staff	61.8
Office staff	51.3
Research technician	49.2
Other (please specify)	39.2
Physical Plant Supervisor	32.2
On site faculty	31.7
Education staff	27.1
IT staff	25.1
Assistant Director	24.6
Boat captain/operator	24.1
Administrative Director	21.6
Research Director	21.1
Data manager	20.6
Academic Programs Coordinator	13.6
Librarian	12.1
Informal Science Education Director	10.6
Undergraduate Education Director	6.5
Off site contractors	8.0
On site contractors	7.5
Total N	**199**

Table 13 shows the range of positions available at place-based research stations. However, note that nearly 40% of respondents added positions in the "other" response option. Three often mentioned categories of staff included researchers/scientists, cooks and food service workers, and custodial or housekeeping staff. Respondents drew other distinctions between directors, managers, and coordinators.

Table 14 presents the results from the first open ended question regarding scientific trends. Open-ended questions always present a number of challenges. Comparing open ended questions to more quantitative questions, consider that the purpose of good statistics is to turn many numbers in to a few (among other purposes). Similarly, in a qualitative analysis the goal is to turn many words into a few. In our particular case, we were quite exploratory in our purposes, so I elected to preserve some detail when possible. Often this took the form of a leveled coding scheme where rigorous categories were imposed with associated descriptive suffixes.

Another problem with open ended questions is that no matter what the prompt, respondents will tell you what they want to tell you. In planning stages, development of question language carefully focused questions on science rather than funding considerations. However, many respondents often mentioned financial concerns. Therefore, coding for the question in Table 14 had to discriminate between economic type comments and those comments that addressed the prompt directly. In this coding process, it became obvious some respondents drew clear links between their economic concerns and the science they conducted. Therefore, it would be wrong to cast out all comments about economic concerns as irrelevant or inappropriate. Indeed since the prompt did not ask for such connections, the prompt could not have elicited such detailed responses from all respondents. We should conclude that all comments about economics likely have some connection to science (i.e. the comments linking economics and science probably represent those comments lacking such specificity).

A second round of coding grouped comments into five broad categories (Table 15). The social process category was any mention of behavior like collaboration or coordination outside the site setting. For example, an outreach program for seniors was coded education, but the community work to invite them would be coded social process. Other examples of social process would include interacting with industry (e.g. forest or fisheries) representatives or interests and making real time data sets available for community use. Table 15 shows that 56% of respondents identified scientific trends and 23% identified economic trends that impact their science. Note that the mention of social processes remains small in this context, but that respondents offered social process comments just as economic comments, i.e. without specific prompt.

Table 14. Q16: Please identify two scientific trends that are affecting how your facility operates.

Econ vs Science Trend	Percent
Science	40.4
Science Soc Proc	10.6
Science Ed	2.3
Science and Technology	1.4
Science and Community	.9
Science Soc Proc interaction	.5
Science Subtotal	*56.0*
Economic	10.6
Econ Science interaction	8.7
Econ Science	2.8
Econ Ed	.5
Econ Science Soc Proc	.5
Econ Soc Proc	.5
Economic Subtotal	*23.4*
Soc Proc	1.8
Blank	18.8
Total N*	**218**

** Includes 16 non USA cases*

Table 15. Scientific Trends.

Topics Classified	Percent
Climate Mentioned	21.6
Technology	20.6
Social Process	14.7
Molecular Biology	3.7
Education	2.8
Social Process & Education	1.4
Technology & Molecular Biology	.5
Total N	**218**

** Includes 16 non USA cases*

Table 16. Q17: What are the primary elements of your organization's mission? (check all that apply)

Responses	Percent of Cases
Scientific	93.9
Educational	86.9
Resource management	35.4
Other (please specify)	20.2
Total N	**198**

Table 16 shows the responses to the prompt asking about mission. Note the high percentage (N=43) of responses in the Other category. Many (25) of the responses include outreach and public service types of statements, one mentioning policy. Seven statements discuss conservation, preservation or rehabilitation. Future surveys should include such options.

