



March 23, 2020

To: President Jim Johnsen

Fr: Chancellor Cathy Sandeen

A handwritten signature in blue ink that reads 'Cathy Sandeen'.

Re: **Expedited Program Review Recommendations**

Background

As requested, the University of Alaska Anchorage has undertaken an expedited program review as a result of budget cuts imposed by the governor and legislature. I have closely read the expedited program reviews that resulted from this process, reports and recommendations from the deans and the provost, as well as additional responses from some programs. I have also reviewed nearly 200 emails and letters as well as verbal input provided at approximately 20 meetings, including a large public testimony session. I have consulted with the chancellors at UAF and UAS regarding their recommended program changes.

I want to emphasize that all programs at University of Alaska Anchorage are high quality. All programs produce graduates who are prepared to address specific workforce needs. Our faculty are excellent and deeply committed to the UAA mission of teaching, scholarship, and service. Our programs provide a unique and vital sense of community, a sense of "home," for faculty, staff, and students in those programs. These decisions are extremely difficult and in many cases heartbreaking. While we have been transparent, data-informed, and mission-driven as much as possible throughout this process, at the end of the day, these are judgment calls.

I am providing you with these recommendations, not because I want to make these decisions, but because I am called to do so given the situation the University of Alaska confronts. I believe these are the best decisions under the circumstances. UAA will contract and become smaller with a more focused mission. Much is retained under my recommendations and I am confident that this path forward will allow UAA to sustain excellence and the ability to continue to serve the region and the State of Alaska. UAA will remain Alaska's vibrant open access urban/metropolitan university.

Please note I will continue to encourage all UAA programs, on all our campuses, to become more streamlined and efficient in producing graduates to meet workforce needs, while maintaining academic quality as defined by the faculty.

I realize these are recommendations only and that you will develop your own proposal and that the University of Alaska Board of Regents will make final decisions.

(Continued, next page)

Decision

I concur with the recommendations of Interim Provost John Stalvey dated March 9, 2020, with the following two exceptions:

Anthropology (MA)

Changed to Continued Review

Marketing (BBA)

Changed to Continuation

Appendix: Faculty Reductions from Expedited Academic Program Review

Community and Technical College

CTC is reducing by 3 lines following the program review outcomes.
Two retirements (not replacing), Aviation and Culinary & Hospitality in FY21.
For Fiscal Year 2022 we will need to reduce by an additional faculty member.

College of Engineering

One tenure-track non-replacement in EE in FY21 and 2 tenure-track non-replacement of anticipated retirements (1 in CE and 1 in CS&E) in FY22.

College of Business and Public Policy

The cost savings is through not replacing faculty. One term faculty in Logistics and another two tenure-track faculty in Information Science & Decision Science (MIS).

College of Arts and Sciences

Program	Tenure-Track Reductions after 1 year	NTT Reductions after 1 year	Tenure-Track Reductions after 2 year	NTT Reductions after 2 year	Total RIF
Anthropology MA	1	0	0	0	1
Art BFA	0	1.5	0	0	1.5
CWLA MFA	0	0	1	1	2
English MA	0	0	3	0	3
Environ & Society BS	0	0	3	0	3
Journalism BA	1	0	0	0	1
Languages BA (Chinese)	1	0	0	0	1
Sociology BA-BS	0	0	3	0	3
Theatre BA	0	0	5	0	5
Total	3	1.5	15	1	20.5

The decreases in CAS are particularly large because they also include addressing the structural debt that the college has been carrying the past two FY.

College of Health

One non-replacement of a tenure-track faculty in Legal Studies and one non-replacement of a tenure-track faculty in Justice.

Total number of **faculty lines** reduced: 31.5.

Total estimated decrease is \$3.25M from eliminated **faculty lines** outlined above.



Date: March 9, 2020

To: Cathy Sandeen, Chancellor

From: John Stalvey, Interim Provost *John R. Stalvey*

Cc: John Petraitis, Interim Dean, College of Arts and Sciences
Khrys Duddlestone, Professor; Director, Biological Sciences
Jonathan Stecyk, Associate Professor
Susan Kalina, Vice Provost for Academic Affairs
Claudia Lampman, Vice Provost for Student Success

Re: **AY20 Expedited Program Review Findings – Biological Sciences MS**

I have reviewed the dean's findings, the program's response to the dean's findings, and the completed Expedited Program Review Template for the Biological Sciences MS.

Recommendations

My recommendation is to accept the decision and recommendations of the dean with the additional commentary that the program should develop a non-thesis option. To inform the revision, the program should also conduct an analysis of the recent increase in the number of semesters to graduation, which might be causing a decrease in the number of awards per year. The revision should be completed in AY21 for implementation in fall 2021. An interim progress report on all recommendations is due to the dean by March 1, 2021. The dean will submit a review along with the program's interim progress report to the provost by April 1, 2021. Unless otherwise noted at that time, a follow-up Program Review will be conducted in AY24.

Decision

Recommend Revision

AY20 Expedited Program Review – Optional Program Response to the Dean’s Findings Form

Date: February 28, 2020

To: John Stalvey, Interim Provost

From: Khrys Duddlestone, Professor and Director of Biological Sciences

Cc: John Petraitis, Interim Dean, College of Arts and Sciences
Jonathan Stecyk, Associate Professor of Biological Sciences

Re: AY20 Expedited Program Review: Optional Program Response to Interim Dean’s Recommendation

Program/s in this review: MS Biological Sciences

Program response to Dean’s findings

We thank the Interim Dean for his review of the MS in Biological Sciences Degree. We agree that our program “contributes to CAS’s and UAA’s mission, and is **unusually important in serving UAA’s research mission**, by connecting graduate students with research-active faculty in state-of-the-art facilities.” As the Interim Dean stated, **our Master’s students are deeply embedded in the Bachelor’s programs** as teaching assistants, mentors to undergraduates performing research in our labs, and as role models to undergraduates who are considering pursuing a graduate degree. He also commended program faculty “... **for doing some of the most important research in Alaska**, and **being among the leaders in helping UAA in one of its core missions: research**”. Our MS BIOS program betters Alaska and beyond by providing place-based research programs for students who are interested in pursuing jobs in health and natural resources in Alaska. Despite the above accolades, the Interim Dean recommended the MS BIOS program for revision. Here we not only rebut the recommendation by shedding light on inconsistencies in the review, we also make the argument that rather than revision, our program deserves to be enhanced.

