

California Maritime Academy

Options For The Legislature

Legislative Analyst's Office
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Introduction

The purpose of this review of the California Maritime Academy (CMA) is to evaluate the cost-effectiveness of the academy and to determine whether alternative approaches for carrying out the academy's mission should be considered. We initiated this study for two reasons. First, it is part of our ongoing responsibilities to review all state-funded programs, and we have not conducted an in-depth review of the CMA since 1971. Second, we noted that the U.S. maritime industry continues to be in a state of economic decline—a condition that began several decades ago. It is therefore reasonable to ask whether continuation of state support for the CMA, as presently constituted, is warranted, given the other pressing needs facing the state.

Recently, the academy has received considerable publicity due to allegations of sexual harassment on the campus and during the annual training cruise. While this is an important issue, it does not fall within the scope of our analysis. We note, however, that the U.S. Maritime Administration has conducted an investigation of these allegations and has submitted the investigation team's report to the academy's governing board.

The following report contains four chapters. In the first chapter, we provide a brief history of the academy and a description of its program and operations. The second chapter consists of an analysis of the cost-effectiveness of the academy. Chapter III examines several alternatives to continuation of the current level of state support for the CMA. Finally, the last chapter contains our conclusions and a recommendation.

The framework for evaluating the CMA consists of an examination of the costs and benefits of (1) maintaining the academy, (2) eliminating the academy, and (3) continuing merchant marine training at lower state costs. These costs and benefits are considered in the context of the impacts on the principal groups affected: the state, the maritime industry, the students, the academy's employees, and the local economy.

In undertaking this effort, we contacted numerous individuals from the CMA and other maritime academies, companies and unions in the maritime industry, the U.S. Maritime Administration, the U.S. Coast Guard, the Military Sealift Command, the Office of Management and Budget, and former staff of the President's Commission on Merchant Marine and Defense. We would like to thank each of them for their cooperation in responding to questions and requests for information.

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Executive Summary

The California Maritime Academy (CMA) is an accredited four-year college, with an enrollment of approximately 390 students. It is supported primarily by the state, at a budgeted General Fund cost of \$6.6 million in 1989-90 (excluding salary increases). The academy's mission is to provide licensed deck and engineering officers for the U.S. merchant marine and California maritime industries. The CMA is one of seven such institutions (six state and one federal) in the country.

The purpose of this review is to determine the cost-effectiveness of the CMA and to identify alternative ways to carry out its mission. The costs and benefits are considered with reference to the principal groups affected: the state, the maritime industry, the students, the academy's employees, and the local economy. In addition, we discuss four alternatives to continuation of the current level of state support of the academy: establishing a comparable program at a California State University (CSU) campus, establishing a financial assistance program for state residents attending out-of-state maritime academies, supporting the academy through an industry tax or contribution, and raising student fees.

We initiated this study for two reasons. First, it is part of our ongoing responsibilities to review all state-funded programs, and we have not conducted an in-depth review of the CMA since 1971. Second, we noted that the U.S. maritime industry continues to be in a state of economic decline—a condition that began several decades ago. It is therefore reasonable to ask whether continuation of state support for the CMA, as presently constituted, is warranted, given the other pressing needs facing the state.

**Costs and Benefits
of the CMA**

Because of its small size and specialized mission, the CMA is relatively expensive to operate. For example, the state cost per student—\$16,400 in 1989-90—is almost three times the cost at the CSU. We found that eliminating support of the CMA would result in net state savings of approximately \$5.4 million annually (excluding inflationary cost increases in the future). In addition, it would result in a one-time multimillion dollar revenue gain if the CMA property were sold. The net benefit from disposition of the CMA property, however, would depend on the value of the property in its current use compared to the best alternative use of the property or the proceeds derived from sale of the property.

Weighed against these direct fiscal gains is the negative impact of eliminating the CMA on the students, the industry, the academy's employees, and the local economy. While we were unable to express these effects in quantitative terms, our review indicated that the impact on potential students, employees, and the local economy appears to be relatively limited. Students have available to them a wide variety of alternative vocational education opportunities in the state, including programs in fields related to current CMA instruction, such as engineering and transportation management. The CMA employees would be affected adversely due to loss of their jobs; but we believe that most of these employees—primarily skilled technical and professional personnel—should be able to find suitable employment within a reasonable period of time. Similarly, we concluded that the impact on the local economy, while disruptive in the short run, would not be significant in the long run.

Regarding the impact on the industry, we concluded that the industry would have little difficulty in finding licensed applicants for job vacancies in the absence of the CMA. This conclusion was based on an analysis of the current and projected supply of, and demand for, deck and engineering officers.

The impact of eliminating the CMA on industry productivity, however, is less clear. Industry productivity (in terms of operational efficiency and effectiveness) could be affected adversely, depending on the extent to which CMA students receive better training than potential employees recruited from other sources. Some evidence of the quality of CMA training is reflected in the relatively high percentage of these graduates who obtain employment in maritime-related jobs, particularly in sea-going positions (known as billets), where 71 percent of the CMA graduates in 1988 found employment. While these data are not conclusive, they suggest a high level of industry satisfaction with the training provided by the academy. This is not sufficient, however, to enable us to conclude that there is a qualitative differential between CMA graduates and other academy graduates, and to further determine if such a differential results in any effect on industry productivity. We were able, nevertheless, to develop two alternative ways to approach this issue.

As part of our cost-benefit approach, we concluded that a decision to terminate or continue support of the academy could depend on the degree to which "industry impact" is assessed according to the following two criteria: (1) the need to meet a documented labor market demand (in other words, will the demand for deck and engineering officers be sufficient to warrant continuation of the academy), or (2) the job placement success of the academy. If the Legislature chooses to apply the first criterion (or both criteria, as it has done for community college vocational education programs), a strong case could be made for terminating support of the CMA, based on labor market projections. This is because current projections show a significant oversupply of merchant marine officers to the year 2000—an oversupply that would exist even if we exclude CMA's contribution to the projected level of supply. If, on the other hand, the Legislature chooses to apply only the job placement criterion (as it has done for specific programs at the University of California), continuation of state support of the CMA might be justified. This is because the academy places a relatively high percentage of its graduates in sea-going jobs in the merchant marine.