Table 17 shows results from another open ended question. The multi-level coding used three major categories and preserved lower level descriptors: economic, scientific, and ecological. The term business model was used when respondents discussed vulnerability of funding sources. Readers in this context may reject business language in this context; however, consider first that in the context of the non-profit world, there are analogs to business models, and some NGO use the term outright. While a place-based research site may be funded exclusively by a single source, that in itself is a sort of business model. Thinking in these terms may be instructive for some sites. Issues such as risk assessment, diversification of funding, and marketing all play a role in the life of a research station. Table 17 also supports the previous finding that infrastructure maintenance remains a large concern for a small portion of respondents.

Table 17. Q18: What most threatens the long term sustainability of your place-based research station?

Econ vs Sci Threat	Percent
Economic	39.9
Econ business model	17.4
Econ infrastructure	7.3
Econ Host interaction	1.8
Econ Priorities	1.4
Econ business model Soc Proc interaction	1.4
Econ, Ecological	.9
Econ business model, Host lack of support	.5
Econ business model, Sci recruiting	.5
Econ Drivers	.5
Econ Sci interaction	.5
Econ Sci staffing interaction	.5
Econ shortages	.5
Econ Soc Proc	.5
Econ, ecological, sci	.5
Econ, Host lack of support	.5
Econ, Host lack of support, Sci staffing	.5
Econ, Sci recruiting	.5
Econ, Sci, Soc Proc	.5
Economic Subtotal	***76.6***
Sci staffing	3.2
Sci Recruiting	.9
Sci staffing & recruiting	.5
Sci staffing, Econ infrastructure	.5
Sci tech driven upgrades	.5
Scientist time shortages	.5

Econ vs Sci Threat	Percent
Science Subtotal	***6.0***
Host lack of support	7.3
Ed lack of support	.5
Ecological	1.8
Ecological, Econ	.9
Ecological Subtotal	***2.7***
Host underestimation of demand for the program	.5
Soc Proc	.5
NO THREAT!	.9
Blank	6.0
Total N	**218**

** Includes 16 non USA cases*

Tables 18a and b address economic concerns directly. In Appendix B, detailed results are presented along a proposed continuum. The continuum may help conceptualize the breadth of work and the inter relation of the types of work that site managers must consider. The proposed continuum may be sensitive to the size of the site (staff or budget), where smaller sites are concerned with fewer details but the same topics. Often respondents provided multiple items of concern. This analysis coded the first two items mentioned, Investment A and B respectively.

Infrastructure rises as the top concern in both lists. Respondents mention both maintenance and upgrades as well as the need for new infrastructure (usually classrooms, lab space, and housing). Three responses - time, money and people - were grouped when respondents offered no specification. Finally, respondents mentioned management concerns including planning, training, and advisory committees. Note that a low level of the collaboration and networking (social processes) theme continues here.

Table 18a. Q19: What investments (money or time) in FSMLs will yield the greatest returns in terms of your organization's mission?

Investment A	Percent
Infrastructure	34.8
Time = Money = People	16.1
Management	8.8
Marketing	5.7
Long-term funding	4.8
Staffing	3.8
Education	3.4
Collaboration & Networking	3.4
Research	2.5
Science	1.5
Establishment	.5
Blank	17
Total N*	**218**

** Includes 16 non USA cases,* Total % over 100 due to rounding error.

Table 18b. Investment Additional Comments

Investment B	Percent
Infrastructure	10.1
Time = Money = People	3.2
Education	2.7
Collaboration & Networking	2.7
Staffing	2.3
Research & Science	1.8
Management	1.4
Long-term funding	0.9
Marketing	.5
Blank	74.8
Total N*	**202**

* *Includes 16 non USA cases,* Total % over 100 due to rounding error.

Table 19 presents 11 management type questions combined in a single question tabular format in the survey. Responses to these questions may inform common practices registries under development.

Table 19. Q20 (in percent)

Prompt	Yes	No	Don't Know	Total N
Does your station have a stated mission?	89.4	9.6	1.0	198
Does the station track number of scientific publications?	82.8	17.2	0.0	198
Does the institution track site use?	77.7	20.3	2.0	197
Does your station have a strategic plan?	65.2	32.3	2.5	198
Does the institution have an Institutional Animal Care & Use Committee (IACUC)	58.4	38.6	3.0	197
Does the institution have a data management policy in place?	48.5	44.9	6.6	198
Does your station have a financial plan?	46.5	49.0	4.5	198
Do you maintain a data catalog?	45.7	51.3	3.0	197
Does your budget cover 100% of costs?	36.5	58.9	4.6	197
Is the sites data catalog publicly available?	32.1	63.7	4.1	193
Is depreciation of the value of buildings and equipment part of financial planning for the site?	27.4	60.4	12.2	197

Table 20. Q21: Please rate the importance of funding sources at your place-based research station.

