



Sustainable Science Management
Bachelor of Applied Science

1. Program or Unit Description

Program and Purpose Statement - Catalog Description

The Sustainable Science Management (SSM) program, leading to a baccalaureate degree, provides a variety of options to students seeking employment in the rapidly expanding field of sustainability. Coursework covers important contemporary topics including but not limited to energy, ecology, business and management, water and wastewater, ocean systems, agriculture, waste-management, economics, policy, the built environment, natural and social sciences; all in the context of case studies in the larger interdisciplinary field of sustainability. Students develop systems thinking and analytical skills, which will enable graduates to apply learned principles to the changing and complex issues of the future. The program is designed to equip students with the fundamental skills necessary to bridge disciplines and to facilitate sustainable solutions and operations for any organization or community.

Value of the BAS SSM Degree

According to the 2017 National Council for Science and the Environment (NCSE) report, sustainability science has emerged as one of the fastest-growing interdisciplinary degree programs in the U.S., with applications in a variety of fields ([NCSE, 2017](#)). Only 13 programs in sustainability were identified in 2008; in 2017, that number had grown to 266. However, with this rise in sustainability degree programs has also come a lack of clarity around core competencies being addressed within and across interdisciplinary degree programs focused on sustainability (Brundiers et al. 2021). In response, key competencies have been articulated in the literature (e.g., Weik et al. 2011; Brundiers et al. 2021) to ensure consistency across campuses and sustainability programs.

The Sustainable Science Management (SSM) BAS degree at UHMC currently fulfills this need within the UH campus system. Unlike other sustainability degree and certificate offerings within the UH system, the SSM program includes these principles and key competencies throughout its curriculum (Table 1). While introduced to some of these core concepts in lower-division offerings, it is within upper division courses that students apply integrated problem solving and higher level critical thinking skills. In particular, upper division coursework focuses on the application and integration of key competencies described in the literature. For example, in SSM 422 (Sustainable Systems Thinking) students spend an entire semester learning how to apply a systems thinking approach to systems based modeling of real-world problems/issues chosen by the student. These are further reinforced and developed through upper division internships (SSM 392v) and senior capstone projects (SSM 495/496) where students apply and integrate sustainability tools and critical thinking within a local organization or business, or toward a particular problem or issue. While a certificate program could introduce students to sustainability competencies, it would be extremely difficult to incorporate all the requisite courses into a certificate program and expect to retain the quality now provided by the BAS degree offered at UHMC. Indeed, higher degrees in sustainability lead to better salaries and higher positions (Best Colleges, 2020), and most sustainable professions outside of skilled trade professions (e.g., solar installation, wastewater technicians) require a bachelor's degree for entry level positions.

Table 1: Applications of Core Competencies Across SSM Upper Division Coursework

Core Competency	Definition (Wiek et al. 2011; Brundiers et al. 2021)	Curriculum Application	Course Alpha(s)
Systems thinking	"ability to collectively analyze complex systems across different domains (society, environment, economy, etc.) and across different scales (local to global), thereby considering cascading effects, inertia, feedback loops and other systemic features related to sustainability issues and sustainability problem-solving frameworks." p. 207	Systems Models and Capstone Projects	SSM 101 SSM 422 SSM 384 SSM 402 SSM 495 SSM 496 BIOL 424/424L BIOL 331/331L
Normative/Values Thinking	"ability to collectively map, specify, apply, reconcile, and negotiate sustainability values, principles, goals, and targets" p. 209 Includes ethical, equity issues, transcultural understanding, cooperation, communication and collaboration.	Stakeholder roundtable discussions Students explore diverse values and perspectives when problem-solving	BIOL 424/424L SSM 384 SSM 402 SSM 496 SSM 301
Strategic thinking	"ability to collectively design and implement interventions, transitions, and transformative governance strategies toward sustainability" (p. 210)	Final Research Projects Examining systemic interventions and strategies. taking into account feasibility, trade-offs, unintended consequences and feedback loops when developing solutions	BIOL 424 SSM 402 SSM 202 SSM 301 SSM 401 SSM 422
Interpersonal (collaboration) competence	"ability to motivate, enable, and facilitate collaborative and participatory sustainability research and problem solving" p. 211	Communication Projects/Stakeholder Roundtables: Developing and teaching effective communication, leadership, and collaborative skills to conduct sustainability assessments with diverse stakeholders	SSM 202 SSM 302 SSM 402 SSM 384 BIOL 424/424L SSM 392v
Anticipatory/ futures-thinking	"ability to collectively analyze, evaluate, and craft rich "pictures" of the future related to sustainability issues and sustainability problem-solving frameworks".	Applied in all courses through concepts such as: precautionary principle, preventative, mitigation and adaptation responses	SSM 202 SSM 301 SSM 302 SSM 402 SSM 384 SSM 422 BIOL 424/424L

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Graduate Placements

Careers in sustainability range across a wide array of pathways from entrepreneurs, non-profit managers, and educators to natural resource management and environmental or sustainability consultants. This trend is evident in the number of new and replacement positions articulated within the ARPD data for SSM, which shows 898 State positions in 2020-2022. The critical thinking, systems thinking approach, and problem-solving skills described above are skills commonly sought by employers from all sectors. On top of this skill set, SSM students are regularly introduced to individuals, local organizations, and businesses through required internships and course offerings, making valuable community contacts and relevant experience that serve them once they graduate.

To date, SSM graduates have been quite successful in finding employment, both within and outside the sustainability arena (Table 2). As of Fall 2021, 93% of SSM graduates (39/42) were known to be employed or in graduate school (others are believed to be but have not been verified). 77% of those were working in sustainability fields (30/39), three times higher than the national average (27%) of students finding work in degree-related careers within five years of graduation (Arizona State University, 2017).

In addition, the vast majority of SSM graduates (over 80%) remained here in Hawai'i to apply their sustainability training to meet statewide workforce demands. A few have built a new enterprise for their work (e.g., sustainable surfboards, nonprofit agriculture organization), and many are active in the Maui community (e.g., helping establish ballot amendments related to agriculture and water; serving on nonprofit boards). Several have worked directly for Maui County Council members. Others have advanced through graduate work in sustainability and natural resource management.