**Alternative Criteria
for Assessing
Industry Impact**

Summary of Options

Using our cost-benefit approach, we identified three options for the Legislature in its consideration of the CMA:

(1) Eliminate state support of the CMA on the basis that the academy is not necessary to meet projected labor market demand for licensed deck and engineering officers, and thus is not cost-effective.

(2) Continue the existing level of state support of the CMA on the basis that its job placement success reflects superior productivity—in terms of the performance of its graduates once employed—thereby indicating that the academy is cost-effective.

(3) Continue to provide merchant marine officer training, but reduce the state's costs for such training by (a) increasing the level of CMA support provided by students and the industry, or (b) replacing the CMA with a comparable program at a CSU campus or a financial assistance program for students attending out-of-state maritime academies.

Recommendation

We recommend that the Legislature conduct an oversight hearing to review options for continuation, modification, or elimination of state support of the California Maritime Academy.

In our analysis, we were unable to acquire all of the data needed to recommend one of the three options identified above. This was due, in large part, to the difficulty of quantifying certain benefits (particularly those related to industry productivity) associated with the CMA. Thus, the Legislature will need additional information to fully explore which course of action to pursue. We believe that this information can be collected, and can be evaluated by the Legislature in an oversight hearing. This hearing should focus on the following informational needs and policy issues:

- The qualitative dimension of the training provided by the academy, and the feasibility of measuring this factor in quantitative terms so as to address the issue of industry productivity. We note, however, that even if additional data can be collected that demonstrate CMA's contribution to industry productivity, it is unlikely that this contribution can be expressed in monetary terms and thereby be compared to the fiscal benefits that would result from eliminating the academy.
- The appropriate criteria (specifically, labor market demand and/or job placement success) for evaluating the academy and the desirability of continuing state support.
- The feasibility of reducing state costs by (1) increasing the level of support provided by students and the industry, or (2) replacing the CMA with a comparable program at a CSU campus or a financial assistance program for students attending out-of-state maritime academies.

If the Legislature does choose to continue support of the CMA, we recommend that it establish statutory criteria to define more specifically the mission of the academy. Specifically, we believe that, in evaluating the job placement success of the CMA, the labor market should be defined so as to include only sea-going billets in the merchant marine. We can find no compelling argument for the state to pay a premium to train CMA students for shore-based occupations in the maritime industry, when the same objective can be accomplished at a lower cost in the UC or CSU systems.

The Legislature should also consider the adoption of specific measures of success, with respect to placement of a minimum percentage of graduates in shipboard positions as merchant marine officers. These criteria could serve as the basis for a biennial review of the CMA, in a manner similar to the review required for community college vocational education programs.

In summary, we believe that an oversight hearing would provide a vehicle for the Legislature to consider the aforementioned options for evaluating the success of the CMA, and to further examine the alternatives to continuing the current level of state support of the academy.

Vertical line separator

The California Maritime Academy

The California Maritime Academy, located on a 67 acre site in Vallejo, was established by Chapter 661, Statutes of 1929 for the purpose of providing instruction in navigation, seamanship, and engineering to male students. Subsequently, the Legislature revised the academy's mission, authorizing it to admit women and "to provide instruction on the nautical sciences, marine engineering, and related fields, including all those necessary to provide the highest quality licensed officers of the American Merchant Marine and California maritime industries."

Initially, the academy was a three-year program, governed by its own board but affiliated with the State Department of Education. In our *Analysis of the 1971-72 Budget Bill*, we recommended that the academy be phased out, based on numerous reasons, the primary ones being: (1) there was a large oversupply of deck and engineering officers, and (2) the academy's degrees and courses were not academically recognized because it was not accredited by the Western Association of Schools and Colleges. In response, the Governor convened a task force, which recommended that the academy be given independent status from the Department of Education and that its curriculum be strengthened to gain accreditation. The Legislature implemented these recommendations in Chapter 1069, Statutes of 1972.

As part of its plan to obtain accreditation, the CMA converted from a three-year to a four-year program and broadened its curriculum. In 1977, the academy received full accreditation. Currently, it is one of seven institutions (six state and one federal) in the United States that train students to become licensed merchant marine officers.

Table 1 summarizes the expenditures and funding sources for the academy from 1987-88 through 1989-90. The General Fund appropriation for the academy in 1989-90 is \$6.6 million (excluding salary increases).

Historical Background

Funding

Table 1

**California Maritime Academy
Budget Summary**

 1987-88 through 1989-90
 (dollars in thousands)

Programs	Actual 1987-88	Est. 1988-89	Budgeted 1989-90	Change from 1988-89	
				Amount	Percent
Instruction	\$4,464	\$4,678	\$4,638	-\$40	-0.9%
Academic support	1,167	1,460	1,489	29	2.0
Student services	3,017	3,075	3,108	33	1.1
Administration (distributed)	(2,090)	(2,283)	(2,172)	(-111)	(-4.9)
Totals, expenditures	\$8,648	\$9,213	\$9,235	\$22	0.2%
Funding Sources					
<i>General Fund</i>	\$6,057	\$6,547	\$6,642	\$95	1.5%
<i>Continuing Education Revenue Fund</i>	40	55	—	-55	-100.0
<i>CMA Trust Fund (Lottery)</i>	54	30	30	—	—
<i>Federal Trust Fund</i>	545	401	401	—	—
<i>Reimbursements</i>	1,952	2,180	2,162	-16	-0.8
Personnel-years	136	135.5	136.5	1	1.7%

**Enrollment and
Student Fees**

Table 2 displays the average annual enrollment and the student fees at the CMA from 1987-88 through 1989-90. The long-term trend in enrollment indicates that the number of students declined from about 470 in 1981-82 (not shown in the table) to a low of 337 in 1987-88, after which it is expected to increase to 400 in 1990-91. The academy anticipates additional enrollment increases over the next few years, due to more emphasis on student recruitment.

Approximately 83 percent of the CMA students are California residents.

Table 2

**California Maritime Academy
Enrollment and Student Fees**

1987-88 through 1989-90

	1987-88	1988-89	1989-90
Enrollment	337	358	390
Fees: ^a			
Education/student services	\$645	\$706	\$740
Medical fee	162	179	188
Nonresident tuition	2,200	2,420	2,660

^a Excludes room and board.