	Critical = 4	3	2	Unimportant = 1	Not Applicable	Total N
Host institution	79.4	6.7	2.6	2.6	8.8	194
Government grants	44.3	19.1	18.0	8.2	10.3	194
Federal or state budget item	35.2	9.8	9.3	11.9	33.7	193
Donations	24.7	22.2	24.7	12.9	15.5	194
Use fees	21.6	16.0	28.9	13.4	20.1	194
Non-government grants	18.1	24.4	28.0	15.5	14.0	193
Contract work	6.8	15.2	15.2	33.5	29.3	191

Question 21 asked about funding sources using a semantic differential scale. Results in Table 20 support previous findings that host institutions and grant funds are key features of site business models. Remaining results must be cautiously interpreted as high proportions of respondents indicate that the item is inapplicable.

Table 21. Q22: What are your site's most recent annual expenditures?

Response	Percent
Less than $50,000	16.8
$50,001 to $250,000	26.9
$250,001 to $5,000,000,	47.2
$5,000,001 to $15,000,000,	5.1
$15,000,001 to $50,000,000,	3.0
over $50,000,000	1.0
Total N	**197**

Operating budgets of 90% of sites is less than $5,000,000 (Table 21). As will be pointed out later, place-based research sites perform a number of key functions including: part of the scientific recruiting community, part of the teacher prep programs for K-12 teacher, key non-partisan interlocutors for industry, environmental and community concerns, and recreational opportunities. Grant staff may wish to consider the importance of each of these functions in terms of investments and scientific import relative to other investments, for example at the university level, or national budget line items.

Table 22. How many staff (full time equivalents) does your site employ? * What are your site's most recent annual expenditures?

	Recent Annual Expenditures (in percent)						
FTEs	**Less than $50,000**	**$50,001 to $250,000**	**$250,001 to $5,000,000,**	**$5,000,001 to $15,000,000,**	**$15,000,001 to $50,000,000,**	**over $50,000,000**	**Total %**
0	6	2	0	0	0	0	**8**
1-10	10	23	28	0	0	0	**61**
11-30	1	1	12	0	1	0	**14**
31-70	0	1	5	2	1	1	**9**
71-150	0	0	2	3	1	0	**5**
151-250	0	0	0	0	1	0	**1**
251-500	0	0	0	1	1	1	**2**
500 or more	0	0	0	0	0	0	**0**
Total %	**17**	**27**	**47**	**5**	**3**	**1**	**100**

Table 22 shows the staff size versus expenditure groupings. This table or better graded versions in the future can help managers plan scale of future projects or of expansion of existing projects. This sort of table would probably be more helpful if it were specific to land and ocean operations.

Table 23. Q23: If available, what is the approximate percentage of annual expenditures associated with administration, research, education, physical plant, and IT? (in percent)

	Percent of Expenditures											
Line Item	**0**	**10**	**20**	**30**	**40**	**50**	**60**	**70**	**80**	**90**	**100**	**Total N**
Research	12.6	27.2	16.6	9.3	8.6	10.6	7.9	3.3	3.3	.7	0.0	151
Physical Plant	10.3	33.6	24.7	13.7	6.2	6.8	1.4	1.4	.7	.7	.7	146
Administration	5.8	36.8	23.9	14.8	4.5	5.2	1.3	3.2	3.2	.6	.6	155
Education	17.6	35.9	26.1	8.5	4.2	2.8	.7	1.4	1.4	.7	.7	142
Other	55.3	17.0	14.9	2.1	4.3	0.0	4.3	0.0	0.0	0.0	2.1	47
Major Equipment	47.7	41.4	6.3	3.9	.8	0.0	0.0	0.0	0.0	0.0	0.0	128
Information Technology	34.1	55.3	8.3	2.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	132

Table 23 shows that four major budgetary categories require less than 20% of expenditures 45 to 61 percent of sites. In future surveys, it would be interesting to add a personnel response to see if it requires a larger portion of expenditures.