According to the Interim Dean’s review, “...*the gap between UAA’s estimate of (a) the program’s instructional costs and (b) the program’s tuition revenue is so steep that it is more than two standard deviations larger than the average gap in CAS’s graduate programs. According to UAA’s budget calculations, the program only brings in 25% of its instructional costs, the lowest return of any of CAS’s masters or doctoral programs*”. Examination of the data and approach used to calculate graduate program efficiency revealed **serious flaws in the analysis**, resulting in an **egregious overestimation of the costs of the graduate program**.

For the analysis, the Interim Dean utilized 80% Tuition Revenue and Instructional Cost data provided by the UAA office of Institutional Research (IR) specifically for the expedited program reviews (EPRs). To achieve the percent coverage estimate reported, he divided tuition revenue (80% tuition to CAS) generated from 600-level courses by the Instructional Cost data. In preparing our response to the recommendation, we noted that the FAQ sheets provided with the EPR data define Instructional Costs as 100% of the salary of F9, A9 and other non-FR/FN faculty. To confirm if this was true we did the following:

First, we reconstituted the EPR data by accessing the Official 2020 Program Review Data Instructional Productivity tab and selecting the same filters as the Interim Dean (note: while the tuition data matched what was in the EPR-provided IR table, the instructional cost values did not match. According to IR staff, reports are updated throughout the year; however, the cost data increased between \$100,000 and \$300,000 for every fiscal year from 2014-2019, calling into question the very accuracy of the data used in all program reviews). *Second*, we compared the Instructional Cost data in the reconstituted EPR table to that in the *Course Tuition by Faculty Pay* IR tables on the UAA IR site (Filters: UAA campus, CAS college, BIOL subject, 600-699 course level). This second step confirmed that the Instructional Cost data in the EPR tables was in fact “Faculty Total Pay” from the *Course Tuition by Faculty Pay* IR tables. .

The graduate and undergraduate programs in Biological Sciences are highly integrated. Indeed, we have no faculty with teaching, research and/or service exclusive to the graduate program. Not only are there no graduate-only faculty, but the MS BIOS degree contains but three graduate-only courses (BIOL A601, A605

AY20 Expedited Program Review – Optional Program Response to the Dean’s Findings Form

and A606) in its curriculum. All other graduate courses are stacked with undergraduate courses, and the undergraduate enrollment is 2-5 times higher than graduate enrollment; thus, it is incorrect to attribute the entire cost of teaching those courses to the graduate program. In addition, tripartite faculty are expected to contribute to the mission of the University through their research as well as teaching, and all research-active faculty in Biological Sciences have both graduate and undergraduate students in their laboratories. Likewise, their grants include funding to support both graduate and undergraduate students in research. Given this, research activities (and pay for research time) are not attributable to the graduate program alone.

Given the above, “Faculty Total Pay” is inappropriate for use in this analysis because 1) it is inconsistent with the distribution of teaching, research and service in the faculty workload; 2) it fails to account for stacked undergraduate/graduate courses and; 3) there are no faculty in biological sciences who are exclusive to the graduate program. In addition, Faculty Total Pay is the entirety of what the faculty member was paid, regardless of the source of those funds. Thus, academic year salary paid from grants (i.e., buy-outs) was counted against the department, when in reality it offsets GF.

In order to more faithfully assess the instructional cost of the graduate program, Faculty Instructional Pay from general funds (GF) rather than Faculty Total Pay is the appropriate IR data to use. These data are by no means perfect. The distribution of course credits to undergraduate vs graduate instruction in stacked courses does not always align with the faculty member’s actual workload. In addition, a course credit is counted for graduate enrollment in research and thesis credits (BIOL A698 and A699), even though faculty get no workload credit. Despite these inconsistencies, Faculty Instructional Pay from GF better reflects WL credit for teaching than the alternative, and does not include pay from restricted funds. We therefore relied on this data for our reanalysis (From IR Table Course Tuition by Faculty Instructional Pay, filtered for UAA campus, CAS college, BIOL subject, 600-699 course level).

Table 1 shows the amount of tuition (rounded to the whole dollar) generated for CAS from enrollment in graduate credits (600-699 level) for academic years 2016-2019. Summers are not included because graduate credit enrollment is rare in the summer. Note the trend of increasing tuition over those four years. Table 1 also includes Instructional Pay from GF for the same four academic years. The final column in the table shows percent efficiency, calculated by dividing instructional pay by tuition generated. Here we see that efficiency increased from 60% in 2016 and 2017 to 93% in 2019. Even the lowest number of 60% is more than double the efficiency calculated by the CAS Interim Dean for the MS BIOS program.

Table 1: Graduate Program Efficiency

Academic Year	Tuition (80%) from 600 level credit enrollment	Instructional pay from General Funds	Efficiency [(Tuition/GF)*100]
2016	\$91,706	\$146,798	63%
2017	\$100,522	\$166,487	60%
2018	\$127,498	\$143,968	87%
2019	\$151,003	\$162,177	93%

One cost that is not included in this analysis is that of Graduate Teaching Assistantships (GTAs). CAS provides GF to support GTAs each academic year, and the GTAs are instructors of record for undergraduate labs in Biological Sciences. These labs generate tuition for the college. Table 2 presents the data from Table 1, but also includes the GF provided by CAS to support GTAs as well as the tuition generated in undergraduate labs taught by GTAs. Note that when we account for both the GTA labor and the tuition generated in the labs GTAs teach, our programmatic efficiency was higher in all years.

AY20 Expedited Program Review – Optional Program Response to the Dean’s Findings Form

Table 2: Graduate program efficiency including GTA support and tuition

Academic Year	Tuition (80%) from 600 level credit enrollment	Tuition (80%) from courses taught by GTAs	Instructional pay from General Funds	GF to support GTAs	Efficiency (tuition/GF)
2016	\$91,706	\$87,907	\$146,798	\$72,998	82%
2017	\$100,522	\$100,304	\$166,487	\$87,598	79%
2018	\$127,498	\$115,990	\$143,968	\$114,535	94%
2019	\$151,003	\$108,849	\$162,177	\$114,535	94%

In the review, the Interim Dean stated that “...the surplus from the undergraduate program is more than surpassed by the deficit in the MS program”. He goes on to state that “...when all costs for running all programs in Biological Sciences are combined (including costs for instruction, research time, and service), the Department operated at a deficit in 2019, requiring the allocation of state appropriations to cover the overall gap.” The implication is that the MS BIOS program is a money pit draining the department coffers, which is clearly not the case. Here the Interim Dean also makes reference to total departmental costs, analysis of which reveals an additional flaw in the approach to calculating departmental revenue. Namely, the only revenue credited to the department is tuition, despite that externally funded grants to Biological Sciences faculty generate revenue through indirect cost recovery (ICR, or “Indirects”). Indirects generated from grant activities are distributed across the University, with 22.4% going to the College and 10% going to the Department. Although indirect revenue is utilized when assessing the efficiency of the College as a whole, CAS has routinely refused to count the indirect as a *departmental* revenue stream, despite that faculty write the grants and carry out the research that generates the indirects.