As stated above, the academy offers a four-year program designed to train men and women to become licensed deck or engineering officers in the merchant marine. All students are required to live on the campus. Students major in Marine Transportation or Business Administration (for deck officers), or Marine Engineering Technology or Mechanical Engineering (for engineering officers).

The federal government provides a training ship to the academy. The ship (the "Golden Bear") is a 491 foot, steam-powered vessel of approximately 8,000 gross tons. As part of the licensing requirements, students sail on the Golden Bear for three sea training periods of approximately 12 weeks each. Successful completion of the Coast Guard licensing examination constitutes the student's final requirement for graduation.

All CMA graduates must obtain a Coast Guard license to serve as merchant marine officers on U.S. oceangoing ships of unlimited size. Consistent with this requirement, most of the academy graduates secure employment on such ships, although this varies with job availability and individual career goals.

Curriculum and Training

Career Opportunities

The oceangoing merchant marine fleet consists primarily of privately-owned ships in the transportation industry, but also includes ships operated by the U.S. Military Sealift Command (MSC). The basic task of the MSC is to provide support for the U.S. Navy.

The CMA graduates also obtain employment as officers on relatively small merchant marine ships such as tugboats and fishing vessels, and in shore-based occupations in—or related to—the maritime industry. The latter occupations include marine transportation management, ocean engineering, and offshore drilling.

Academy graduates may also seek employment outside the merchant marine industry, either in the military—primarily the Navy and the Coast Guard—or in shore-based occupations not related to the maritime industry.

Cost-Effectiveness of the Academy

The best approach for evaluating the CMA is to use a cost-benefit framework to determine what the state and society gain from retaining versus closing the academy. In our analysis below, we identify the key factors which this cost-benefit approach should incorporate. In practice, however, not all of these factors lend themselves to easy quantification. As a result, we have been unable to derive a numerical cost-benefit calculation that would permit us to draw firm conclusions regarding CMA's future.

It also must be stressed that there is no simple agreed-upon formula for deciding exactly how much state funding should be allocated to different types of educational programs in California, or what the optimal per-student level of state support should be. Rather, decisions of this sort generally have reflected legislative priorities and policy decisions that have evolved and changed over time. This is true not only for the CMA, but also for other public educational institutions.

Given the above, arriving at a decision regarding the state's support of the CMA involves both qualitative factors and legislative policy issues in addition to the various quantifiable cost-benefit factors.

Costs. The 1989 Budget Act contains an appropriation of \$6.6 million from the General Fund (excluding salary increases) for support of the CMA in 1989-90, of which approximately \$200,000 will be offset by federal reimbursements for fuel oil to operate the training ship. Thus, in 1989-90 the state will spend \$6.4 million, plus salary increase allotments, to support the academy. State support costs are expected to increase moderately for annual inflation adjustments and, potentially, for enrollment increases. We anticipate that new capital outlay costs will be relatively minor.

**Costs and Benefits
of Continuing Support
of the CMA**

In addition to providing the fuel oil reimbursements, the federal government spends approximately \$400,000 annually for grants and student subsidies, and \$1 million annually for maintenance and overhaul of the training ship.

Benefits. The direct benefits associated with the CMA accrue primarily to the students, the industry (including the federal government, which operates merchant ships), the academy's employees, and the local economy proximate to the academy.

The CMA provides students with the opportunity to obtain a baccalaureate degree and, more specifically, to become qualified for employment in the maritime industry and other related industries. In recent years, about 75 percent of the academy's entering students graduate within four years—a statistic that compares favorably to the California State University (CSU) and the University of California (UC). Because it is a requirement for graduation, all CMA graduates obtain a Coast Guard license to serve as deck or engineering officers in the merchant marine.

The industry stands to benefit from the CMA by having access to potential employees who are qualified to fill job vacancies. Almost 90 percent of the students who graduated in 1988 obtained employment in the maritime industry, primarily on merchant marine ships. (We discuss these data in greater detail later in this chapter.)

The other groups that benefit directly from the CMA are the academy's employees and the local economy. The CMA employed 145 individuals in 1988-89, which equated to 135.5 personnel-years. The total cost of employee salaries and benefits amounted to \$6 million. Local businesses that benefit from the academy include restaurants and motels in the area and various enterprises that provide supplies and services to the academy.

This brief description of the costs and benefits associated with the CMA will serve as a reference point for a more extended discussion of the costs and benefits if state support of the academy were terminated.

**Costs and Benefits
of Eliminating Support
of the CMA**

Presumably, if support of the CMA were eliminated, it would be accomplished by phasing out the academy's operations over a four-year period, so as to permit currently enrolled students to complete their programs. In order to simplify our analysis of the costs and benefits of this alternative, our estimated fiscal effects reflect the annual amounts that would result when the final phase of elimination is completed.

Direct State Costs

If state support of the CMA were eliminated, the state would still incur the costs of supporting the estimated number of potential CMA students who would attend other public institutions of higher education. Assuming that 90 percent of CMA's resident enrollment would otherwise attend a public college or university in California, at an estimated marginal cost of \$3,500 per student (using CSU's marginal cost as the standard), the state cost would be approximately \$1 million annually.¹

Impact on Students

Eliminating the CMA would have a negative impact on students by reducing the scope of occupational training opportunities available to state residents. In the context of the broad array of occupational training provided by the state, however, this impact would appear to be relatively limited. While the CMA offers the only program in the state which trains individuals to become licensed merchant marine officers, the state-supported university systems offer a variety of related programs in engineering and transportation management.

¹CSU's marginal cost approximates the unweighted average of the marginal cost of the three public postsecondary education segments.

***The Costs of Eliminating
Support of the CMA***

Impact on the Industry

Another important aspect of the cost of eliminating the CMA is the impact on the maritime industry. We believe that the industry should be able to recruit from other colleges and universities to accommodate its need for shore-based managerial and other professional positions. This is because the maritime companies, like companies in other industries, can recruit graduates from business and engineering programs and train these individuals to adapt their skills to the specific requirements of the industry. Consequently, we will focus our attention on the industry's ability to satisfy its requirements for *ship-board* deck and engineering officers in the absence of the CMA.