Tables 24a and b show the results of a question soliciting descriptions of educational or research achievements. Although this sort of compound question is often problematic during analysis, it served the current purpose of generating a broad array of conceptualizations of achievements.

Coding followed the previous description of using major categories but retaining additional descriptors. To learn about specific research or educational achievements see Appendix B. Scientific infrastructure would include remote data collection networks for example. Four sites report they are too new to report achievements. Collaboration and networking continue to appear at low levels.

Table 24a. Q24 Please name your facility's two most significant educational or research achievements.

Educational/Research Achievements A	Percent
Research & Science	30.6
Education	24.3
Long-term funding	10.1
Scientific infrastructure	5.0
Collaboration & Networking	4.6
Infrastructure	3.7
Publications	3.3
TOO NEW!	1.8
Management	0.9
Marketing	0.9
Time = Money = People	0.5
Blank	14.2
Total N*	**202**

** Includes 16 non USA cases*

Table 24a. Additional Educational/Research Achievement Comments

Educational/Research Achievements B	Percent
Research & Science	29.9
Education	24.3
Collaboration & Networking	6.9
Long-term funding	4.6
Scientific Infrastructure	3.7
Infrastructure	2.8
Sci Pubs	1.9
TOO NEW!	1.8
Time = Money = People	1.4
Misc.	1.4
Blank	21.1
Total N*	**202**

** Includes 16 non USA cases*

Misc. includes: Staffing, Patent Dev, Ecological – Discovery, Non-Bio Sci cosmology

Question 25 asks about facility's public benefit. The previous low level of collaboration in other open ended questions rises to top position here. In the current coding scheme, simply benefiting human kind is not sufficient to be categorized as social process. Social process had to include language that stated collaboration, coordination, or networking or included descriptions of such activities. A large portion of these sites report impressive community engagement, spanning traditional outreach, industry consultants, community (business, vs. residents) mediation, to policy mediation and advising. Comments indicate that these sites are highly engaged in their communities and responsive to their community's needs (including employment).

Table 25a. Q25: Please name your facility's two most significant achievements in terms of public benefit.

Achievements in Terms of Public Benefit A	Percent
Collaboration & Networking	42.2
Research & Science	21.5
Education	13.8
Infrastructure	3.2
TOO NEW!	.9
Pubs	.5
Blank	17.9
Total N*	**202**

** Includes 16 non USA cases*

Table 25a. Secondary Public Benefit Comments

Achievements in Terms of Public Benefit B	Percent
Collaboration & Networking	34.5
Research & Science	16.0
Education	12.4
Infrastructure	2.8
TOO NEW!	.9
Host Intl literary scholars	.5
Blank	33.0
Total N*	**202**

** Includes 16 non USA cases*

Table 26. Q26: How does your place-based research station assess success?

Response (in percent)	**Yes**	**No**	**Total N**
Scientific publications,	84.3	15.7	185
Number of students trained,	84.2	15.8	184
Number of use days,	69.4	30.6	183
Number of general public members reached	59.1	40.9	181
Number of students who go on to scientific careers,	46.1	53.9	178
Quality of management decisions informed,	44.1	55.9	179

Table 26 shows that place-based research stations generally consider their success in ways similar to universities. Considering the collaboration and networking findings in Tables 25 and b, adding community engagement measures would distinguish them from other research and scientific endeavors. Community engagement measures could go further than counting visitors to the site. One important measure might be counting the number of K-12 teachers receiving training, since STEM education remains a priority for both political parties. Additionally, K-12 program directors may wish to consider the intended or unintended consequences of youth program participation. One view of their participation is that sites offer an experiential educational opportunity. Might this opportunity inspire a few visitors that they wish to be field scientists one day? Depending on the goals such an outcome could be an unintended consequence. Alternatively, other programs may see every K-12 interaction as a recruiting opportunity. Such program goals will help sites determine what best to measure for their community engagement. Less common engagement measures can be applied to policy input where risk benefit analyses of not participating can show important impacts.