Table 3: Departmental efficiency, tuition revenue only

Fiscal Year	Faculty Pay (GF)	Tuition (80%)	Efficiency (tuition/GF)
2016	\$2,964,678	\$2,351,610	79%
2017	\$2,892,007	\$2,390,758	83%
2018	\$2,501,705	\$2,474,097	99%
2019	\$2,502,802	\$2,350,520	94%

Table 3 presents overall departmental efficiency for Fiscal Years 2016-2019, relying only on faculty cost and tuition revenue. Here, faculty cost is Faculty Total Pay (from GF only), which is appropriate for use here as it accounts for all research, teaching and service, as well as GTA salaries. By this measure, Departmental efficiency has improved significantly since 2016. Missing from this efficiency determination is the indirect revenue stream. Table 4 presents efficiency calculations that include indirects. When the CAS proportion of indirects is included as a revenue stream, overall departmental efficiency increases by two to four percent each year. In 2018, efficiency was therefore 103%, and in AY 2019 efficiency rose from 94% to 99%. The Department uses its 10% portion of indirects to support a variety of research activities, but primarily to maintain/replace shared research equipment (e.g., regularly scheduled maintenance, repair or replacement of broken equipment, etc). As a consequence, we do not need to ask the College (or Vice Provost for Research) for these funds. When both the CAS and BIO proportion of indirects are included in the revenue stream, efficiencies increase by an additional one or two percent such that the department achieved 105% and 101% efficiency in fiscal years 2018 and 2019, respectively. Regardless of how CAS chooses to use its proportion, **indirects are revenue generated by the department and the department should get credit.**

Not shown in Table 4 is the departmental efficiency for the current fiscal year (i.e., Fall 2019 only). Based on data from the same IR tables, our departmental efficiency is currently running at 105% without accounting for indirects, 112% when accounting for CAS’s proportion, and 115% when accounting for both CAS and BIO proportions of indirects. The department worked very hard to adjust workloads and improve efficiencies for this academic year, and our efforts appear to be paying off, even in the face of overall decreases in enrollment and tuition across the College and the University.

Table 4: Departmental efficiency, tuition and indirects

Fiscal Year	Faculty Cost (GF)	Tuition (80%)	CAS proportion of indirects (22.4%)	BIO proportion of indirects (10%)	Efficiency [(tuition + CAS indirects)/GF]	Efficiency [tuition + CAS + BIO indirects/GF]
2016	\$2,964,678	\$2,351,610	\$76,376	\$34,096	82%	83%
2017	\$2,892,007	\$2,390,758	\$76,232	\$34,032	85%	86%
2018	\$2,501,705	\$2,474,097	\$112,261	\$50,117	103%	105%
2019	\$2,502,802	\$2,350,520	\$125,009	\$55,808	99%	101%

The Interim Dean indicated that our awards per year are below the average for CAS graduate programs (5.4 vs 13.8), and that awards dropped in 2017-2019. First, a research-intensive MS degree will not have the same graduation rate as programs that are course-driven and prescriptive; thus, a comparison of graduation rates across all CAS graduate programs is “apples to oranges”. We acknowledged in our original review that we anticipated an uptick in graduation rates soon. Indeed, four Ms students graduated in summer (August 2019), making them FY2020 graduates. Including these students, we anticipate at least six MS graduates in 2020.

In his decision to REVISE, the Interim Dean stated *“Unfortunately, with its modest state appropriations, CAS likely cannot sustain the MS program in Biological Sciences in its current form.”* Unfortunately, this decision was based on **an analysis that was deeply flawed**, in particular with respect to the data used to determine the efficiency of our program. The Interim Dean also stated: *“To be sustainable in the long-run with less state appropriations, the Biological Sciences Department must revise this program.”* This statement is based not only on a flawed analysis, but by placing the department’s burden of University budget cuts solely on the shoulders of the MS program, it fails to recognize the true degree of faculty integration across all programs, as well as the interconnectedness of our graduate and undergraduate programs. The Interim Dean also stated *“UAA’s program review process gives the following examples of area for revision: 1) faculty or staff workloads and assignments, 2) curriculum, 3) program delivery, 4) student success initiatives, 5) outreach and/or partnerships with the community or industry, program promotion and marketing, and facilities”*. Regarding workload assignments, Biological Sciences does not have department-specific staff; however, tenure track faculty are teaching 30% more instructional credits this academic year compared to last, and we cut our term and adjunct faculty hires considerably. As noted in the AY20 efficiency calculations, our efforts appear to have made a difference. As noted in our original EPR submission, we are also developing a non-thesis MS option *in order to meet demand and increase tuition revenue (without concomitant salary costs)*. We have been highly responsive to the budget climate and it is unfortunate this fact was ignored in the recommendation. Another suggestion was to engage in outreach with the community. We find this ironic, considering that over the last few years these very outreach activities (e.g. UAA STEM Day, which brings 1000s of people to UAA each October to engage in STEM and promote our, and other, departments at UAA) have been systematically devalued on faculty workloads. The Interim Dean further notes that *“The program must greatly narrow (if not erase) the gap between the costs of all the Department does (namely, teaching, research and service), all that it needs (e.g., specialized staff support), and all of the revenue they generate (namely, tuition, direct expenses [we assume the Interim Dean means grant expenditures here] and indirect recovery for grants, etc.)”*. Again, the Department does not have department-specific specialized support staff. Perhaps this is in reference to support staff within the Math and Natural Sciences Hub, but these individuals support ALL programs in this hub, not just Biological Sciences. Finally, the Interim Dean indicates a need to narrow the gap by addressing all the revenue we generate, including indirect. We find this statement ironic considering that historically, the indirect we generate has not been attributed to our department as a revenue stream when determining our efficiency.