Four SSM graduates have now been hired by the UHMC Huliha Systems Center for Sustainability, which was recently awarded a \$2.75 million grant for its establishment on the UHMC campus. Positions include directing and managing operations and community/stakeholder engagement, systems modeling efforts, and an indigenous knowledge specialist who ensures that Native Hawaiian values are at the center of all decision-making and practices.

Table 2: SSM Employment Sources and Trends. As of Fall 2021, 93% of SSM graduates were known to be employed and 77% (30/39) of SSM graduates were working in sustainability related careers.

Sustainability/Other Field	Graduates' Employment (up to Fall 2021)	Graduates in Sustainability Related Fields
Agriculture	1	1
Education	4	4
Educational Film & Media	1	1
Entrepreneur	3	2
Graduate School	6	6
Natural Resource Management	5	5
Renewable Energy	1	1
Sustainable Business Strategies	3	3
Sustainability Consulting	3	3
Sustainable Tourism	1	1
Other Employment	11	3
Unknown	3	0
Total Employed	39/42 (92.86%)	
Total Employed Sustainability Careers		30/39 (77%)

Target Student Populations

Sustainability science relies on a broad foundation of knowledge which naturally attracts a diverse student body. As testament to that breadth, SSM attracts students from all ages, ethnicities, and a broad range of academic and life experiences. The majority of our students are born and raised on Maui, searching for a bachelor's degree opportunity on the island and the chance to make a difference in their community. Indeed, if one had to choose, the most consistent group would be returning students, some of whom have previously received degrees but are returning to school in search of a 'more meaningful career' opportunity.

While local high school and returning students are our main target populations, in truth, the concept of sustainability science and corresponding educational opportunities remains nuanced enough that most high school students and community members are not aware of it as a valid and growing career opportunity. Moreover, many community members still think of UHMC as MCC and don't realize that the campus offers bachelor's programs; and, even if they have heard of the Sustainable Science Management program at UHMC, most don't know what that means or what career opportunities await if they were to pursue it. However, once students have taken SSM 101, many who originally thought it a novelty become more aware of the challenges and opportunities in sustainability overall.

According to recent ARPD data (see appendix for complete report), approximately twenty percent of SSM majors are Native Hawaiian and only about a third of students are currently registered full-time (fall range: 35%-47%). This latter point seems to emphasize what we know to be true: our students are balancing multiple responsibilities simultaneously, not just school; and, since the pandemic began in 2020, the number of full-time students has decreased steadily (47% to 35%). Despite this, over the last three years, an average of 80% of our students (range: 87%-77%)

successfully completed SSM courses with a grade C, or higher. In the last three years, we have had 13 graduates and 39 since the program was initially established in AY 2011-12. Ultimately, SSM is a rigorous academic program and this identifies who will pursue and complete the degree.

Pathways and Articulation

- **Articulated Pathways for 4-year or graduate pathways**

To date, a few high school students have taken SSM 101 and have generally shown interest in the program. However, in our experience most of these EarlyAdmit/Running Start students are intent on traveling off-island for their college experience. To address this bridge to local high school populations, we are currently working with Huliha Systems Center for Sustainability to catalyze interest in sustainability and SSM as a college destination (see SSM action plan). Shortly after the submission of this annual review, we are meeting with administrators to develop a dual enrollment course for SSM 101, our signature gateway course into SSM. This effort is being enhanced by a grant which allows more focus on providing expanded opportunities for Native Hawaiian students to achieve a Bachelor's degree at UHMC.

Without question, the preferred undergraduate pathway is the achievement of the SSM BAS degree. Approximately 15% of SSM graduates (6/42) have attended graduate school within a year of completing their BAS degree. Several more have expressed interest but are hesitant to leave Hawaii, or to revert to an online program, to do so. From the standpoint of sustainability in Hawai'i and to avoid duplication of degree programs within the UH system, we strongly believe that a graduate degree program in Sustainability from UH Manoa would service and capture these and other students, as well as build future leaders within the State to meet growing employment opportunities.

Closing Equity Gaps

Some observers vaguely familiar with sustainability tend to characterize it as an ‘environmental’ program, rooted in advocacy and aligned with efforts which can create rifts in society and/or result in hierarchy or elitism in populations. However, this understanding misses the most important point of sustainability science; that is, a systems based approach inherently prioritizes the identification of any vulnerable ecosystem service or human demographic as a sign of *unsustainability*. Secondly, the necessary processes to achieve these ends are rooted in the term ‘transdisciplinary’, which values knowledge from any source as critical to sustainable outcomes. By definition then, local knowledge and traditional practices have the same value as advanced research or technology or academics.

As a core value of sustainability science and systems thinking, equity is embedded throughout the degree and its graduates. The impact of these elements is twofold on equitable reparations. For one, students of any societal niche are welcome both as learners and contributors to broader knowledge. For two, teaching principles of sustainability tends to broaden personal awareness, sensitivities, and avenues to repair inequities among populations. Several SSM students have focused on serving vulnerable populations by integrating and applying equity issues into their coursework or in their life’s work after graduation. For example, just in the last year, one SSM student focused her capstone on decolonizing sustainability science to expose both the perceived and literal connections and disconnections between Kānaka Maoli practices and the field of Sustainability Science, while another student is addressing impacts of ancestral land loss due to steep rises in property taxes for Kānaka Maoli.

2. Analysis of the Program/Unit

SSM Program Assessment and Trends

The most recent [2022 ARDP report](#) for the SSM program rates its overall program health as “Cautionary”, its Demand indicator as “Healthy”, the Efficiency indicator as “Progressing” and the Effectiveness indicator as “Progressing”. This represents a downward trajectory from the [2021 ARDP report](#) in both Overall Program Health and Effectiveness Indicators (Table 3).

Table 3: SSM ARPD Data Summary and Trends, 2020-2022 (see appendix for full report).

