

Executive Summary Phase One Fitness Study

The Coast Guard Fitness Advisory Committee sought to determine the current fitness level of Coast Guard personnel using both the current Boat Crew Physical Fitness Standard and a proposed six element fitness assessment based on Boat Forces job task analysis.

Volunteers were solicited via ALCOAST, and 125 units with 1,050 members participated in the study. The participants were asked to take the Boat Forces test, and then at least 48 hours, but no more than 2 weeks later, were asked to take the proposed assessment. Testing for the Boat Forces test was administered by the Unit Health Promotion Coordinator and the proposed assessment was administered by the regional Health Promotion Manager. To accommodate all of the units operational commitments testing began 01 Aug and Concluded 13 Sept. This report contains the results of the testing. Significant findings are summarized as follows:

The proposed assessments appear to be comparable to the Boat Force Fitness Test in measuring general fitness levels. The proposed assessments also evaluate elements of fitness found to be essential to Coast Guard operations such as upper body pulling strength and power and certain types of mobility not measured by the Boat Forces Fitness Test. Specifically, results indicate the following;

- 1) The 300 yard shuttle appears to have a strong relationship with the 1.5 mile run, sit-up and push-up.
- 2) The inverted pull appears to have a strong relationship with the push-up, the sit-up and the 1.5 mile run.
- 3) Pull-ups appear to have a strong relationship with the push-up
- 4) The t-test appears to have a strong relationship with the 1.5 mile run.

Further analysis reveals that subjects who reported consistent exercise patterns for longer periods of time performed better on both the Boat Forces Fitness Test and the proposed assessments when compared to subjects with inconsistent exercise patterns.

Regression analysis indicates that performance on either the Boat Force Fitness Test or the proposed assessments could not predict injury. However, analysis revealed two factors that are associated with predicting injury in this population. Specifically, it appears that “years spent consistently exercising” and “time exercising per week” were associated with decreased risk of injury.

Finally, analysis indicated there was no significant difference among Unit types with respect to injury rates.

USCG Fitness Study: PHASE I Summary of Results

A Coast Guard fitness assessment study was conducted in Sept 2013. The study required participants to take the current Boat Forces Fitness Test consisting of:

- push-ups
- sit-ups and
- 1.5 mile run.

At least 48 hours later the members were required to take the proposed fitness test. The six elements were derived from a face validity study of the boat forces physical requirements and correlated to the assessments below.

- Pull –ups
- T-test
- Inverted row
- Side bridge
- Long jump
- 300 yard shuttle

Members were then asked to complete a survey which provided more in-depth demographics.

Included below are tables with results from the 1053 subjects who completed all 3 components of PHASE I (Boat Crew assessment, Proposed Assessment, Survey).

With respect to performance on Boat Force Fitness Test, we have included tables indicating pass and fail rates for each component (Tables 2-4) and all subjects (Table 5). Tables reflecting results on the proposed assessments include scores that are age and gender neutral (Table 6), gender neutral (Table 7), and gender and age specific (Tables 8-19).

Additionally, information regarding exercise and injury history are included (Tables 20-29).

Results indicate the proposed assessments are comparable to the Boat Force Fitness Test in measuring overall fitness. The proposed test also evaluates certain elements of fitness that were found to be essential to Coast Guard

operations such as upper body pulling strength, power, and certain types of mobility not measured by the Boat Forces Fitness Test.

Table 30 reveals the relationships between each of the proposed assessments and the Boat Force Fitness Assessments. Specifically, results indicate the following:

- 1) The 300 yard shuttle appears to have strong relationship with the 1.5 mile run, the T-test and to a lesser degree the inverted pull.
- 2) The inverted pull has a strong relationship with the push-up.
- 3) Pull-ups have a strong relationship with the inverted pull.
- 4) The push-up has a strong relationship with the sit-up.
- 5) The 1.5 mile run has a strong relationship with the sit-up and the push-up.

Further analysis reveals that subjects who reported consistent exercise patterns for longer periods of time performed better on both the Boat Forces Fitness Test and the proposed assessments when compared to subjects with inconsistent exercise patterns.

RELATIONSHIP BETWEEN TESTS, UNIT TYPE AND INJURY

Regression analysis indicates that performance on either the Boat Force Fitness Test or the proposed assessments could not predict injury. However, analysis revealed two factors that are associated with predicting injury in this population. Specifically, it appears that “years spent consistently exercising” and “time exercising per week” were associated with decreased risk of injury.