Current Supply Exceeds Demand for Merchant Marine Officers. This component of our analysis involves an examination of the supply of, and the demand for, merchant marine officers. We recognize that other state-supported four-year university programs are generally not the subject of a labor market analysis, but we believe that it is a reasonable technique for the CMA because of its specialized vocational orientation.

Our interviews with industry personnel indicate that the current labor market can be characterized as having an excess supply of merchant marine officers. Companies report relatively few vacancies in sea-going jobs, and some academy graduates have had to take unlicensed seaman positions in order to get jobs on board ship. The two major unions for merchant marine officers, moreover, have been virtually closed to new membership for several years. We were also informed by representatives of companies who have hired CMA graduates that they would be able to recruit qualified candidates from the other academies if CMA were not available as a source of supply.

The relatively low level of demand for deck and engineering officers is also reflected by the enrollment and employment data reported by the state and federal maritime academies. The total number of students graduating from all academies in 1988, for example, was 27 percent lower than in 1980, when more jobs were available; and the percentage of these graduates obtaining jobs on merchant marine ships declined from 69 percent to 46 percent.

The following comments from the President's Commission on Merchant Marine and Defense support our observations on the labor market conditions in the industry:²

"The decline of the merchant marine has been continuous during the last several decades in spite of federal support programs. . ."

"The accelerating rate of downturn in the economic fortunes of the merchant marine industry has caused grave concern about whether an American merchant marine, operating in the international trades, can survive except as the carrier of the small amounts of military and government-impelled cargo required by the cargo reservation laws to be shipped on United States flag ships."

Future Supply of Officers Expected to Exceed Demand. We also have sufficient data to compare the projected supply and demand for deck and engineering officers for the year 2000, based on reports from the U.S. Maritime Administration (MARAD) and the Commission on Merchant Marine and Defense, and information provided by the Military Sealift Command, the academies, and industry personnel.

Table 3 summarizes the data on the labor market for deck and engineering officers in the merchant marine.³ Data for the year 2000 are based primarily on commission projections under two scenarios: (1) continuation of current federal policies governing the industry, and (2) adoption of all of the commission's policy recommendations. (Briefly, the commission's recommendations call for several policy changes designed to require or encourage companies to use U.S. flag rather than foreign flag ships.) The commission's projections are supplemented by projections provided by the Military Sealift Command.

²First Report of the Commission on Merchant Marine and Defense, September 30, 1987, p. 11.

³The data on demand are based on the reports of the Commission on Merchant Marine and Defense, 1988 and 1989, and data provided by the U.S. Maritime Administration and the Military Sealift Command. Because these data on demand exclude the Great Lakes fleet, we adjusted projected supply by excluding the Michigan academy.

The data yield several important findings:

- *On the average, two officers are employed to fill each position.* In 1988, there were 4,063 jobs, or billets, for licensed deck and engineering officers in the merchant marine fleet, and 8,516 *individuals* ("actively sailing" officers) filling these positions. Thus, there was a ratio of two actively sailing officers to one officer billet. This ratio was possible because officers employed by merchant marine companies in the private sector had a relatively large amount of paid vacation time (typically four to six months annually).
- *The number of available jobs is projected to continue to decline.* The number of billets for deck and engineering officers declined by 46 percent between 1980 and 1988, and is projected to decline by an additional 37 percent between 1988 and 2000, given current policies. This is due primarily to the reduction in the number of ships, which in turn is the result of (1) a decline in the market share of international shipping by U.S. flag ships and (2) the replacement of older ships by new ships that are larger and more efficient. (We also note that adoption of all of the commission's recommendations would result in a 12 percent increase in the number of jobs in the year 2000.)
- *The number of officers is projected to continue to decline.* Corresponding to the decline in billets, the number of individual deck and engineering officers declined by 40 percent between 1980 and 1988, and is projected to decline by an additional 45 percent between 1988 and 2000, given current policies.

The number of individual officers is the best measure of the industry's *demand*, or need, for these officers. Thus, the projected demand for deck and engineering officers in the year 2000—assuming the continuation of current policies—is 4,657 officers, as shown in Table 3. The potential *supply* of officers available to meet this demand depends on the following factors:

- The number of officers currently in the seafaring workforce who will remain in the workforce in 2000, which is primarily a function of the attrition rate from retirements, disability, resignations, and deaths.
- The number of new entrants to the labor market who come from the academies and other sources, such as "the hawsepipe" (those who come up through the ranks), and remain in the workforce in 2000.

Table 3

**U.S. Flag Merchant Marine Ships
and Deck and Engineering Officers^a**

	Actual			Projected			
	1980	1988	Percent Change	Current Policies		Commission Recommendations	
				2000	Percent Change Over 1988	2000	Percent Change Over 1988
Ships	589	453	-23.1%	290	-36.0%	534	17.9%
Positions (billets)	7,500	4,063	-45.8	2,580	-36.5	4,532	11.5
Individuals	14,112	8,516	-39.7	4,657	-45.3	8,561	0.5

^a Sources: Third and Fourth Reports of the Commission on Merchant Marine and Defense, September 1988 and January 1989 and September 1989 letter from Military Sealift Command; 1980 data provided by U.S. Maritime Administration and Military Sealift Command (positions). Data exclude Great Lakes fleet. Number of positions and individuals in 1980 estimated by Legislative Analyst's Office.

Table 4 compares the projected level of potential supply with the projected level of demand for merchant marine officers in the year 2000, given current policies.⁴ We also include the projected level of demand if the policies recommended by the commission are adopted. The commission's recommendations, as noted previously, include various statutory and administrative changes designed to increase shipping on U.S. flag ships, which would result in the addition of an estimated 244 ships to the fleet over the next 12 years. According to staff at the Office of Management and Budget, however, it is highly unlikely that these recommendations—which carry an estimated cost of \$13 billion—will be funded, even if authorized by Congress. Consequently, the commission's recommendations can serve as an estimate of the maximum demand under an absolute "best case" scenario for the industry.

As the table shows, the projections indicate a significant oversupply of officers, ranging from 759 to 4,663. The lower oversupply figure occurs even if all of the commission's recommendations are adopted. Moreover, the same conclusions would prevail if the CMA's contribution to the projected level of supply is excluded.

We should note that the data on demand reflect only U.S. oceangoing ships of 1,000 gross tons or more. This excludes ships such as tugboats and most commercial fishing vessels. While CMA graduates obtain licenses to serve on ships of unlimited size, some academy graduates obtain employment on relatively small vessels that would not be included in the commission's data. Consequently, the data may understate demand.