Year	Overall Program Health	Demand Indicators	Efficiency Indicators	Effectiveness Indicators
2019- 2020	Cautionary	Healthy	Progressing	Progressing
2020- 2021	Healthy	Healthy	Progressing	Healthy
2021 - 2022	Cautionary	Healthy	Progressing	Progressing

From this data, one of the strengths of the SSM program is the fact that our program is training students in an area where there is an increasing number of employment opportunities. Despite the impact of the pandemic and other world events, the number of new and replacement positions has remained consistent over the past three years at both a Statewide and County level. This is consistent with our high employment rate of SSM graduates working in the field of sustainability (see Table 2).

On closer inspection, it appears our overall program health ranking dropped from “Healthy” to “Cautionary” based primarily on the “Effectiveness” indicators that dropped from “Healthy” in 2021 to “Progressing” in 2022. Despite this discouraging change in labels, many of the effectiveness indicators actually improved during the last three years. For example, in the last year,

successful course completion improved from 76% to 87% ; the number of withdrawals decreased from 14 to 4; and our persistence rates improved in both fall to spring (70% to 77%) and fall to fall (50%-59%). As such, this change seems to be more of a reflection of the number of graduates dropping from seven graduates in 2021 to five graduates in 2022, a difference of only two students, illustrating the vulnerability of a small program. Over the last three years, SSM has awarded 13 BAS degrees and 23 transfers to 4-year UH programs. This is a mixed result as the transfer indicator does not reflect that students remain at UHMC to complete this 4-year BAS degree. In 2023, we anticipate a slight uptick to six SSM graduates.

Perhaps more disconcerting is the declining number of SSM majors over the last three years. This is a trend that evidently is not unique to SSM and can be seen across multiple programs (e.g., Liberal Arts) not only at UHMC but throughout the UH system and even nationally ([UH News, October 2022](#)). UHMC saw the largest drop in enrollment across the UHCC campuses (-9.3%) and SSM data reflects these trends. According to ARPD data, the number of SSM majors has dropped from 45 in 2020 to 27 in 2022, a 40% change from 2020 and 33% decrease from last year.

It has been known for some time that many SSM majors do not declare majors in their early semesters as they are seeking an AA degree, mostly in Liberal Arts or Natural Science. They then declare the SSM major once the AA degree is obtained. The SSM lower division pathway makes this easy to do, but in the interim SSM does not receive credit for students who are actually in school to receive the SSM BAS degree. ARPD data indicates, however, that the number of majors in natural science at UHMC, a lower division pathway into SSM, has increased since 2020 from 64 to 82 majors in 2022, and should be considered a target market for us to recruit from for SSM.

We also know that the pivot in 2020 to distance learning has impacted the number of students in SSM. Anecdotally, we have heard from several students that they are dropping out or transferring due to the emphasis on remote learning in lower division course offerings. Rising inflation and housing costs have also led several students to leave the island and/or return to work rather than completing their degree. This reduction in the number of SSM majors is also reflected in smaller class sizes (from 10 in 2020 to 7 in 2022), particularly in upper division courses, and an almost 50% reduction in FTE enrollments and a 45% reduction in SSH program majors in program classes. This suggests that many students are returning to work, taking fewer classes per semester, and therefore taking longer to graduate.

New SSM Program Initiatives: Marine Studies Concentration and Exploration of ASC in Sustainability

Since our last program review, the SSM concentration in marine studies has been approved and is now integrated into the SSM BAS degree and UHMC catalog. The concentration allows students to accumulate elective courses in a field of interest and complete an additional credential along with their BAS that will be stated on their SSM diploma. With increasing SSM majors in the future, the intention is to develop additional concentrations that match our students interest (e.g., Natural Resource Management, Policy, Native Hawaiian Studies, and Energy). The addition of a concentration has been met with strong enthusiasm from our students. One student graduated with the concentration in 2021 and we anticipate that nearly half of SSM graduates will graduate with this concentration in 2022-2023 (3/6 graduates). Indeed, we see several students taking additional courses (i.e., beyond what is needed to graduate) to qualify for the marine studies concentration.

Because of the declining number of SSM majors, national employment trends related to the pursuit and expense associated with bachelor degrees, and our commitment to introducing sustainability principles to as many students as possible, we are currently exploring new ways to capture students in lower division pathways. One idea considered in our 2021 program review was creating a two-year AA degree in sustainability; however, that was met with some skepticism from administration and we have now pivoted toward exploring the possibility of building an Academic Subject Certificate (ASC) in Sustainability. In theory, this would allow more students access to sustainability courses and increase our opportunity to recruit interested students in progressing toward a BAS. For other students, they could be introduced to some of the key competencies mentioned in Table 1 without the added expense of the upper division courses that we know can be a deterrent to students pursuing a degree on Maui.

Consequently, an ASC would expand our academic footprint, perhaps facilitating more students going on toward a higher degree, and allow us to contribute to the broader UH system-wide effort of offering ASCs in sustainability at each of the UH campuses. However, we need to ensure that providing this option will not undermine the value of the BAS degree. The SSM BAS degree is unique and fulfills a gap within the current UH system and is critical for many employment opportunities in the field of sustainability.

3. Program Student Learning Outcomes or Unit/Service Outcomes

SSM Program Student Learning Outcomes (PLOs)

SSM Program Learning Outcomes (PLOs) were updated in 2019 to reflect current and contemporary thinking in sustainability:

1. Describe the functions, inter-relationships, and limitations of human-developed and naturally occurring systems.
2. Utilize systems and sustainability science tools to synthesize and illuminate complex problems and design durable responses.
3. Understand contemporary legal, technological, economic, cultural, and ethical infrastructure as it impacts sustainability.
4. Utilize conventional and emerging methods to measure sustainability aspects of behaviors.
5. Integrate transdisciplinary knowledge across cultural, social and educational realms to identify and implement sustainable practices.

Program Assessment

The program assessment for this review focused on one lower division (SSM 202, Sustainable Island Communities) and one upper division course (SSM 301, Sustainability Assessments and Indicators) taught by Tim Botkin, SSM Assistant Professor. We chose SSM 201 due to what we perceive as a possible bottleneck of students from lower division coursework to upper division coursework to see if we could glean any insights into where we are losing students. SSM 202 is usually the last SSM program course before students can progress to upper division coursework. We chose SSM 301 as it tends to be a course where students struggle with the course material. The results are reported below.