Finally, analysis determined there was no significant difference among Unit types with respect to injury rates.

Table 1: Boat Forces Fitness Requirements

Age	Push-ups (1 min)		Sit-ups (1 min)		1.5 Mile Run	
	Males	/ Females	Males	/ Females	Males	/ Females
Under 30	29	/ 15	38	/ 32	12:51	/ 15:26
30-39	24	/ 11	35	/ 25	13:36	/ 15:57
40-49	18	/ 9	29	/ 20	14:29	/ 16:58
50-59	13	/ 9	25	/ 16	15:26	/ 17:55
60	10	/ 9	22	/ 15	16:4	/ 18:44

Table 2: Push Up Pass Fail

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Pass	962	91.4	94.3	94.3
	Fail	58	5.5	5.7	100.0
	Total	1020	96.9	100.0	
Missing	System	33	3.1		
Total		1053	100.0		

Table 3: Sit-up Pass-fail

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Pass	794	75.4	78.7	78.7
	Fail	215	20.4	21.3	100.0
	Total	1009	95.8	100.0	
Missing	System	44	4.2		
Total		1053	100.0		

Table 4: 1.5 Mile Run Pass Fail

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Pass	758	72.0	76.0	76.0
	Fail	240	22.8	24.0	100.0
	Total	998	94.8	100.0	
Missing	System	55	5.2		
Total		1053	100.0		

Table 5: BF Test Results * Age Group Cross tabulation

		Age Group				Total
		< 30	30-39	40-49	50-59	
BC Test Results	Pass	313	305	82	11	711
	Fail	107	136	74	5	322
	22.00	1	0	0	0	1
Total		421	441	156	16	1034

PROPOSED FITNESS ASSESSMENTS**Table 6: Percentiles age and gender neutral**

	Percentiles						
	5	10	25	50	75	90	95
Pull ups	.00	.00	.00	3.00	7.00	11.00	13.00
Long Jump (inches)	50.20	58.00	68.00	77.00	85.00	92.00	96.00
T-Test seconds	16.50	15.40	14.00	12.60	11.70	11.00	10.60
Side Bridge total seconds	35.00	44.00	60.00	71.00	94.00	120.00	144.60
Inverted Pull	.00	2.00	5.00	9.00	12.00	16.00	17.00
300 yd shuttle total seconds	91.60	84.00	74.00	69.00	65.00	62.00	60.00

Table 7: Percentiles: Total Population (Gender Neutral) N=1053

		Age Group	Percentiles						
			5	10	25	50	75	90	95
Weighted Average(Definition 1)	Pull ups	< 30	.00	.00	.00	5.00	8.25	12.00	15.00
		30-39	.00	.00	.00	3.00	7.00	11.00	12.60
		40-49	.00	.00	.00	1.00	5.00	11.00	13.00
		50-59	.00	.00	.00	.00	.75	3.00	.
	Long	< 30	56.00	60.00	69.00	79.00	88.00	94.00	97.00
	Jump	30-39	43.20	56.20	68.00	76.00	84.00	91.00	95.00
	(inches)	40-49	49.50	53.00	63.25	74.00	79.38	85.50	90.75
		50-59	41.00	41.50	46.00	53.50	72.00	76.80	.
	T-Test	< 30	15.98	14.67	13.30	12.10	11.30	10.90	10.50
	seconds	30-39	16.88	15.70	14.00	12.90	12.00	11.10	10.54
		40-49	16.50	15.95	14.77	13.30	12.30	11.55	11.02
		50-59	.	20.44	17.80	15.05	14.00	13.64	13.60
	Side	< 30	36.00	45.00	60.00	74.50	95.00	120.00	146.10
	Bridge	30-39	33.40	44.00	60.00	70.00	92.00	121.00	147.60
	total	40-49	35.25	40.50	54.25	68.00	95.00	122.50	140.75
	seconds	50-59	35.00	36.40	54.25	67.50	83.75	91.40	.
	Inverted	< 30	.15	2.00	6.00	10.00	13.00	16.70	18.00
	Pull	30-39	.00	2.00	5.00	8.00	11.00	15.00	17.00
		40-49	.00	1.50	4.00	6.00	10.75	13.50	16.00
		50-59	.00	.10	1.00	3.50	6.00	8.70	.
	300 yd	< 30	85.00	79.00	72.00	67.00	63.00	61.00	59.00
	shuttle	30-39	92.80	83.20	74.00	69.00	66.00	63.00	61.00
	total	40-49	104.25	92.00	81.00	73.00	68.25	64.00	61.50
	seconds	50-59	.	101.60	96.50	84.50	75.25	68.50	68.00