Department recommendation

Our graduate program covers much more of its costs than suggested by the Interim Dean and is completely undeserving of a “Revise” designation. Given that our program is **“...unusually important in serving UAA’s research mission...”**, that our **MS students are deeply embedded in our Bachelor’s programs**, and that our faculty are **“doing some of the most important research in Alaska”** and are

“...among the leaders in helping UAA in one of its core missions: research”, our program should be targeted for ENHANCEMENT.

The Northwest Commission on Colleges and Universities recently recommended that UAA “Expand efforts around institutional planning of graduate programs to demonstrate their academic quality and role in mission fulfillment (Standard 2.C.12).” To meet this goal, the University is in the process of hiring a new Dean of the Graduate School, which should strengthen the resources available for our students and provide the support needed to increase the retention and graduation rates. However, UAA must not only reinforce graduate studies from the top-down, but also from the bottom up. This is particularly true in light of the CAS Interim Dean’s proposal to delete several CAS graduate programs, which will diminish UAA’s already small set of advanced degree options.

Providing enhanced support to the MS in Biological Sciences program will not only allow us to recruit and retain outstanding students, but will stimulate the formation of the diverse and supportive graduate community that the NWCCU will expect to see during its next accreditation visit. Our Department has a strong reputation for recruiting diverse MS students from state and federal agencies, the military, and the Alaska Native Science and Engineering Program (ANSEP). In many cases, these agencies also financially support their affiliate students. Prior to our net loss of 10 faculty over the past 10 years (18 losses, 8 hires), we were able to maintain a sizable group of grant-supported students; however, for those students not directly funded from agencies, fellowships, or faculty grants, we are currently limited to approximately six lines of GTA support. New GTA lines will not only enable us to support Alaskans in our MS program, but also enable us to recruit more students from out of state. Recruiting top-tier students from outside Alaska brings new ideas, skills, and cultural and geographic diversity that are the lifeblood of healthy graduate cohorts and academic departments. Notably, now that UAA has joined the Western Regional Graduate Program, we have an unprecedented opportunity to recruit from outside the state. Just last semester we enrolled three such students, and expect this trend to increase as the prestige of our program grows. Increasing the number of GTA lines to at least 10 is a direct and cost effective way to increase the quality of our graduate program in the short term, retain existing faculty, and stimulate the growth of graduate education. Retaining existing faculty is critically important, as the College has already invested considerable funds in start-up packages to recruit them initially. These research-active faculty and superb facilities are well-prepared to support these new lines.

According to Chancellor Sandeen, health and applied research are a significant part of UAAs future. The Department’s research emphasis in Biomedical and Ecosystem Health Sciences is perfectly aligned with this vision. Our faculty and graduate students conduct research in one of three focus areas, 1) cellular, molecular and microbial biology, 2) physiology and physiological ecology, and 3) boreal and polar ecosystem health and ecology, and graduates from our program are successful in obtaining jobs in the high demand health and natural resources fields in the state. In addition, the National Institutes of Health have invested significant funds to enhance biomedical research capacity in Alaska, and at UAA recently in particular via creation of a microbiome support core and the renovation of a microbiome suite in the ConocoPhillips Integrated Sciences Building. Over the last five years, Biological Sciences has lost several research-active faculty in physiology and boreal and polar ecosystem health. These faculty contributed significantly to the graduate program, and their loss has decreased opportunities for graduate education in those areas. Enhancement through faculty hires will expand opportunities for acquisition of funding (and indirects) and graduate education.

The MS degree in Biological Sciences has great potential to energize CAS and UAA, capitalize on the natural resources of Alaska, and contribute to workforce development in health and natural resources fields in Anchorage and the State. Targeting it for enhancement is also the necessary choice if we are to meet the NWCCU recommendation on graduate studies.



Date: February 21, 2020

To: John Stalvey, Interim Provost

From: John Petraitis, Interim Dean, College of Arts and Sciences

Cc: Khrys Duddleston, Professor; Director, Biological Sciences
Jonathan Stecyk, Associate Professor

Re: AY20 Expedited Program Review Findings

Program/s in this review: Biological Sciences MS

Specialized accrediting agency (if applicable): None

Campuses where the program is delivered: Anchorage

Members of the program review committee:

Khrys Duddleston, Professor and Department Director
Jonathan Stecyk, Associate Professor

Centrality of Program Mission and Supporting Role

UAA's mission is to discover and disseminate knowledge through teaching, research, engagement and creative expression. UAA is committed to serving the higher education needs of the state, its communities and its diverse peoples. It is also committed to instruction at multiple academic levels, success of all students regardless of their higher education goals, and service to the diverse peoples and communities of the state. UAA's core themes are (1) Teaching and Learning, (2) Research, Scholarship and Creative Activity, (3) Student Success, (4) UAA Community, and (5) Public Square. UAA values international and intercultural education, diversity of experiences and perspectives, and the diversity of our unique location in Southcentral Alaska that comes from the Alaska Native peoples of this area.

The College of Arts and Sciences contributes to UAA's mission with a suite of programs that provide, among other things,

1. general education courses for undergraduates in CAS and other Colleges,
2. opportunities for undergraduates to pursue majors in the humanities, social sciences, natural sciences, and the arts, and

3. opportunities for faculty and students to pursue research and creative activities in CAS's academic disciplines,
4. graduate programs for advanced studies.

Given decreased enrollments across UAA and significant budget cuts to CAS, the challenge is to serve UAA's and CAS's missions with only 75% of the funds it had in 2018-2019. CAS's shrinking budget is especially challenging for programs that rely on state financial appropriations through CAS because the programs have a gap between (a) the total costs of everything the program does and needs, and (b) the tuition CAS receives to cover those costs. This describes most programs in CAS: most rely on state appropriations and CAS has 30% less than it had two years ago.

CAS's Department of Biological Sciences MA contributes to CAS's and UAA's mission, and is unusually important in serving UAA's research mission, by connecting graduate students with research-active faculty in state-of-the-art facilities. Faculty in the MS program are embedded in the BA-BS program in Biological Sciences. Students in the MS program are also embedded in the BA-BS program in the Department. Beyond contributing to faculty research and their own research, graduate students in the MS program cover many of the lower-division labs for general education students and undergraduates in Biological Sciences.