Assessment Results

Both courses were evaluated at the SLO level, following assessment indicators based on 70% success rate in assignments designed to meet the SLOs. Tables 3 and 4 illustrate the results. While this form of assessment ensures that we are meeting the PLOs of the program, shows how we are teaching and integrating the core competencies reported in Table 1, and helps us to glean patterns of

student performance and success, it does not really provide much insight into why we may be losing students before they progress to the upper division level of SSM coursework. For example, students in SSM 201 are doing well overall in relation to course content and SLOs. Due to small class sizes (average class size: 13 over the last three years), differences in student performance can be swayed by one student withdrawing from the class or not performing well overall. This is indicated in the somewhat poorer performance in Spring 2022 compared to other years in SSM 202. Course assessment is helpful, however, in monitoring and tracking growth in new assignments (e.g., 50-year Maui plan in SSM 202) and how core competencies are built upon and reinforced as students progress through the degree. It also revealed places where we might want to revisit assignment instructions to ensure we are preparing students for success (e.g., SSM 301, toolkit assignment).

Table 3: SSM 202 (Sustainable Island Communities) SLO Assessment

SLOs for SSM 202	Related Assignment	70% Attainment Rate		
		SP 22	SP 21	SP 20
1. Describe the key environmental, socio-political, cultural and economic issues unique to island sustainability	Student Island Final Report	100%	100%	100%
2. Describe and define island carrying capacity	Midterm Exam	84%	100%	100%
3. Develop a mechanism for identifying key stakeholders for sustainability	Final Paper/Exam	84%	88%	86%
4. Understand the scale and applicability of economic and environmental policies made on islands	Short Paper: <i>What is Maui's likelihood of becoming a part of "Sustainability in the larger world economy?"</i>	72%	100%	86%

SLOs for SSM 202	Related Assignment	70% Attainment Rate		
5. Identify and describe how proposed and implemented plans do and do not address sustainability conflicts between development and resources on islands	Maui 50-year plan assignment	100%	88%	n/a
6. Describe best practices in the sustainable tourism industry	Read the Saarinen article describing three ways to evaluate sustainable tourism. Write a short summary and be prepared to report on the strengths and weaknesses of each.	84%	100%	100%

Table 4: SSM 301 (Sustainability Assessments and Indicators), SLO Assessment

SLOs for SSM 301	Related Assignment	70% Attainment Rate		
		SP 22	SP 21	SP 20
1. Ability to articulate and analyze sustainability concepts, processes and metrics for a variety of situations.	Midterm Exam	100%	100%	100%
2. The capacity to recognize criteria/indicators and calculate basic sustainability measurements such as carbon footprint, and to gain an understanding of the mechanisms of more complex models.	Development of a “Tool Kit” (Students are required to document the variety of assessment methods learned in class through the creation of a document.)	75%	80%	67%
3. The means to construct combined business case and sustainability	Business Case paper and presentation	75%	100%	84%

SLOs for SSM 301	Related Assignment	70% Attainment Rate		
assessments for organizations and their various components				

4. Action Plan

Overview

Based on ARPD data and our own assessment of our program’s strengths and weaknesses, we have summarized specific strategies and outcomes to focus on during the next academic year to strengthen the SSM program and ensure its longevity (see Table 5). We have created the beginning of a more comprehensive five-year plan that includes measurable outcomes for the next academic year (2022-2023). Our primary focus is on increasing the number of SSM majors, which would eventually increase other indicators such as graduation rates, SSH hours, average class sizes, and the growing number of lower enrolled classes.

While the core benchmark is to increase SSM majors by 50% over five years, the majority of strategies and specific benchmarks also address the 2021 recommendation to clarify how we plan to better communicate the meaning and value of the SSM degree to students and the broader community. Although seemingly ambitious given the uncertainty of world events and current national trends in higher education, for a program our size, increasing 10% p/year would mean increasing majors by three students in the next year, growing incrementally from there to reach the target of a minimum of 54 SSM majors by 2028. To accomplish this key indicator, our current action plan targets seven overarching strategies and specific benchmarks that are summarized in Table 5 and expanded on below.

Table 5: SSM Action Plan Summary. Increasing SSM Enrollment by Better Communicating the Value of the SSM Degree with Students and Community

Strategy to Increase Enrollment and Improve Community Awareness	22-23 Benchmarks
Develop Comprehensive 5-Year Marketing and Recruitment Plan	<ul style="list-style-type: none"> • Develop 5-year Marketing and Recruitment Plan with SSM Advisory Committee by Fall 23
Conduct Recruitment and Outreach in Local High Schools	<ul style="list-style-type: none"> • Increase SSM Majors by 50% over five years • Increase Native Hawaiian student enrollment in SSM by 20% over three years • Develop Huliha Youth Ambassador Council by Fall 2023 • Local High School Outreach to 150 students p/year, over 5 years • Explore other recruitment opportunities (e.g., dual credit course, non-credit community members in lower enrolled classes) • Develop Professional Development Opportunities for students and teachers, piloted in Spring 2023
Develop SSM Online Cohort	<ul style="list-style-type: none"> • Google Advertisement Placement for SSM in SP 23 • Purchase (FA 22) and Pilot Equipment (SP 23) to enhance remote learning opportunities • Promote through UH Sustainability Curriculum Committee, Social Media, Google Ad, Press Release • Pilot online cohort in 2023-2024
Increase Community Awareness of SSM Program	<ul style="list-style-type: none"> • Create newsletter highlighting SSM and UHMC Sustainability efforts for Maui Community • Sponsor at least 5 Community Events that Highlight Sustainability Issues and Promote SSM • Release at least one press release highlighting SSM • Develop Program Agenda for Global Sustainability Conference at UHMC in SP 2024 • Develop professional development workshops and learning modules for PD around sustainability principles (faculty, teachers, community workshops, workforce development, etc)
Identify and Explore Collaborative Opportunities within UHMC and UHCC	<ul style="list-style-type: none"> • Work with UHCC and UHSCC to build relationships to increase transfer recruitment • Continue discussion of program mergers with AG Department (e.g., sustainable ag concentration) • Develop recruitment strategies for National Science majors at UHMC • Develop and pilot new lower division course aimed at non-majors by SP 23 • Recruit community members (non-credit) for lower enrolled upper division SSM courses

Invest in Development of Huluhia Sustainability Center	<ul style="list-style-type: none">• Create Vision for Integration of Huluhia and SSM BAS degree• Develop Applied Research Opportunities for SSM and ALL UHMC students• Build Huluhia Community Advisory Council• Build Huluhia Youth Advisory Council
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1. Develop a comprehensive 5-year marketing and recruitment plan with assistance from the SSM Advisory Committee.