MALES N=900**Table 8: Pull-ups**

		Percentiles: Male						
	Age group	5	10	25	50	75	90	95
Pull ups gender male	< 30	.00	.00	2.00	5.50	9.25	13.00	15.00
	30-39	.00	.00	1.00	4.00	8.00	11.00	13.00
	40-49	.00	.00	.00	2.00	5.00	11.00	13.00
	50-59	.00	.00	.00	.00	2.25	.	.

Table 9: Long Jump

		Percentiles: Male						
	Age group	5	10	25	50	75	90	95
Long jump inches gender male	< 30	61.50	65.00	72.50	81.00	89.00	95.00	98.00
	30-39	54.20	63.00	71.00	78.00	85.00	91.00	96.00
	40-49	51.75	58.00	67.75	75.00	80.25	86.00	91.25
	50-59	41.00	41.00	47.50	59.50	74.00	.	.

Table 10: T-Test

		Percentiles: Male						
	Age group	5	10	25	50	75	90	95
T-test seconds gender male	< 30	15.02	14.05	12.90	12.00	11.20	10.75	10.47
	30-39	15.86	14.82	13.60	12.70	11.90	11.00	10.50
	40-49	16.32	15.45	14.35	13.00	12.30	11.45	11.00
	50-59	.	.	18.17	14.35	14.00	13.60	13.60

Table 11: Inverted Pull

		Percentiles: Male						
	Age group	5	10	25	50	75	90	95
Inverted pull gender male	< 30	3.75	5.00	7.00	11.00	14.00	17.00	19.25
	30-39	2.00	4.00	6.00	9.00	12.00	15.00	17.00
	40-49	1.00	2.00	4.00	7.00	11.00	14.00	16.00
	50-59	.00	.00	3.00	4.00	6.00	.	.

Table 12: Side Bridge

		Percentiles: Male						
	Age group	5	10	25	50	75	90	95
Side bridge seconds gender male	< 30	40.00	47.00	60.00	75.50	95.00	148.75	148.75
	30-39	36.40	46.80	60.00	72.00	94.00	149.20	149.20
	40-49	36.00	44.00	55.00	69.50	95.50	143.50	143.50
	50-59	35.00	35.00	51.25	72.50	85.25		

Table 13: 300 Yard Shuttle

		Percentiles: Male						
	Age group	5	10	25	50	75	90	95
300 yd shuttle seconds gender male	< 30	78.25	74.50	71.00	66.00	63.00	61.00	59.00
	30-39	82.60	77.20	72.00	69.00	65.00	62.00	61.00
	40-49	94.75	87.00	78.25	72.00	68.00	64.00	61.00
	50-59	.	.	87.25	81.00	73.75	68.00	68.00

FEMALES N=139**Table 14: Pull-ups**

		Percentiles: Female						
	Age group	5	10	25	50	75	90	95
Pull ups gender female	< 30	.00	.00	.00	.00	.00	2.20	6.20
	30-39	.00	.00	.00	.00	.00	1.60	4.60
	40-49	.00	.00	.00	.00	.00	.90	.
	50-59	.00	.00	.00	.00	.00	00	00

Table 15: Long Jump

		Percentiles: Female						
	Age group	5	10	25	50	75	90	95
Long jump inches gender Female	< 30	49.00	52.60	57.00	63.00	68.50	77.80	83.60
	30-39	25.93	41.40	50.63	59.25	65.00	72.30	75.15
	40-49	.00	4.70	48.50	53.00	61.50	64.80	.
	50-59	46.00	46.00	46.00	48.00	.	.	.