Table 27. Q27: What groups does your place-based research station partner with?

Response	**Percent**
Research institutions	87.9
State agencies	84.7
Federal agencies	81.6
NGOs	71.1
Other place-based research sites	54.2
Other (please specify)	18.9
Total N	**190**

Table 27 shows a first attempt to gather partnership information. The term partner is too vague to generate informative responses to this question. Future surveys may wish to develop critical distinctions regarding types of partnerships that would be more informative. Note that 26 of 39 Other comments discuss collaboration or networking.

Table 28. Q28: Please rate how different investments would facilitate cross-site research (defined as the ability to use data from multiple sites to answer research questions).

Prompt (in percent)	**Critical = 4**	**3**	**2**	**Unimportant = 1**	**Not Applicable**	**Total N**
scientific interest in cross-site questions	63.9	29.0	5.5	.5	1.1	183
data management	45.7	37.5	14.1	1.6	1.1	184
a knowledge network infrastructure	30.4	40.9	21.5	3.3	3.9	181
reducing administrative hurdles	19.2	33.5	23.6	19.2	4.4	182
shared standardized site descriptions	19.3	34.8	29.8	11.0	5.0	181

Question 28 seems to value cross-site research. Although many obvious benefits come from collaborations, it is not clear why cross-site research is valued here. Is it driven by scientific questions that cross wide spans of the Earth, like climate research? Or, is cross-site research thought to be a new wave of scientific approach? Nevertheless, 93% (categories 3 plus 4) of respondents agree that specific interest in cross-site questions are critical investments.

Crosstabulation

This section describes results of statistical tests where two categorical variables produce a table of frequencies. These tables are too large to present here; however, the results of the statistical tests can be summarized. All statistical tests employed have three expressions: symmetrical, with variable one as dependent and with variable 2 as dependent. The hypothesis being tested is that when the independent variable is known, how much is the reduction in error when predicting the dependent variable relative to when nothing is known about the independent variable? The measures selected follow the logic of the type of variables being joined. Lambda rages from -1 to 0 to +1 as does Somer's d.

For the following analyses a new size variable was developed where group 1 included sites reporting less than $50k, group 2 included $50-$250k, group 3 included $250,000 to $5,000,000 or more with 1 to 10, and group 4 included $250,000 or more and 11 or more employees. Effectively, the $250,000 to $5,000,000 group became two groups where the second merged with the largest.

Table 29. Statistical outcomes for questions associated with size.

Statistical Question/Finding	Dependent Variable	Measure/ Value	Sig
Do the critical infrastructure components differ by size?	**Dependent Variable**	**Lambda**	**Sig**
Larger sites consider X more critical	Electricity	.514	.001
Larger sites consider X more critical	Lab capacity	.493	.001
Larger sites consider X more critical	Equipment Storage	.341	.001
Larger sites consider X more critical	Refrigeration/freezer Capacity	.512	.001
Larger sites consider X more critical	Remote data acquisition	.188	.038
Larger sites consider X more critical	Live animal facilities Vertebrates	.379	.001
Larger sites consider X more critical	Live animal facilities invertebrates	.239	.019
Larger sites consider X more critical	Access to online journals	.383	.001
Larger sites consider X more critical	Access to physical journals	.331	.018
Larger sites consider X more critical	MSDS Management	.367	.001
Larger sites consider X more critical	Maintenance & engineering	.320	.001
Larger sites consider X more critical	Internet access	.564	.001
Larger sites consider X more critical	Support staff	.535	.001
Larger sites consider X more critical	Special equipment	.352	.001
Does the condition of infrastructure components differ by size?	**Independent Variable**	**Somer's d**	**Sig**
Better condition at larger sites	Electricity	.232	.011
Better condition at larger sites	Research Lab Space	.383	.001
Better condition at larger sites	Classroom capacity	.228	.020
Better condition at larger sites	Laboratory capacity	.367	.001
Better condition at larger sites	Refrigeration/freezer Capacity	.327	.000
Better condition at larger sites	Live animal facilities invertebrates	.313	.009
Better condition at larger sites	MSDS Management	.392	.001
Better condition at larger sites	Maintenance & engineering	.416	.001
Better condition at larger sites	Internet access	.232	.004
Better condition at larger sites	Support staff	.310	.001
What site features are important to sustainability by size?	**Independent Variable**	**Lambda**	**Sig**
More critical the smaller the site	use by individuals outside your FSML	-.082	.038
More critical the bigger the site	Federal Support	.109	.004
What site features are most vulnerable by size?	**NO DIFFERENCES**	**Lambda**	**Sig**
What management features differ by size?	**DV**	**Lambda**	**Sig**
Larger sites more likely to have a financial plan	Financial plan	.250	.017
Larger sites more likely to have a data mgmt. policy	Data mgmt. policy	.163	.007