Program Demand (including service to other programs), Efficiency, and Productivity

As to program demand, the MS in Biology retains a steady number of students, and with 26 students in 2019 it was at the CAS median for number of students in graduate programs. As to efficiency, however, the program has financial challenges. The gap between UAA's estimate of (a) the program's instructional costs and (b) the program's tuition revenue is so steep that it is more than two standard deviations larger than the average gap in CAS's graduate programs. According to UAA's budget calculations, the program only brings in 25% of its instructional costs, the lowest return of any of CAS's masters or doctoral programs. With so many large undergraduate classes in Biological Sciences, the BA/BS program easily covers its costs with tuition, but the surplus from the undergraduate program is more than surpassed by the deficit in the MS program. As a result, when all costs for running all programs in Biological Sciences are combined (including costs for instruction, research time, and service), the Department operated at a deficit in 2019, requiring the allocation of state appropriations to cover the overall gap. As to productivity, there are challenges, too. Since 2013 the program average 5.4 awards per year, far below the average of 13.8 in CAS's graduate program, and the number of awards in Biological Sciences fell to 4, then 2, and then 2 again in the academic years of 2017, 2018, and 2019, respectively.

Program Quality, Improvement and Student Success

The program has high quality, anchored by research-active faculty who are doing important work with graduate students by their side in the lab and field. Those faculty and their students are involved in large-scale collaborative research efforts and working with important community partners. Program graduate do well after finishing the degree, getting either jobs or admission into doctoral programs. The program is also developing a non-thesis option that could get more students through the program faster.

Program Duplication / Distinctiveness

Although UAF has an MS in Biological Sciences, the two programs are not the same and, even if they were the same, duplication is defensible: both programs have 20+ students (a reasonable critical mass), and as long as both programs require a thesis then both programs require onsite supervision from research-active faculty. Eliminating either UAA's program or UAF's program likely means fewer master-level trained biologists for Alaska.

Commendations and Recommendations

Program faculty are commended for doing some of the most important research in Alaska, and being among the leaders in helping UAA in one of its core missions: research. The faculty should also be commended for the hard work they put into their expedited program review submission.

Decision

Revise. Budget cuts are forcing CAS to evolve quickly, doing less of some things it did in the past, especially in programs and departments where the various revenues do not cover the program's or department's costs for all the things faculty and program-specific staff do. Unfortunately, with its modest state appropriations, CAS likely cannot sustain the MS program in Biological Sciences in its current form. To be sustainable in the long-run with less state appropriations, the Biological Sciences Department must revise this program. UAA's program review process gives the following examples of area for revision:

- *faculty or staff workloads and assignments,*
- *curriculum,*
- *program delivery,*
- *student success initiatives,*
- *outreach and/or partnerships with the community or industry, program promotion and*
- *marketing, and facilities.*

All of these options should be on the table. The program must greatly narrow (if not erase) the gap between

- the costs of all the Department does (namely, teaching, research and service), all that it needs (e.g., specialized staff support), and
- all of the revenue they generate (namely, tuition, direct expenses and indirect recovery for grants, etc.).

It must also reverse the downward trend in the number of degrees awarded and show that the reversal is sustained. The program should report on its progress by Spring 2022.

Submission date: January 31, 2020

Program/s in this review: MS BIOS Biological Sciences

Specialized accrediting agency (if applicable): Not applicable

Campuses where the program is delivered: Anchorage

Members of the program review committee:

- Khrys Duddleston, Professor and Director of Biological Sciences, Anchorage Campus
- Jonathan Stecyk, Associate Professor of Biological Sciences, Anchorage Campus

1. Centrality of Program Mission and Supporting Role (700 words or less)

Relevancy of the program:

The MS BIOS fundamentally aligns with the UAA, CAS and Dept. of Biological Sciences missions, and the UAA 2020 strategic plan. The program *disseminates knowledge efficiently and effectively* (Biological Sciences mission) via *the discovery of knowledge through teaching and research* (UAA mission), and *betters Alaska and beyond* (CAS mission) by successfully training students for future employment (i.e., workforce development). We train developing life scientists to discover new knowledge through rigorous scientific experimentation and critical reasoning, and prepare students for careers requiring advanced technical and scientific skills. Our students are competitive for positions in the federal, state, and private sectors, and for more advanced training at professional and academic institutions. The program also supports the Department's undergraduate programs via instruction (GTAs in undergraduate labs), and near-peer mentoring of undergraduates in research labs. The MS program is critical to the Department's research emphasis in Biomedical and Ecosystem Health Sciences through its contribution to faculty research productivity, which in turn informs graduate and undergraduate curricula, and enables faculty to engage students in the highest impact teaching practice in the sciences, research, through which students learn via the creation of new knowledge.

Role the program plays in supporting other academic programs

Graduate students from other programs enroll in core MS BIOS courses (BIOL A601, A605; e.g. Anthropology, Geological Sciences, WWAMI, Education, Economics, and Engineering). Our graduate faculty also serve on graduate committees outside the department. We are also home to 7 INDS MS students. Additionally, the MS BIOS supports departmental undergraduate programs (BA/BS BIOS; BS NSCI) via GTA activities and near-peer mentorship in research laboratories. Additionally, MS BIOS students recently implemented a graduate-undergraduate mentoring program to provide education and career mentorship to BIOS and NSCI undergraduates.

Partnerships with agencies, businesses, or organizations

The Department maintains research and educational partnerships with state and federal agencies (e.g. ADF&G, AKDEC, CDC, State Public Health Labs, US DHS, US FS, NOAA, USGS, Alaska Science Center and others) through Cooperative Agreements. MS BIOS students are often supported by these and other agencies to conduct their research. Agency employees serve on graduate committees, students gain employment following graduation.

Specific workforce development and employment opportunities relevant to the program

The individual, diverse graduate research projects fall within the Biomedical and Ecosystem Health Sciences and meet the needs of the state and nation by successfully training students for future research and employment. Our research-based MS degree emphasizes learning through creation of new knowledge, which develops creativity, problem solving skills, and writing and presentation skills; all skills valued by employers. MS BIOS graduates have been 100% successful in obtaining professional positions in biologically relevant fields (tracking since 2011). Approximately 1/3rd go on to jobs with state and/or federal agencies, 1/3rd to other research/professional careers and 1/3rd remain affiliated with UAA post-graduation (e.g. research technicians).