Table 16: T-Test

		Percentiles: Female						
	Age group	5	10	25	50	75	90	95
T-test seconds gender female	< 30	17.68	16.92	14.70	14.00	12.70	12.18	11.78
	30-39	20.07	19.03	16.30	14.80	13.85	13.22	12.59
	40-49	.	18.47	16.92	15.30	14.85	13.95	13.90
	50-59	.	.	.	17.00	16.60	16.60	16.60

Table 17: Inverted Pull

		Percentiles: Female						
	Age group	5	10	25	50	75	90	95
Inverted pull gender female	< 30	.00	.00	.00	2.00	6.00	8.20	10.60
	30-39	.00	.00	.00	1.50	4.50	10.30	14.30
	40-49	.00	.00	.00	1.00	4.00	4.90	.
	50-59	.00	.00	.00	.00	.00		

Table 18: Side Bridge

		Percentiles: Female						
	Age group	5	10	25	50	75	90	95
Side bridge seconds gender female	< 30	16.60	34.40	47.00	66.00	90.00	105.80	116.00
	30-39	19.70	26.60	45.50	60.00	74.00	116.50	129.45
	40-49	25.00	26.00	35.75	63.00	89.75	130.10	
	50-59	56.00	56.00	56.00	61.50	.	.	

Table 19: 300 Yard Shuttle

		Percentiles: Female						
	Age group	5	10	25	50	75	90	95
300 yd shuttle seconds gender female	< 30	104.20	91.40	85.00	78.00	71.00	66.80	63.40
	30-39	126.20	113.20	94.75	82.00	75.25	71.00	68.85
	40-49	.	130.90	121.75	85.00	82.50	81.00	81.00
	50-59	.	.	.	99.00	96.00	96.00	96.00

EXERCISE HABITS**Table 20: How many times per week do you exercise?**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not Answered	2	.2	.2	.2
	None – I do not exercise	18	1.7	1.7	1.9
	1-2	158	15.0	15.2	17.1
	3-4	524	49.8	50.4	67.5
	5 or more	338	32.1	32.5	100.0
	Total	1040	98.8	100.0	
Missing	System	13	1.2		
Total		1053	100.0		

Table 21: How many years have you consistently (3-4 times per week) exercised?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not Answered	1	.1	.1	.1
	None – I have not exercised consistently	65	6.2	6.3	6.3
	Less than 1 year	90	8.5	8.7	15.0
	At least 1 year but less than 3 years	205	19.5	19.7	34.7
	At least 3 years but less than 5 years	168	16.0	16.2	50.9
	At least 5 years but less 10 years	220	20.9	21.2	72.0
	Greater than 10 years	291	27.6	28.0	100.0
	Total	1040	98.8	100.0	
Missing	System	13	1.2		
Total		1053	100.0		

Exercise activities most performed

RUNNING: 71.8%
 WEIGHT TRAINING: 65.1 %
 WALKING OR HIKING: 47%
 CARDIO: 39.1%
 FIELD SPORTS: 36.5%
 COURT SPORTS: 30.7%
 CROSS TRAINING: 30.5%

CYCLING	28.7%
SWIMMING	25%
GOLF:	16.8%
OTHER:	11.1%
MARTIAL ARTS/BOXING:	5.4%
SKATING	3.7%

Table 22: Do you enjoy exercising?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not Answered	120	11.4	11.5	11.5
	No (I hate it)	36	3.4	3.5	15.0
	Rarely	58	5.5	5.6	20.6
	Sometimes	241	22.9	23.2	43.8
	Often	342	32.5	32.9	76.6
	Always (I love it)	243	23.1	23.4	100.0
	Total	1040	98.8	100.0	
Missing	System	13	1.2		
Total		1053	100.0		

Table 23: Over the last year, how often did your workouts include running?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	<1 day/week (I don't run)	205	19.5	19.7	19.7
	1-3 days/week	679	64.5	65.3	85.0
	greater than or equal to 4 days/week	156	14.8	15.0	100.0
	Total	1040	98.8	100.0	
Missing	System	13	1.2		
Total		1053	100.0		

Table 24: Over the past year, how many miles did you run each week?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	I did not run	134	12.7	12.9	12.9
	<5 miles/week	363	34.5	34.9	47.8
	5-9 miles/week	329	31.2	31.6	79.4
	10-19 miles/week	160	15.2	15.4	94.8
	20-29 miles/week	40	3.8	3.8	98.7
	30-39 miles/week	12	1.1	1.2	99.8
	40-49 miles/week	2	.2	.2	100.0
	Total	1040	98.8	100.0	
Missing	System	13	1.2		
Total		1053	100.0		