⁴The projected supply of academy graduates is based on 1988 data on the number of graduates (and 1989 and 1990 projections in the case of the CMA), the estimated percentage of graduates who would opt for sea-going billets if jobs were available, and the estimated attrition rates, pursuant to data from the U.S. Maritime Administration (see U.S. Merchant Marine Workforce Supply and Demand Analysis, 1979-99, December 1979). While we do not have recent data on attrition rates, we do know that the median age of the workforce has declined since 1979, suggesting that the attrition rate from retirements might be lower than we have assumed. If so, our projections would tend to understate the supply level. The projected supply from sources other than the academies is based on MARAD's 1979 report, reduced by 50 percent to correspond to the reduction in the workforce.

Table 4

Supply and Demand, Deck and Engineering Officers^a

	1988	Projected	
		Current Policies 2000	Commission Recommendations 2000
Supply			
1988 workforce remaining	8,516	3,620	3,620
New entrants:			
CMA graduates	--	500	500
Other academy graduates	--	4,000	4,000
Other sources	--	<u>1,200</u>	<u>1,200</u>
Total potential supply	--	9,320	9,320
Demand	8,516	<u>4,657</u>	<u>8,561</u>
Excess supply		4,663	759

^a Data on demand (and 1988 workforce) are derived from the Third and Fourth Reports of the Commission on Merchant Marine and Defense, September 1988 and January 1989 and estimates from the Military Sealift Command (letter dated September 5, 1989) (see Table 3). Attrition rates derived from U.S. Maritime Administration, U.S. Merchant Marine Workforce Supply and Demand Analysis, 1979-88, December 1979. Projected supply from academies assumes continuation of 1988 graduation rates (and 1989 and 1990 projections for CMA), 85 percent choosing sea-going billets assuming conditions of full job availability (see 1979 Maritime Administration report, p. 40), adjusted for attrition. Supply from "other sources" based on 1979 Maritime Administration report, reduced by 50 percent to correspond to the reduction in the workforce. Supply from new entrants excludes Michigan academy because data on demand exclude the Great Lakes fleet.

The data, however, may similarly understate supply because the projections do not account for three potential sources of officers: (1) licensed officers currently serving in shore-based jobs who would prefer seagoing billets if available, (2) licensed officers serving in unlicensed (seaman) billets, and (3) the effective increase in the number of officers that could be made available by changing industry workload standards.

The third category requires explanation. Officers serving in the private sector, due to longer periods of paid vacation, work fewer days during the year than do their counterparts in the government-operated fleet. The difference is significant—typically, officers in the private sector have about four months of additional vacation. While a reduction in vacation time would have to be a negotiated change—probably requiring a trade-off in the form of higher salaries—it represents a *potential* source of additional supply that could be tapped by the private sector during a period of labor shortage.

Thus, we conclude that, on balance, the data indicate that the current and future supply of merchant marine officers exceeds the demand by a substantial amount.

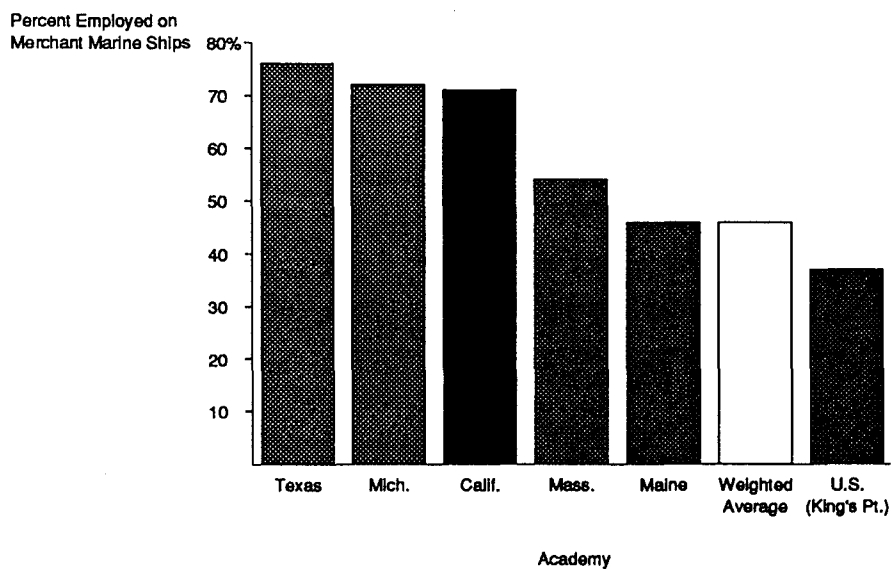
Quality of CMA Training and Industry Productivity. The data, in summary, suggest that elimination of the CMA would not have an adverse effect on the industry's ability to satisfy its requirements for licensed deck and engineering officers. There is, however, a qualitative dimension to the production of licensed officers which is not reflected in a supply/demand analysis. If the CMA provides training which is superior to the industry's other sources, elimination of the academy could affect industry productivity even if alternative sources of qualified officers exist.

We do not have sufficient data to make the comparisons required for this type of an assessment, although such information may be available through an extensive survey of the industry. We do have sufficient information, however, to draw some inferences at this time. First of all, we note that in spite of the apparent surplus of qualified deck and engineering officers, the CMA reports a relatively high rate of job placement in sea-going billets in the commercial fleet. As Chart 1 illustrates, 71 percent of the graduating class of 1988 obtained such positions. This compares to an average (weighted by enrollment) of 44 percent for all the other academies. Combining the data from 1986 through 1988, the differential was 55 percent for the CMA versus 40 percent for the other academies. (See the Appendix for more employment data for the class of 1988.)

Chart 1

Employment of Maritime Academy Graduates In Seagoing Merchant Marine Positions

Class of 1988



Thus, the CMA has been able to show a relatively high job placement rate, with respect to its primary function of producing licensed officers for the merchant marine. We also found, in our discussions with industry personnel, a high level of satisfaction with the training provided by the academy. Typically, the CMA was rated either first or second among the academies in terms of the training and performance of its graduates. While these findings are far from conclusive, they suggest that elimination of the CMA could have an adverse impact on industry productivity (in terms of operational efficiency and effectiveness).