With global pandemic and restrictions on in-person gatherings, the SSM advisory committee had fallen behind in its regular meetings over the last few years. However, with the return to campus this fall, the SSM advisory committee has been revived and new members added. We have held two meetings this fall, both aimed at training and recruiting new members, and developing a thoughtful marketing plan and strategy to increase community awareness and student recruitment for the SSM program. Representatives span industry and service organizations ranging from local nonprofit organizations focused on ecological restoration, local businesses in the energy sector, resort executives from the tourism industry, County government officials, and individuals invested in sustainability practices on Maui. From these meetings it is clear that they recognize the value our program is offering and are very enthusiastic about helping us to increase brand awareness around SSM. While the goal here is to integrate feedback from the SSM advisory committee in 22-23, the beginning of the plan is outlined in [Table 5](#) and below.

KEY STRATEGIC BENCHMARK: Create a 5-year marketing and recruitment plan for SSM with the advice and assistance of the SSM advisory committee by Fall 2023.

UPDATES FROM 2021 REVIEW: With limited resources and budget to implement comprehensive marketing strategies, we continue to focus on “low-hanging fruit” that is cost

effective (e.g., social media, website, in-house marketing materials) and resource efficient (i.e., use of AmeriCorps Vista Interns to support SSM faculty). Over the last two years, SSM faculty, Dr. Meagan Jones, has supervised the UHMC AmeriCorps Vista Internships for the UH Office of Sustainability. This has expanded our work force and implementation of SSM marketing efforts at no cost to the College. We are currently building on progress made in 2021-2022 with two new Vista interns. The SSM website has been revised and updated and our social media presence is now being monitored by the two new interns. SSM students, however, have questioned the value of social media as a true recruitment tool so we are monitoring to see if it makes a tangible difference in followers.

2. Increase recruitment efforts in local high schools.

As discussed elsewhere, the number of SSM majors has fallen by forty-percent in the last three years. As such, our entire plan is focused on recovering and rebuilding the number of SSM majors and includes a multi-pronged five year approach to reverse this downward trend. As noted earlier, our two target populations focus primarily on local students and returning community members. As such, our action plan outlines a way to improve communication around the value of our degree to both students and community members as well as attempting to attract new target populations (e.g, online learners, transfer students, UHMC natural science majors). Below we discuss a new initiative to actively engage high school students in sustainability issues on Maui, while increasing awareness around the availability of the BAS SSM degree on Maui.

According to ARPD data, Native Hawaiian students make up approximately 20% of SSM enrollment over the last three years. As a program based in Maui and part of an indigenous serving institution, one of our primary goals is to increase opportunities for Native Hawaiian students in our

community. Specific goals include developing opportunities for Native Hawaiian students within a larger scope of sustainability initiatives on Maui, and secondly, to increase enrollment within this population in the SSM program. To address these goals, we are focusing our efforts on high schools with higher representation from Native Hawaiian students (e.g., Maui High School, King Kekaulike), and to develop culturally relevant curricula with Huluhia's Indigenous Knowledge Specialist and former SSM graduate, Kehau Kimokeo. The goal is to develop collaborative learning opportunities that engage students in experiential learning around sustainability issues using systems thinking rooted in Native Hawaiian values. This is critical not only to meet metrics such as increasing enrollment in SSM but to ensure inclusion, opportunity, and diversity remain paramount within our program and community.

KEY STRATEGIC BENCHMARKS: Increase SSM enrollment by 50% over five years, including at least 20% from Native Hawaiian or other vulnerable populations.

To meet these strategic benchmarks, we have focused on three major initiatives: 1) engagement and recruitment at targeted local high schools; 2) piloting SSM 101 as a dual enrollment course for high school students in AY 23-24.

Benchmark #1. Reach 150 High School Students p/year, over five years. Although we have participated in high school engagement activities on UHMC campuses, active recruitment of students from local high schools is a new initiative that we have started in collaboration with Huluhia Sustainability Systems Center during Fall 2022. Because Huluhia is an outgrowth of the SSM program ([see 2021 review](#)) and we have mutually beneficial goals, one of our new initiatives is developing a program to engage high school students in the broader field of sustainability and to highlight the academic opportunities available to local students through SSM. The idea behind the

outreach effort is three-fold: 1) begin building relationships with local high schools and faculty to develop a youth ambassador council for Hulihiia that will engage students in sustainability issues on Maui from a younger age; 2) increase interest and awareness around broader sustainability practices and SSM; 3) recruit local students into the SSM program. Of course, these all complement each other and the first objective is intended to build a pipeline of SSM students into the future.

Benchmark #2: Explore and pilot dual-enrollment opportunities for high school students as part of SSM 101. Currently, we are meeting with UHMC administrators and counselors to explore options for SSM 101 to become a dual-credit course for local high school students. Our goal is to pilot this course in Fall 2023.

UPDATES FROM 2021 REVIEW: *1) This is a critical component in communicating the value of the SSM degree to local students and to reach our target population of potential students. 2) One of our goals from the 2021 review was to increase internship opportunities for SSM students through Hulihiia.* Our first such internship was given to an SSM student who was responsible for developing the interactive presentation and program described above and geared toward high school students. Having a local student deliver the presentations is particularly impactful as she is someone the students can relate to, and she can share firsthand experiences about the value of the SSM degree. Part of the presentation includes a hands-on activity that allows students to apply systems thinking to a local environmental issue. To date, Marie has visited four classes at one high school, reaching 65 students, including 18 Native Hawaiian students. More visits are being scheduled now to meet the goal of reaching 150 students in 22-23.