Sources of extramural support and funding

Research funding to support the MS program comes primarily through grants awarded to faculty, which provide tuition and research funds. External funding comes from numerous federal and state agencies (NSF; NIH; ADF&G; others) and private non-profits. From FY2013 - FY2018, extramural grants totaled ~\$21M (CAS Biology org code 12099), averaging 7-12 active grants/y (average FY budget ~\$1.8M). Currently, research faculty (n = 13) are managing ~\$9.2M in active awards (~\$5.8M DC; ~\$3.1M ICR; org code 12099). External support also comes from graduate research fellowships (stipends and tuition). Indeed, 62% of our graduate students (AY2018-2019) were supported by GTAs or extramural funds (fellowships; research assistantships). Thus, students are state economic multipliers, their employment contributing directly to the Alaskan economy.

High demand job designation for the program

The M.S. BIOS program, with its strength in Biomedical and Ecosystem Health Sciences research, helps fulfil the diverse employment needs of Alaska and beyond. All graduates since 2011 have gained employment in science research, or related fields, or are continuing their graduate research at the Ph.D. level. Employment opportunities for our graduate students remain strong with no indication of market saturation.

2. Program Demand (including service to other programs), Efficiency, and Productivity (7 year trend; 1400 words or less) *NOTE: We refer to table numbers provided by the Dean, but they are not discussed in the order provided*

Demand for the MS BIOS degree is strong and consistent, as research active faculty in the department directly involve students in their research programs. Over the past seven years, an average of 27 students/year have been enrolled in the program (Table 3). Currently, we have 26 MS students. An additional 3 UAF PhD students are supervised by UAA Biological Sciences faculty, spending nearly all of their time at UAA. Instructional productivity is also strong and consistent. Student credit hours averaged 317 over the past 7 years (Table 7).

From 2013 to 2015/2016, there was a decline in the number of graduate students in the program and/or student credit hour production (Tables 3 and 7). This may have been due in part to the number of extramural awards our research-active faculty had during that time, because faculty must have funding in-hand to support the student's research prior to accepting a student into the program (this program requirement ensures students can move through their programs efficiently and produce a quality thesis). The more significant factor was likely that the number of faculty with research in their workloads declined over those years due to faculty departures. Since FY10 the department has had a net loss of 10 faculty, the majority of whom were tripartite research faculty (16 losses [via retirement, move to CoH, left UAA]; 6 hires). This was further compounded by a decrease in the number of students that individual faculty members were willing/able to accept into their labs, which was likely a reflection of the burden of increased teaching and service loads on remaining faculty. The decline in the number of research-active faculty able to accept students, and the number of students per faculty are further reflected in the number of degrees awarded (Table 1). Graduation numbers decreased from a peak of 13 in 2014. Prior, the trend was reversed (graduates were 3 in 2010, 4 in 2011, 6 in 2012, and 7 in 2013).

To reverse these trends and increase program vigor, we implemented a number of programmatic changes to encourage faculty (particularly junior faculty) to accept more students. These include:

- a. Recruiting TA-ships: the department offers several 'recruiting TA'ships' each year. These two-year TAships provide stipend and tuition support for students and are designed to allow faculty to recruit new students to the program, even if they don't have a large pool of resources (funding for the project must be in hand). These are prioritized to junior faculty.
- b. We continually encourage our students to apply for (and make them aware of) additional sources of external funds for travel and research support, as too few of our students were taking advantage of these opportunities (or reporting their use). Additional student-generated support for research activities will allow faculty to bring more students into their laboratories.
- c. We altered the graduate supervisory policy such that the primary graduate student committee advisor can be any UAA faculty (so long as two committee members are from Biological Sciences). This has enabled students to enroll in our MS program instead of the Interdisciplinary MS degree where appropriate.

The improvements to the program appear to be working. The number of MS students in the program has increased (from 22 in 2015 to 26 in 2019; Table 3), as has student credit hour production (from 277 in 2016 to 386 in 2019; Table 7). Concurrently, SCH/FTEF, Enrollment/FTEF, FTES/FTEF, average class size, and Tuition Revenue/SCH have continuously increased (Tables 8-11 and 13), whereas Cost/SCH has continuously decreased (Table 12). Specifically, SCH/FTEF (73.8 in 2014; 155.4 in 2019), Enrollment/FTEF (29.3 in 2014; 49.7 in 2019), and average class size (2.3 in 2014; 5.3 in 2019) have approximately doubled, and Tuition Revenue/SCH (402.7 in 2015; 489.0 in 2019) has increased by 21%. Thus, Cost/SCH has decreased by 35% (2375.2 in 2015; 1535.4 in 2019).

The number of degrees awarded remains lower (2-4 per year) than the peak of 13 that occurred in 2014 (Table 1). As noted above, this may be due in part to the decrease in total numbers of students. It likely also reflects that students are taking longer to complete their degree. Indeed, credits, semester and years per degree has increased since 2016 (Table 2; note: 2019 was anomalously high due to personal circumstances of a graduate). Although a majority of graduate students are supported by assistantships, some students complete their degrees while working outside employment, which increases time to completion. Important however, is that students are neither dropping out of the program nor becoming inactive. Retention of admitted students is high and almost all students complete their degree. Over the past 5 years, only 2 students have left the program prior to completion. In addition, enrolled students are highly productive, as indicated by the number of publications in peer-reviewed journals and presentations at state, national and international conferences resulting from their work (*detailed below*). These metrics of student success, coupled with the 100% success rate of students finding employment upon graduation or going onto to additional advanced degrees, indicate that the program is producing high quality scientific research in Biomedical and Ecosystem Health Sciences, is functioning efficiently, and succeeding in workforce development for the State and beyond.

From summer 2014 through fall 2018 (201402-201803), 93% of Biological Sciences total faculty pay from unrestricted funds (\$12,563,632) was covered by tuition revenue to CAS (total tuition*0.80 = tuition to CAS: \$14,666,816*0.80 = \$11,733,453 [BIOL/MBIO courses taught by CAS faculty on main UAA campus] from IR Course Tuition by Faculty Total Pay accessed January 28, 2020). Faculty in Biological Sciences contribute to departmental instruction at all levels. The majority of our graduate courses are stacked with undergraduate courses and therefore do not incur separate instructional costs. In addition, graduate students enroll in directed research (A698) and thesis (A699) credits, generating ~\$410K in tuition over the aforementioned timeframe (~\$45K/semester exclusive of summer) for no instructional cost (faculty are not given workload credit for these courses). Research in the biological sciences does not adhere to the human construct of the "academic year"; thus, graduate research continues through the summer months (as is true for the majority of thesis research-based graduate degrees in the sciences regardless of institution). Faculty advisors must continue supervision and mentorship during the summer, and their summer salaries are paid from restricted funds/external research grants.