Impact on Federal Government's Merchant Marine Reserve Fleet

In addition to its impact on the industry, one additional aspect of eliminating the CMA is its effect on the federal government's ability to staff the government's reserve fleet in case of mobilization during national emergencies. A 1985 MARAD report, which projected the reserve fleet requirements through 1995, concluded that the seafaring workforce will be adequate to fully staff the reserve fleet in the event of mobilization.⁵ The Commission on Merchant Marine and Defense, on the other hand, came to the opposite conclusion in its series of reports from 1987 to 1989.

Even if the commission is correct in identifying a shortfall in reserve fleet mobilization staffing, the problem can be remedied only by creating more jobs (thereby increasing the number of licensed officers). The CMA, of course, contributes to the pool of manpower that could be used in case of mobilization; but, in the current and projected labor market, the loss of CMA's contribution to the seafaring workforce would be offset by other sources of supply. The commission, in fact, concluded that the shortfall in reserve fleet staffing requirements can be eliminated only by increasing the number of actively sailing mariners in the commercial fleet, which would require an increase in the number of jobs.

We also note, in this connection, that the federal government can increase the supply of merchant marine officers by expanding the enrollment of the federal academy. The superintendent of the federal academy indicated that this was feasible when he testified at hearings held by the commission in 1987, noting that the academy's enrollment "can easily be doubled" without adding new facilities.⁶ To put this in perspective, the federal academy's enrollment currently is more than twice the enrollment of the CMA, so the loss of CMA enrollment could be recaptured.

⁵U.S. Maritime Administration, Reserve Fleet Crewing Feasibility, 1984-1995, April, 1985.

⁶Public Hearings Before the Commission on Merchant Marine and Defense, February 1987 - July 1987, p. 441.

Impact on CMA Employees and the Local Economy

We turn, finally, to the impact of eliminating the CMA on the academy's 145 employees and the local economy. Loss of jobs would obviously affect the academy's employees adversely. The degree to which they would be affected is unknown, depending primarily on how readily they could find suitable alternative employment. Because this would depend partly on future economic conditions and the unique characteristics of the employees, we cannot estimate how costly this would be to the employees. We note, however, that most of the academy's employees are skilled professional, technical, or clerical and other support personnel, who should be able to compete effectively for jobs in the economic marketplace. In this respect, we note that as civil service employees, CMA personnel would be given preference for civil service job openings in related areas. Consequently, the net impact may be relatively minor.

The local economy would also be affected adversely by elimination of the CMA. The degree to which this impact would extend beyond the period immediately following closure of the academy, however, would depend on the purposes for which the CMA property were used. It is possible that most of the initial adverse effect would be offset by some other type of economic activity.

We also note that, from a statewide perspective, economic losses that might accrue to individuals and local businesses due to closure of the CMA could be offset, in whole or in part, by the redirection of the state funds expended on the academy into other programs that provide economic benefits.

**The Benefits of
Eliminating Support
of the CMA**

The benefits that would result from the elimination of the CMA are the savings and revenues that would be realized by the state and federal government. The state would save \$6.4 million annually (excluding inflation adjustments) in support budget expenditures and, if the property were sold, would gain several million dollars in one-time revenues. The net benefit resulting from disposition of the property, however, would depend on the value of the property in its current use compared to the best alternative use. We are unable to estimate this potential benefit.

The federal government would save approximately \$1 million in annual maintenance costs if the training ship were deactivated or sold, and approximately \$600,000 annually in support budget expenditures (including the fuel oil reimbursement). Potential revenues from the sale of the ship probably would be limited to scrap value, due to the age of the vessel.

**Summary of Costs
and Benefits**

Table 5 summarizes the costs and benefits of eliminating support of the CMA. Focusing on the state's fiscal impact, elimination of the academy would result in annual savings of approximately \$6.4 million and a potential unknown net benefit related to the sale or alternative use of the property. The savings would be partially offset by annual costs of approximately \$1 million to support those students who would attend public colleges and universities.

These direct fiscal gains to the state would have to be weighed against the impact of eliminating the academy on the students, the industry, the academy's employees, and the local economy. While we cannot express these effects in quantitative terms, our review indicates that the impact on potential students, the employees, and the local economy—though disruptive in the short run—appears to be relatively minor. We also conclude that the industry would have little difficulty in finding qualified applicants for job vacancies. The effect on industry productivity, however, is less clear. We will discuss this in more detail in the concluding chapter.

Table 5

Summary of the Costs and Benefits of Eliminating Support for the California Maritime Academy

Costs		Estimated Amount (Annual)
State:	Cost to support students who would attend public colleges/universities	\$1 million
Student Impact:	Reduction in educational opportunities	Probably minor
Industry Impact:	Impact on ability to fill job vacancies	Minor
	Impact on productivity	Unknown
Employee Impact:	Job dislocation	Probably minor
Local Economy Impact:	Revenue loss	Probably minor
Benefits		
State:	Support budget savings	\$6.4 million
	Alternative use of property	Unknown
Federal:	Support budget savings (including ship maintenance)	\$1.3 million

Having examined these cost-benefit considerations, what can we say regarding whether or not the CMA should be retained? As noted earlier in this report, a cost-benefit calculation is difficult to derive because of those factors which are hard to quantify, such as the productivity gain associated with employment of CMA graduates.

Given this, it seems that there are two alternative approaches for the Legislature to follow in deciding the future of the CMA:

- First, given the difficulties of arriving at a clear cost-benefit calculation, the Legislature may wish to simply focus on adopting what it perceives to be the single most important decision-making criterion. One obvious criterion might be the success of the CMA in placing its graduates in merchant marine jobs. An alternative criterion might be the labor market requirements of the merchant marine industry, using a supply-demand analysis.
- Second, the Legislature may wish to obtain additional data on the effects of eliminating the academy in order to permit a more complete cost-benefit evaluation. The key focus here would be to assess whether CMA graduates are in fact "more productive" than other licensed officers and, if so, to evaluate the economic significance of this.

Each of these alternative approaches is discussed in the concluding chapter and implies a different course of action for the Legislature. Before discussing these actions, however, we first consider some alternatives to either keeping the CMA operating as presently structured or eliminating it altogether.