3. Continued exploration and development of an online SSM cohort to increase SSM enrollment.

To ensure we survive as a bachelor's degree program in a community college setting, we need to explore all options for student recruitment. Without residential housing options for off-island students, we are relatively limited in how actively we can recruit traditional students. However, one of the strategies outlined in our 2021 program review was the idea to develop an online cohort of online/remote SSM students. In other words, we could bolster SSM enrollment with the addition of a fully remote cohort of students that could include a mix of off-island, remote Maui, and out-of-state students. Below is an update on this undertaking and the plans for this academic year.

KEY STRATEGIC BENCHMARK: Pilot a fully integrated online cohort for SSM in Fall 2023.

Benchmark #1. Procure and field test remote learning equipment purchased with the 2022 Perkins grant. We plan to procure (finally!), learn (attend training), test, and use the new remote interactive and two-way AV equipment with online learners in Spring 2023. This will give us new opportunities to truly recruit and expand our SSM classrooms to virtual learning environments by Fall 2023.

Benchmark #2. Begin active recruitment for an SSM online cohort in 22-23. We plan to place a Google Ad in early spring 2023 as a test case to see if this will help with new recruits and allow us to start, however modestly, with a new online cohort for SSM in Fall 2023. Funding has been approved for this one-time ad placement but the administrative process to get this done has been frustratingly slow to date. As part of our comprehensive marketing plan detailed earlier, we will identify new strategies to help encourage enrollment from other demographics (e.g., remote areas of Maui, other islands, and on-island students looking for an online bachelor's degree). Some ideas include promoting this option in our current high school recruitment efforts, detailing in our new

community newsletter, and using press releases to announce this along with other SSM news when appropriate.

Benchmark #3. Launch SSM Online Cohort. While the initial goal was to begin with six new students in Fall 2022 (2021 program review), given current enrollment trends at UHMC, we would be happy to begin with three new students, thereby increasing SSM majors by 10% in the first year.

UPDATES FROM 2021 REVIEW:

1) Online SSM Course Offerings: With the transition to online learning, testing of the online cohort idea has begun with separate online CRN offerings for SSM 101, SSM 202, and SSM 302 (Fall 2022), and fully online and synchronized versions of SSM 275, SSM 392v and SSM 496. Other upper division courses included in the SSM pathway (SSM 302; SSM 384, BIOL 331) have opportunistically provided a synchronized online option (i.e., as needed by students) over the last two years using hybrid classrooms provided by UHMC. While this has served its purpose and allowed students to continue the SSM degree remotely, we have also noted some limitations in student success. As such, we are focused on ways to improve the interaction in the classroom and in the field with our remote students.

2) Invest in Enhanced Remote Learning Tools: To fully hybridize the degree, we are designing a more interactive system that allows students to participate fully in classes, both inside and outside the classroom. Since submission of our last review, we received a Perkins Grant in Spring 2021 for the purchase of enhanced remote learning tools that could mimic the classroom in field settings common in SSM upper division courses. While this was

approved in Spring 2022, we are still working our way through the UHMC procurement process and hope to have the equipment by the start of Spring 2023.

3) Launch SSM Student Cohort in Fall 2022: The optimistic plan was to start with a new online remote cohort in Fall 2022. The idea was to increase SSM exposure using social media and our updated website in conjunction with a SSM Google Ad. While the advertising costs were approved by the Chancellor's office in Spring 2022, it was delayed due to administrative holdups. As such, there was not enough new exposure to SSM to begin a new cohort. As stated above, we are hoping now to begin that in Fall 2023.

4. Explore Collaborative Opportunities within UHMC and UHCC to Elevate SSM as a Transfer Destination and BAS Degree

Part of our action plan includes increasing awareness of the existence of and value of the SSM degree inside the UH system, including on our campus. This focuses on elevating SSM as a viable transfer option for other UHCC students, engaging and recruiting UHMC students that are natural science majors about SSM, and continuing to explore options for 'program mergers' that can be mutually beneficial across programs. While an important strategy to pursue, the specific outcomes are less clear than some of the other options with more specific benchmarks attached.

Benchmark Goal #1: Elevate SSM as a Viable Transfer Option by 2024: ARPD data still lists 'four yr transfer' as a good outcome for SSM students. For us, the much better result is retention of students to graduation with the SSM degree. While we have made some effort to increase awareness of this for students in other community colleges around the state (e.g., participation in transfer fairs), we hope to increase system-wide awareness to ensure students know SSM at UHMC is a

valid option for transfer. Since attendance at transfer fairs has been limited for us, a new option we are exploring is working with faculty from other campuses to increase their understanding of our program and its value for other UHCC students as a transfer option. One current vehicle for exploring that awareness is SSM faculty (Meagan Jones) joining the recruitment subcommittee within the UH System Sustainability Curriculum Committee. Most of these faculty are already invested in developing an ASC for their campuses in sustainability and have access to a target audience of students interested in sustainability. While this would not benefit their campuses directly, it would help facilitate higher degree options for UHCC students within the greater UH system.

Benchmark Goal #2: Engage and Recruit UHMC Natural Science Majors. In addition to creating awareness of SSM as a valuable degree option within the UH system, ARPD data suggests that recruiting from within our own campus is also something to consider. For example, we know that many SSM majors start with an AA in Liberal Arts or Natural Science. As noted earlier, UHMC natural science majors have increased in number over the last three years, so expanding our outreach and engagement of those students could be worth pursuing. One option we are considering is offering a version of SSM 101 that would be targeted for non-majors to increase awareness of SSM as a valuable degree option within our own campus, or serving as guest lecturers in some of the classes that might include students who would be interested in SSM (e.g., BIOL 124/124L). One current offering in the UHMC catalog is BIOL 282 (Global Change) that could be used to target non-majors.