Statistical Question/Finding	Dependent Variable	Measure/ Value	Sig
Do funding sources differ by size?	**NO DIFFERENCES**	**Lambda**	**Sig**

The Geographical base variable included groups land and ocean, where one category was all land—"Land, freshwater lakes, streams" and the other was any ocean in them, including estuary. Table 30 shows results for the asymmetrical measures, while Table 31 shows results for symmetrical measures.

Table 30. Statistical outcomes for questions associated with Geographical Base (Geobase).

Is there a difference in size between facilities serving land and ocean	**Dependent Variable**	**Lambda**	
Marine Labs are likely to be large (using recoded size indicator).	GeoBase	.208	.037
Do they serve different audiences	**Dependent Variable**	**Lambda**	**Sig**
Marine labs serve slightly more Grad Students	Graduate students	.046	.018

Table 31. Statistical outcomes for questions associated with Geographical Base (Geobase).

Statistical Question/Finding	Measure/ Value	Sig
Do the critical infrastructure components differ by Geobase?	**Phi**	
Electricity is slightly more important for Ocean sites	.181	.024
Classroom capacity less critical for Ocean sites	-169	.046
Laboratory Capacity is more critical for ocean sites	.289	.001
Equipment Storage space more critical for oceans	.173	.028
Refrigeration capacity is more critical for Ocean sites	.410	.001
Remote data acquisition is more critical for Ocean sites	.243	.008
Live animal facilities Verts more critical for ocean facilities	.231	.045
Live animal facilities Inverts more critical for ocean facilities	.290	.007
Access to Online Journal more critical to Oceans	.340	.001
Access to Physical Journal more critical to Oceans	.308	.003
MSDS more critical to Ocean sites	.307	.001
Internet Access more critical to Ocean sites	.169	.037
Support Staff is more critical to ocean sites	.173	.032
Specialized Equipment is more critical for Ocean sites	.249	.002
Does the condition of infrastructure components differ by Geobase?	**Phi**	**Sig**
NO DIFERENCES		
Do the site features important for sustainability differ by Geobase?	**Lambda**	**Sig**
NO DIFERENCES		
Do the vulnerable site features differ by Geobase?	**Lambda**	**Sig**

Statistical Question/Finding	Measure/ Value	Sig
Use by individuals outside the institution is more vulnerable for Ocean sites	.205	.004
Does the staff size (original variable) differ by Geobase?	**Lambda**	**Sig**
Staff size is larger for Ocean sites.	.106	.033

Principal investigators wished to know whether any investments yield greater returns differed by size or type (Geobase) of institution. Since this was a qualitative question, statistical analysis isn't appropriate without a different coding method. However, data provided in file tables.docx may allow investigators to draw their own qualitative conclusions.

Investigators added data to 21 non-respondents on three publicly known variables (described in Survey Methods). Then statistical tests showed that non-respondents were the same on all three variables as respondents.

Table 32. Testing the representativeness of the original sample vs. 21 non-respondents.

Statistical Question/Finding	Measure/ Value	Sig
Please indicate what type of institution hosts your place based research station?	Phi	NS
Chose the features that best describes your site	Somer's d	NS
What are your site's most recent annual expenditures?	Somer's d	NS

Measures of Association Summary

The principal investigators will have to determine what is important to talk about in the above results (Table 29 – 31). In general, large stations require more modern infrastructure (electricity, internet, Lab capacity & support staff) and keep that infrastructure in better condition. Larger sites had slightly better financial management practices. Marine labs were generally larger than other sites and fit the same description as large sites. Ocean sites had a small tendency to attract more graduate students.