Alternatives to the Current CMA Program

In order to expand the scope of our review of the CMA, and to explore additional options for legislative consideration, we will briefly consider four other alternatives to continuing state support for the CMA. All four alternatives have a common denominator: they provide opportunities for merchant marine training while attempting to reduce the state costs for such training. The alternatives are summarized as follows:

- Eliminate the academy, and establish a program at a CSU campus, designed to prepare students to become licensed deck and engineering officers in the merchant marine.
- Eliminate the academy, and establish a financial assistance program—such as a forgivable loan program—for state residents who attend other maritime academies and secure employment as licensed officers in the merchant marine.
- Continue support for the academy, and acquire financial support from the maritime industry—through a tax or a voluntary contribution—to reimburse the state for costs in excess of the costs that the state would incur if the students had instead attended the CSU.
- Continue support for the academy, and raise student fees to reimburse the state for some or all of the costs in excess of those it would incur if the students had attended the CSU.

**New Program
at the CSU**

Under this alternative, the CSU would establish a program at one of its campuses to train students for employment in the maritime industry, primarily as deck and engineering officers. The program would be operated in the same manner as other CSU programs, and would not necessarily be a residential program similar to the CMA. Presumably, the federal training ship would not be available under these conditions, so the students would have to obtain their sea training on commercial ships, as is done in the federal merchant marine academy.

The General Fund costs of establishing such a program would be approximately the same as the cost of additional enrollment in any other program at the CSU, but less than the current costs at the CMA. We note that at least two CSU campuses—Long Beach and San Francisco—already have business degree programs which offer an emphasis in transportation management, as well as engineering programs. Implementation of a new program, however, would require significant one-time capital outlay costs, primarily for laboratory space.

This decision to establish a new program, of course, depends initially on whether this type of training is warranted. Considering the condition of the present and future labor market, establishment of a program designed to train students to become deck and engineering officers may not be justified. If continuation of the CMA can be justified on the basis of a qualitative differential in its training, however, then establishment of a comparable program at the CSU may be warranted, given the potential savings to the state. Sufficient information is not available at this time, however, to fully evaluate this alternative.

If the CMA were closed, a financial assistance program—such as a forgivable loan program—for California residents who attend out-of-state maritime academies would help to maintain these training opportunities for California students. This option might be worth considering if the CMA were closed but the Legislature nevertheless believes that such training merits some type of public subsidy. If, however, the CMA were closed because the supply of officers exceeds demand, there would be little basis for establishing a forgivable loan program.

Under this alternative, funds would be raised from the maritime industry. These funds would be used to reimburse the state for the costs of supporting the CMA which are in excess of the costs that would be incurred to support the same level of enrollment in the public postsecondary educational system (using the CSU system as the standard). This could be accomplished through a tax levy or some form of voluntary contribution implemented by a long-term contractual agreement.

Should the industry support a tax or voluntary contribution, it would serve as a measure of the value the industry places on the quality of the training provided by the CMA, compared to alternative sources of labor supply. We have no basis, however, for making such an assessment at this time. In addition, we note that there is no precedent for state taxation of a specific industry for the provision of occupational training. This should not necessarily preclude the Legislature, however, from considering such a policy.

Financial Assistance Program

Financial Support from the Maritime Industry

**Increase in
Student Fees**

Because of the small enrollment and the high cost per student at the CMA, student fees could not be increased by an amount sufficient to reimburse the state for a significant portion of its costs. Doubling the fee, for example, would increase revenues by only \$300,000, even if it had no effect in reducing enrollment. We also note that the Legislature has, in the past, rejected the concept of a differential fee for high-cost programs at the University of California. Nevertheless, the Legislature—if it decides to continue support for the academy—might wish to consider a minor or moderate fee increase to help reduce the relatively high state cost per student at the CMA.

Conclusions and Recommendation

Because of its small size and its mission to serve as a full service four-year college, the CMA cannot take advantage of the economies of scale available to campuses of the UC or CSU system. As a result, the state cost per student at the CMA is three times as much as the cost at the CSU. The state has been willing to bear the costs of supporting the CMA presumably because of the need for licensed merchant marine officers. While other colleges and universities provide educational opportunities to students to learn the skills necessary for shore-based employment in the maritime industry, the CMA is the only institution in the western United States that trains students to become deck and engineering officers on merchant ships.

We can summarize our cost-effectiveness evaluation of the CMA as follows:

- Elimination of state support of the CMA would result in net savings to the state of approximately \$5.4 million annually and a potential unknown net benefit related to the sale or alternative use of the property. Weighed against these direct fiscal gains is the negative impact of eliminating the CMA on the students, the industry, the academy's employees, and the local economy. While we were unable to express these effects in quantitative terms, our review indicated that the impact on potential students, employees, and the local economy appears to be relatively limited.
- There would be little or no impact on the industry's ability to find qualified candidates for available job vacancies if CMA were closed, based on labor market projections. Industry productivity, however, could be affected adversely, depending on the extent to which CMA students receive better training than potential employees recruited from other sources.

**Summary of
Cost-Effectiveness
Evaluation**

**Alternative Criteria
for Assessing
Industry Impact**

- At this time, data are not available which would allow measurement, in monetary terms, of all the "costs" of eliminating the CMA. In order to do so, additional information would be required, including data related to the impact of CMA training on industry productivity.
- We reviewed four alternatives to continuation of the current level of state support of the CMA, and concluded that they were potentially viable: establishing a comparable program at a CSU campus, establishing a financial assistance program for students attending out-of-state maritime academies, funding the CMA by raising support from the maritime industry, and imposing a student fee increase.

As noted above, sufficient data are not available at this time to conclusively determine the impact of CMA training on the industry. We were able, nevertheless, to develop—as part of our cost-benefit analysis—an alternative way to approach this issue. In developing this approach, we asked the following fundamental question about the CMA: Should the value of the academy be assessed on the basis of its *success* in placing graduates in the maritime industry, or on the industry's *need* for the academy to satisfy its requirements for employees? This question suggests two criteria for evaluating industry impact: job placement success versus industry need.

Regarding the industry need criterion, we concluded in our analysis of high school Regional Occupational Centers and Programs in 1983-84 that:⁷

"...training students for jobs in labor surplus occupations does nothing to improve employment opportunities for the labor force as a whole. Where an Adult Education or ROC/P graduate is hired to fill a job in one of these occupations, it simply means that another qualified applicant or job holder is displaced."