Benchmark Goal #3: Program Mergers: Finally, as mentioned in the 2021 program review, one other option would be to explore opportunities with other departments at UHMC (e.g., Agriculture).

SSM stands well situated to accept coursework in other fields by relatively minor adjustments which would establish an SSM-level sustainability focus for case study applications, or even perhaps lead to an additional concentration for SSM graduates. With a new program coordinator in place for agriculture and some current agriculture courses now listed as ‘sustainability-focused’, we feel this is worth further exploration. One caveat, however, is the lack of upper division offerings at UHMC in agriculture.

UPDATES FROM 2021 REVIEW: 1) We fell short of expectations set in the 2021 program review to recruit 2-4 transfer students by Fall 2022. Recognizing this may take some time to nurture, our new goal is to focus on increasing awareness of faculty that have access to students already interested in sustainability. We will continue to seek out additional opportunities to engage with transfer students to let them know SSM is a viable option. 2) With recent changes in ETRO and the AG department, no significant progress has been made on program mergers. However, with a new Program Coordinator in the AG department, we feel the time is ripe to explore options in more depth in the current academic year.

5. Increase Community Awareness of the Value of the SSM BAS Degree at UHMC.

One of the recommendations from the 2021 review was to focus on how we could improve communicating the value of the SSM degree with students and the larger community. While considered here as a separate strategy from increasing student enrollment in SSM or investment in Huliha, these all clearly work together. Increasing community awareness around SSM will come from all of these means, and ultimately, should lead to many positive outcomes, including increased enrollment rates, internship, and employment opportunities for SSM graduates to name a few.

While this will be addressed more thoroughly in our 5-year marketing plan, we have outlined a few specific benchmarks for this year to meet this objective.

KEY STRATEGIC BENCHMARK: Increased awareness of the existence of and value of the SSM degree within the Community.

Benchmark #1: Host, Sponsor and/or Participate in Five Community Events aimed at Raising Awareness around Local Sustainability Issues and SSM. Although SSM has played a leadership role in organizing, leading, and hosting educational community events in the past, the lack of in-person gatherings over the last 2-3 years has limited these types of gatherings from occurring. However, the role they can play in communicating the value of SSM to the broader community does not go unnoticed, and we recognize the need to increase awareness around the existence and value the SSM program brings to our campus, the greater UH community, and Maui. By doing so, we not only communicate the value of our degree to others, but hopefully build a stronger pipeline of future students, develop collaborative industry partnerships that can serve as a vital resource for our students and graduates, and strengthen our leadership role in the broader community around sustainability issues. This fall, SSM has already sponsored two events on campus, including the “Water is Life Educational Rally” and a community presentation entitled “Sustainability and Carbon Negative Construction in the Pacific” focused on the potential of Industrial Hemp Production in Hawaii for sustainable construction. In both events, SSM was highlighted and acknowledged for our role in the community. We also plan to share information about SSM and Huihiahia initiatives at the Blue Planet Climate Crew celebration, a County of Maui sponsored initiative for high school students that participated in a climate action program. Others, including Earth Day and Whale Tales, are planned for the spring.

Benchmark #2: Develop Program and Agenda for 2024 Global Sustainability Conference at

UHMC. SSM faculty are planning to host an international sustainability conference in 2024. The purpose is to bring together a network of sustainability science academics and professionals to Maui to share effective models, research and actions that can result in more thoughtful and transformative decision making.

Benchmark #3. Develop Professional Development Opportunities for Community Members around Sustainability Practices, Pilot Spring 2023.

Currently, we are partnering with Huliha and the NASA Harvest project to help offer professional development training around systems-based thinking for adult and student learners participating in this workforce development grant. The idea is to create experiential learning modules on systems based approaches that can later be adapted for different audiences, including: faculty and staff training on UH campuses, extended workforce development courses, curriculum for the Workforce for Water ATE NSF grant, and teacher training courses, to name a few. The overall goal is to increase awareness of the value of applying sustainability principles to real-world problems while increasing awareness of SSM.

Benchmark #4. Develop a diverse community communications strategy around SSM and Sustainability Issues that includes:

1) Piloting a quarterly newsletter that will go out to the SLIM database of about 6,000 community members to highlight SSM and sustainability initiatives on the UHMC campus. With the help of the AmeriCorps Vista Interns, our first newsletter is planned for release in January 2023.

2) Developing a short video promoting and highlighting SSM. SSM faculty, Tim Botkin, has drafted a script for a short video that would highlight the value of the SSM degree for prospective students. The media department has expressed interest in helping us to produce, film and edit the short video.

3) Developing interactive and hands-on displays for community and UHMC events. We are working with SSM students to develop hands-on displays and models to educate and engage students and community members in sustainability thinking at community events (e.g., jeopardy game on local water issues).

6. Invest in the Development of Huliha Sustainability Systems Center.

Investment of SSM faculty as advisors and participants in the Huliha Sustainability Systems Center facilitates many of the goals outlined above and more. SSM faculty worked for many years to develop a regional center for sustainability science housed on the UHMC campus. As discussed in detail in our 2021 program review, our investment in Huliha enhances the leadership role of UHMC and SSM in the broader community, increases exposure and awareness to the value of the SSM degree, and increases internships and employment opportunities for SSM graduates. With outside grant funding and staffing, it also helps underwrite resources associated with enacting some of the strategies and goals mentioned above (e.g., recruitment of high school students, professional development). It also helps address some campus concerns that SSM falls short in benefiting Native Hawaiian students. Currently, ARPD data points out that about 1 in 5 students in SSM are Native Hawaiian. One of the central focal points of Huliha is to incorporate Hawaiian values and

principles into its practices, and to help ensure that these values are front and center to all SSM and Huluhia initiatives, is SSM graduate, Kehau Kimokeo.

Benchmark #1. Increase Native Hawaiian Student Enrollment in SSM by 20% over five years.

As an indigenous serving institution, one of our goals is to increase enrollment by Native Hawaiian students by at least 20% over the next five years through the enrollment strategies outlined above.