As was noted in the most recent accreditation review by the NWCCU, graduate programs at UAA need to decrease stacked courses. Budget constraints on resources preclude us from increasing the number of graduate-only course offerings at this time; however, we strive to ensure our stacked graduate courses are truly advanced, through the development of specific graduate level SLOs, including those supporting the development of leadership and mentorship skills through guided group work with undergraduate near-peers. Additionally, our graduate students also enroll in some graduate courses at UAF, and vice versa, and communication and coordination among our programs regarding distance delivery of courses is increasing.

3. Program Quality, Improvement and Student Success (1500 words or less)

Specialized accreditation process and status

Not Applicable

Currency of the program

Over the past few years, we have made improvements to the program in two main areas: First, we instituted three required courses for all graduate students that emphasize experimental design and scientific thought (BIOL A601), academic, scientific, and presentation skills (BIOL A605), and quantitative and analytical skills (BIOL A606). Students are encouraged to complete BIOL A601 and A605 in their first fall semester, and this has helped students move into their

graduate research in a timely and professional way. It also facilitated the creation of graduate student cohorts, which have helped with program morale and student cohesiveness.

Currently, the department is revising the MS BIOS program to include a non-thesis, professional MS option to enhance workforce development. As noted above, the MS program has close ties to a number of state and federal agencies, and demand for such an option is high, in particular for fulltime employees who wish to earn an advanced degree while working. A secondary benefit of the non-thesis option is increased SCH production and tuition revenue.

Innovative program design

The research experiences and workforce development-training that students obtain when conducting their graduate research is distinctive. To enter the program, students must submit a letter of support from a faculty member interested in serving as their graduate advisor and who has extramural funds available to support the student's research. Thus, ultimately, students graduate with MS degrees tailored to their personal research interests and career aspirations.

In order to grow student enrollment in the program and to streamline research opportunities, the requirements for graduate study committee composition were modified in AY2018-2019. Now, the primary research advisor can be from outside Biological Sciences so long as they are a full-time UAA faculty member and the two remaining committee members are from Biological Sciences. This has facilitated expansion of collaborative research projects among faculty across disciplines (e.g., with Chemistry, Geography and Environmental Studies), and has enabled students to enroll in our MS program when appropriate, rather than the Interdisciplinary MS degree.

Availability and indications of quality of distance offerings

Many UAA Biological Sciences faculty are affiliates of UAF departments (e.g. Biology and Wildlife; Biochemistry and Neuroscience). As such, they regularly serve on the graduate committees of UAF students, and through collaborative agreements, are able to serve as primary research advisor to UAF PhD students. There are currently three UAF PhD students who live in Anchorage, are supervised by UAA Biological Sciences faculty, take UAA courses and assist in mentoring UAA undergraduates in our research labs.

Some UAA BIOL graduate courses are offered distance, either synchronously or asynchronously (e.g. BIOL A655 Advanced Bioinformatics; BIOL A677 Advanced Tundra and Taiga Ecosystems; BIOL A669 Advanced Arctic Environmental Security; BIOL A663 Advanced Molecular Biology of Cancer). Students across Alaska, the US and the world have enrolled. We will continue to increase the number of upper level/graduate courses delivered by distance where appropriate.

Program student learning outcomes (SLOs) assessment

The MS in Biological Sciences has four student learning outcomes.

The successful candidate for the MS degree in Biological Sciences will

1. Have a working knowledge of the fundamental concepts of biology across a broad range of fields, and have a demonstrated mastery of at least one focus area within biology.
2. Have a working knowledge of the principles of the scientific method, of the methods and technology of biological research, and of appropriate quantitative methods for the analysis of scientific data.
3. Be capable of writing a publishable scientific paper, and presenting research findings at scientific conferences.
4. Be prepared for a career in biological sciences, and/or able to pursue more advanced research opportunities.

The first two SLOs are assessed through coursework and completion of a thesis research project. Student progress towards these SLOs is assessed yearly via a) approval of a thesis research proposal by the end of year one in the program (i.e., second academic semester) and yearly committee meetings. All students must pass an oral defense of their thesis at the end of the degree program. AY 2018-2019 saw 2 MS students graduate (Table 1). This number is on par with historical numbers (3-4 in AY 2009 and AY 2010), but lower than when departmental faculty numbers were at their peak (6 in AY 2016, 13 in AY 2014, 7 in 2013). The lower number of students completing their degrees is likely due to both the smaller program size in the past couple of years, and a few students taking longer than they had originally planned to complete

their degree. The course pass rate has been consistently high (avg. 75.6%) and the D, F, and withdrawal rate extremely low (avg. 1.9%; Table 4).

The third SLO is assessed by tracking data on student peer-reviewed scientific publications and presentations at local, national, and international meetings. These metrics track student writing, presentation, and synthesis ability, as well as the quality of their science. In the past 7 academic years, graduate students were authors on 111 papers and presented 271 talks or posters at domestic and international scientific conferences or other venues.

The fourth SLO reflects workforce development and is tracked by exit and alumni surveys. The MS program is extremely successful in training students for future employment/research endeavors. As highlighted above, our MS program graduate have succeeded at a 100% rate in obtaining professional positions in biologically relevant fields (for the graduated students we could track since 2011).

How well is the program doing on Student Success and how is student success facilitated

The MS BIOS program, with its strength in Biomedical and Ecosystem Health Sciences research, is by all metrics doing extremely well in terms of student success. Students are not withdrawing from the degree, enrollment in the program is increasing and the number of papers published and research presentations by graduate students is concurrently increasing. We expect that higher graduation rates will follow. Most importantly, the program boasts a 100% success rate in workforce development. For the graduated students we could track since 2011, all have obtained professional positions in biomedical or ecosystem health fields.