⁷Legislative Analyst, Analysis of the 1983-84 Budget Bill, pp. 1331-1332.

The Legislature responded by adopting supplemental language to the Budget Act of 1983 indicating the intent that state funding be prohibited for courses that provide training in occupations where no labor market shortage exists.

On the other hand, the state has in recent years sustained the enrollment levels in law and business school programs at the UC during periods of excess labor supply, based at least partly on the rationale that the quality of training was sufficiently high for the graduates to obtain employment.⁸

Thus, there are two criteria, or models, for evaluating the impact of the academy on the industry, each of which could lead to a different conclusion. The labor market/industry need model, when used in the context of a cost-benefit review, results in a strong case for eliminating support of the CMA. The job placement/achievement model places more weight on the qualitative dimension of the academy's training program, making the case for elimination of support less compelling. We note that both of these models are recognized in the statutory criteria for evaluating community college vocational education programs. The Education Code provides that such programs must, pursuant to biennial reviews, meet a documented labor market demand as well as demonstrate effectiveness in terms of job placement.

Thus, the decision to maintain or eliminate support of the CMA could rest on the degree to which industry impact is assessed according to two criteria: (1) the need to meet a documented labor market demand, or (2) the quality of the training as reflected, in part, by the job placement success of the academy. If the Legislature chooses to apply the statutory criterion for community college vocational education programs—which requires both of the foregoing criteria to be met—the academy would be in serious jeopardy, based on labor market projections. If, on the other hand, the Legislature chooses to apply only the job placement criterion—as it has done for specific programs at the UC—continuation of state support for the academy might be justified.

⁸For example, Senate Appropriations and Assembly Ways and Means subcommittee hearings on recommendations of the Legislative Analyst, *Analysis of the 1984-85 Budget Bill*, pp. 1699-1702.

Summary of Options for the Legislature

In summary, we can identify three options for the Legislature in its consideration of the CMA:

(1) Eliminate state support of the CMA on the basis that the academy is not necessary to meet projected labor market demand for licensed deck and engineering officers, and thus is not cost-effective.

(2) Continue the existing level of state support of the CMA on the basis that its job placement success reflects superior productivity, thereby indicating that the academy is cost-effective.

(3) Continue to provide merchant marine officer training, but reduce the state's costs by increasing the level of CMA support provided by students and the industry, or by replacing the CMA with a comparable program at a CSU campus or a financial assistance program for students attending out-of-state maritime academies.

Recommendation

We recommend that the Legislature conduct an oversight hearing to review options for continuation, modification, or elimination of state support of the California Maritime Academy.

In our analysis, we were unable to acquire all of the data needed to recommend one of the three options identified above. This was due, in large part, to the difficulty of quantifying certain benefits (particularly those related to industry productivity) associated with the CMA. Thus, the Legislature will need additional information to fully explore which course of action to pursue. We believe that this information can be collected, and can be evaluated by the Legislature by means of an oversight hearing. This hearing should focus on the following informational needs and policy issues:

- The qualitative dimension of the training provided by the academy, and the feasibility of measuring this factor in quantitative terms so as to address the issue of industry productivity. We note, however, that even if additional data can be collected that demonstrate CMA's contribution to industry productivity, it is unlikely that this contribution can be expressed in monetary terms and thereby be compared to the fiscal benefits that would result from eliminating the academy.

- The appropriate criteria (specifically, labor market demand and/or job placement success) for evaluating the academy and the desirability of continuing state support.
- The feasibility of reducing state costs by (1) increasing the level of support provided by students and the industry, or (2) replacing the CMA with a comparable program at a CSU campus or a financial assistance program for students attending out-of-state maritime academies.

If the Legislature does choose to continue support of the CMA, we recommend that it establish statutory criteria to define more specifically the mission of the academy. We believe that, in evaluating the job placement success of the CMA, the labor market should be defined so as to include only sea-going billets in the merchant marine. We can find no compelling argument for the state to pay a premium to train CMA students for shore-based occupations in the maritime industry, when the same objective can be accomplished at a lower cost in the UC or CSU systems.

The Legislature should also consider the adoption of specific measures of success, with respect to placement of a minimum percentage of graduates in shipboard positions as merchant marine officers. These criteria could serve as the basis for a biennial review of the CMA, in a manner similar to the review required for community college vocational education programs.

We believe that an oversight hearing would provide a vehicle for the Legislature to consider the aforementioned options for evaluating the success of the CMA, and to further examine the alternatives to continuing the current level of state support of the academy.

Appendix

Table 1

**State and Federal Maritime Academies
Employment of Graduates**

Class of 1988

Academy	Seagoing Commercial		Maritime - Related Ashore		Non-Maritime Ashore		Navy/ Coast Guard		Other ^a		Total	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
California	45	71%	11	17%	3	5%	2	3%	3	5%	64	100%
Maine	48	47	10	10	25	24	19	18	1	1	103	100
Massachusetts	77	54	32	22	17	12	9	6	8	6	143	100
Michigan	13	72	—	—	1	6	—	—	4	22	18	100
New York	47	33	37	26	25	18	23	16	10	7	142	100
Texas	19	76	2	8	—	—	1	4	3	12	25	100
U.S.	<u>74</u>	<u>37</u>	<u>90</u>	<u>45</u>	<u>—</u>	<u>—</u>	<u>27</u>	<u>13</u>	<u>9</u>	<u>5</u>	<u>200</u>	<u>100</u>
Totals	323	46%	182	26%	71	10%	81	12%	38	5%	695	100%

^a Includes unemployed, license reexamination and graduate school. Sources: U.S. Maritime Administration and California Maritime Academy.

RECENT REPORTS OF THE LEGISLATIVE ANALYST

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The Child Development Program: A Sunset Review (February 1989), Report No. 89-5.

Analysis of the 1989-90 Budget Bill (February 1989). This report presents the results of our detailed examination of the Governor's Budget for 1989-90.

The 1989-90 Budget: Perspectives and Issues (February 1989). This report provides perspectives on the state's fiscal condition and the budget proposed by the Governor for 1989-90, and identifies some of the major issues facing the Legislature.

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