Benchmark #2. Continue to develop and facilitate research internship and employment

opportunities through Huluhia for UHMC students. To date, Huluhia has hired five SSM graduates (four remaining today) and supervised one SSM intern. Our two AmeriCorps Vista interns have worked on research for Huluhia as well. While the focus to date has been primarily on SSM students, the vision is for Huluhia to be a community and campus wide resource for faculty and students. **Our goal is for all SSM students to have direct interaction with the systems and processes of Huluhia, as an on-campus living laboratory of real-world learning and problem solving.**

Alignment with UHMC Mission and Strategic Plan

The action plan summarized in Table 5 is in direct alignment with the mission and vision of UHMC by providing a clear and supportive pathway for students to gain knowledge and skills around sustainability living that emphasizes community engagement, lifelong learning, and Native Hawaiian culture. Sustainability Science inherently prepares students to respond to “emerging

challenges in their lives, communities, and the world through compassion, leadership, problem-solving and innovation” (UHMC Vision).

Student Success: The action plan directly links to student success through the additional opportunities and offerings provided through Huluhia and the addition of a quality online SSM degree program option. In particular, the increasing research and internship opportunities via the UHMC Huluhia Sustainability Center and enhanced remote learning opportunities will optimize learning inside and outside of the classroom, affording students flexible and real-world learning opportunities. Offering the SSM degree online not only addresses current enrollment issues, but responds to student needs and overall trends in higher education.

Quality of Learning: Additionally, the addition of Huluhia as a living laboratory actively meets UHMC ILOs by engaging students to: 1) address social, environmental, and/or economic issues through work that exemplifies effective interaction in real-world situations; 2) apply creativity and analytical thinking to address challenges and solve problems; and 3) emphasize the importance of integrating multiple perspectives and a broad context of understanding to interpret and understand issues and problems from a holistic perspective.

Hawai‘i Papa O Ke Ao: The action plan prioritizes the need for a system within Huluhia that is responsive to the needs of the Hawaiian community and relies on input to implement programs to address these needs. In the last year, the creation of a leadership position for a Native Hawaiian Indigenous Specialist reaffirms that commitment to ensuring Native Hawaiian values are included in the decision making processes, and that the needs, voices and concerns are not only heard but acted upon within both the SSM program and Huluhia. It also prioritizes recruitment of Native

Hawaiian and other underrepresented students to ensure that these students have increased access and opportunities in alignment with an indigenous serving institution.

Community Needs and Workforce Development: The action plan emphasizes the importance for community engagement and the development of industry partnerships to address workforce development needs and opportunities for UHMC students and community members by: 1) engaging high school students via a youth council for Huliha, 2) creating new and replacement positions in the sustainability field through Huliha, 3) developing credit and non-credit professional development opportunities in sustainability science and systems thinking for students, teachers, and community members; 4) regularly engaging community members and stakeholders as part of both Huliha and SSM advisory councils to better understand community needs, inform practices, priorities, and operations; 5) creating new industry partnerships to increase internship and employment opportunities for students; 6) connecting the people of Hawai‘i with international engagement through the 2024 sustainability conference.

Sustainability: The entire goal of SSM and this strategic plan and initiative is to foster the strategic direction goal *“to create a culture of sustainability at UHMC in its communities and environments by embedding sustainability practices and processes throughout the College.*

Recommendations from 2021 Program Review

Updates to the [2021 SSM Program Review](#) were highlighted within our action plan where appropriate. Table 7 summarizes and specifies the specific recommendations addressed in our letter from 2021.

Table 7: Addressing Recommendations from 2021-2022 Plan

2022 Action Plan	Status	Revised Goal
Ensure 3 Internship Opportunities through Hulihiia	<p>1 225-hour internship nearly completed to increase recruitment in local high schools.</p> <p>In addition to Hulihiia internships, we have 7 SSM students working on other internships ranging from herbicide free campus to water quality monitoring to a campus energy budget internship funded by JCI to sustainable architecture firms.</p> <p>We have also secured two additional internships with NOAA Marine Mammal Laboratory and MISC (Maui Invasive Species Council) for the future.</p>	Increase Hulihiia internships by at least two by Fall 2023.
Increase SSM Majors by 10%, with a minimum of 5 additional majors by SP 23.	The number of majors dropped in 2022 but we remain optimistic that this can turn around this downward trend with our proposed plan and active student recruitment efforts that began this fall.	Increase SSM majors by 10% for Fall 2023.
Add one additional concentration by Spring 2023.	No additional concentrations have been added.	<p>Although our intention is to eventually increase the number of concentrations to match student enthusiasm and interests, we are holding off until our enrollment increases.</p> <p>With a new PC for AG, we plan to explore the feasibility of a sustainable agriculture concentration for the future.</p>
Implement the Cohort Model and Improve online learning Design, purchase and install technology required for this purpose in at least one classroom no later than fall 2022.	<p>Increased number of online learning options for SSM courses.</p> <p>Received grant funding to help fund enhanced learning options. Procurement process ongoing.</p>	Implement the Cohort Model by Fall 2023. Procure and pilot the new technology in Spring 2023.
Explore the value of creating an SSM two-year degree.	After receiving feedback on this proposal, we are now exploring the addition of an ASC in sustainability to align with UH system efforts.	Submit ASC to Curriculum in Fall 2023.

5. Resource Implications

☐ **I am requesting additional resources for my program/unit.**

We have intentionally created an action plan that is streamlined and efficient in terms of its resources, both in terms of funding and personnel. We have reduced the number of lecturers due to enrollment challenges and focused our actions on strategic and low-cost alternatives. At this point, nearly all of the resources required to fulfill these strategic objectives are embedded in current grants (e.g., Title III, NASA Harvest, Workforce for Water). The one exception is the placement of the Google Ad to increase enrollment, which has been approved by the Chancellor's office, but not necessarily throughout UHMC administration networks that are necessary to finalize and place the ad. As such, we formally request \$1,100 for placement of a Google Ad in Spring 2023 to promote and highlight the value of the SSM BAS degree option to help target potential students for Fall 2023.

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Appendix