Student Success has also been enabled by program administration changes over the past few years. We have

- i. significantly refined methods to track student progress towards the SLOs. Blackboard was being used as the repository for students to maintain their records/paperwork up to date, as well as all faculty to review the files as necessary, and in AY 2017-18 an Excel database was constructed to aid in tracking student paperwork. However, Blackboard is overly cumbersome for this purpose, especially with regular Blackboard updates and purging of old shells). In addition, continuous revision of the Excel tracking file was cumbersome (especially in the event of staff vacancies). To rectify these problems, in AY 2018-2019 we planned, developed and commenced transition to an in-house built and Google-powered student tracking system that feeds data from Banner and multiple other sources. We also planned, developed and constructed a new Graduate Affairs Academic support website and commenced the implementation of the submission of required forms and progress reports using DocuSign PowerForms through the website. The newly implemented student tracking mechanisms will be continually assessed and refined in future years and overall, provides the department and the college with a more accurate understanding of the success of our program. *NOTE: Unending thanks go to our amazing MNS Hub Staff for their hard work putting this together, in particular M.D.-J. and G.S. As a testament to the value of these changes, M.D.-J. has been asked to present this system to others across campus.*
- ii. established new guidelines for faculty mentors, and we present these and student expectations to faculty and students in an annual seminar obligatory for all graduate students and graduate student supervisors. We have also clarified our internal working documents pertaining to the acceptance of students into the program, the application for teaching assistant positions and recruitment TA-ship duration.

Student accomplishments.

Over the review period, MS BIOL students have been first or co-author of 111 peer-reviewed manuscripts. They have also been first/presenting or co-author on 271 presentations at local, domestic and international scientific conferences. As noted previously, MS BIOS graduates go on to gainful employment or further advanced degrees. In the last four years, three graduates have entered PhD programs (Duke, UC Riverside, UAF), and another is pursuing a second master's degree. Eleven graduates have jobs with agencies (NOAA, USFWS, USFS, WA State Div. Nat. Resources) or other state or private sector employers (Systems Biology Institute; Alaska SeaLife Center, Oregon Pacific Area Health Education Center, Polar Field Services, Alaska Premier Health, Fisheye Consulting). Two graduates are research technicians at UAA. Lastly, during the period under review, two MS BIOS graduate students received graduate research fellowships from the National Science Foundation. These are highly competitive and prestigious fellowships awarded each year to the most promising graduate students across the country, and are a reflection of the quality of our graduate students and program.

4. Program Duplication / Distinctiveness (300 words or less)

Our program does not duplicate others in University of Alaska Statewide System. Any apparent duplication is in name only. In fact, each student's MS degree is distinct because each thesis research project is unique, each graduate study plan is unique, and each individual students' scientific interests and career aspirations are unique. Thus, the research experiences and workforce development training that each student obtains when conducting their research-based MS thesis in the Biomedical or Ecosystem Health Sciences at UAA is distinctive.

According to data obtained from UAA Institutional Research (Official Student Demographic Closing), the number of Biology MS majors at UAF between fall 2015 and spring 2019 ranged from 22 to 31. Thus, the programs on both campuses are the same size. Faculty research agendas at UAA and UAF are not duplicative, and the unique research programs of the faculty support individualized theses research on both campuses. Of our current UAA graduate students, nearly 50% are former UAA BIOS or NSCI alumni, a trend that is common among our MS BIOS student body, reflecting the place-based nature of UAA students. There is clearly demand for and strength to retain MS Degrees in Biological Sciences at both UAA and UAF.

Further support for the uniqueness of thesis-based graduate research projects is that UAA Department of Biological Sciences faculty routinely mentor UAF PhD students studying/conducting their thesis research at UAA. Indeed, as a consequence of unique faculty research programs, three UAF Ph.D. students are primarily supervised by UAA Department of Biological Sciences faculty. In addition to unique individual research projects, unique course offerings on both campuses have resulted in UAF graduate students enroll in distance delivered UAA courses and vice-versa.

5. Summary Analysis (500 words or less)

The MS BIOS program excels in workforce development and our graduate students are well-prepared for public and private sector jobs and continuation of their education in doctoral and professional programs. All of the students that have graduated from the program since 2011 have gained employment in science research or related fields, or are continuing their graduate research at the Ph.D. level. Research productivity, as evidenced by number of student-authored publications in peer-reviewed journals and presentations at state, national and international scientific conferences has increased in recent years. In addition, support for the graduate program by the MNS administrative core has led to improvements in paperwork and student tracking and have helped students remain on target and in good standing through their degree.

Our graduate program is integral to both the NSCI and BIOS undergraduate degrees offered by Biological Sciences. MS graduates work under the mentorship of faculty and ultimately publish their work in peer-reviewed journals. The publications a) expand the body of scientific knowledge, b) contribute to the students' future success, and c) contribute to faculty productivity. The latter enhances faculty competitiveness for extramural funds to maintain and grow research programs, which in turn provides opportunities for future graduate and undergraduate students to engage in authentic research experiences and learn via the creation of new knowledge. Faculty research programs inform our teaching and curricula at all levels, ensuring relevance and currency of the curriculum.

Declining university funding, departure of faculty and increasing competition for extramural support from state and federal agencies pose challenges for the graduate program in Biological Sciences. Maintaining cutting-edge laboratory facilities and equipment is critical to support and grow a competitive research faculty and to maintain and grow the graduate program. Growth and support of our graduate program is integral to the success of faculty in the department and to the department's undergraduate programs. Without a strong graduate program, recruiting and retaining faculty will be more difficult and existing faculty will leave. The subsequent decline will result in loss of external research dollars, a loss of currency of the undergraduate curricula, and significantly reduced opportunities for undergraduate research. Our graduate students work directly with undergraduate researchers and in doing so a) gain invaluable academic and professional skills, such as student mentorship and supervision and b) contribute to the delivery of high-impact teaching practice in our undergraduate programs. From the 2011 spring semester through to the 2019 summer semester, departmental faculty mentored 420 BIOL 498 Individual Research students (1,101 student credit hours). These numbers underestimate the number of students impacted by faculty research and our graduate program (via near-peer mentorship), as undergraduates also work in faculty labs as paid student research assistants.

The UAA MS BIOS program is worthy of investment for growth. The basis for and most fundamental component of, research-based graduate degrees is the individual authentic student research project, which is only available to students through the individual faculty research programs. Faculty research needs to be valued and supported, with investment in research faculty lines.