LIMITED DUTY/INJURY

Table 25: Over the last year, have you been placed on limited duty for a muscle, bone, nerve, or joint problem?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	845	80.2	81.3	81.3
	Yes	195	18.5	18.8	100.0
	Total	1040	98.8	100.0	
Missing	System	13	1.2		
Total		1053	100.0		

Table 26: How many weeks of physical training (physical activity) did you miss due to this problem?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Less than 1 week	31	2.9	15.8	15.8
	At least 1 week but less than 2 weeks	23	2.2	11.7	27.6
	At least 2 weeks but less than 4 weeks	35	3.3	17.9	45.4
	At least 4 weeks but less than 8 weeks	45	4.3	23.0	68.4
	At least 8 weeks but less than 6 months	44	4.2	22.4	90.8
	At least 6 months but less than 12 months	12	1.1	6.1	96.9
	Greater than 12 months	6	.6	3.1	100.0
	Total	196	18.6	100.0	
Missing	System	857	81.4		
Total		1053	100.0		

Table 27: Do you experience pain due to this problem?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	39	3.7	19.9	19.9
	Yes	157	14.9	80.1	100.0
	Total	196	18.6	100.0	
Missing	System	857	81.4		
Total		1053	100.0		

Table 28: Are you currently on limited duty or seeking medical care for this problem?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	146	13.9	74.5	74.5
	Yes	50	4.7	25.5	100.0
	Total	196	18.6	100.0	
Missing	System	857	81.4		
Total		1053	100.0		

Table 29: In the past 5 years have you had a significant injury or painful event that caused you to seek medical care or limit physical activities greater than 7 days?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	603	57.3	58.0	58.0
	Yes	437	41.5	42.0	100.0
	Total	1040	98.8	100.0	
Missing	System	13	1.2		
Total		1053	100.0		

INJURY TYPE

Of those claiming an injury in the past 5 years...

Lower Back	19.7%
Knee	18.8%
Foot/Ankle	17.1%
Shoulder	16.0%
Upper Back/Head/Neck	9.7%
Elbow/Wrist/Hand	9.1%
Hip/Thigh	5.4%
Lower Leg	4.5%

BOAT CREW AND BETA TEST CORRELATIONS

Table 30: Test Correlations

		Push Up	Sit Up	1.5 mile total seconds	Pull ups	Long Jump (inches)	T-Test seconds	Side Bridge total seconds	Inverted Pull	300 yd shuttle total seconds
Push Up	Pearson Correlation	1	.584**	-.486**	.429**	.365**	-.389**	.353**	.585**	-.431**
	Sig. (2-tailed)		.000	.000	.000	.000	.000	.000	.000	.000
	N	2247	2243	2179	1712	1700	1606	1674	1712	1597
Sit Up	Pearson Correlation	.584**	1	-.532**	.327**	.311**	-.367**	.350**	.476**	-.439**
	Sig. (2-tailed)	.000		.000	.000	.000	.000	.000	.000	.000
	N	2243	2251	2182	1712	1700	1606	1675	1712	1597
1.5 mile total seconds	Pearson Correlation	-.486**	-.532**	1	-.307**	-.338**	.424**	-.351**	-.497**	.584**
	Sig. (2-tailed)	.000	.000		.000	.000	.000	.000	.000	.000
	N	2179	2182	2186	1659	1650	1561	1622	1659	1551
Pull ups	Pearson Correlation	.429**	.327**	-.307**	1	.070**	-.307**	.292**	.533**	-.353**
	Sig. (2-tailed)	.000	.000	.000		.003	.000	.000	.000	.000
	N	1712	1712	1659	1785	1770	1664	1743	1781	1656

		Push Up	Sit Up	1.5 mile total seconds	Pull ups	Long Jump (inches)	T-Test seconds	Side Bridge total seconds	Inverted Pull	300 yd shuttle total seconds
Long Jump (inches)	Pearson Correlation	.365**	.311**	-.338**	.070**	1	-.497**	.189**	.462**	-.443**
	Sig. (2-tailed)	.000	.000	.000	.003		.000	.000	.000	.000
	N	1700	1700	1650	1770	1775	1659	1734	1771	1651
T-Test seconds	Pearson Correlation	-.389**	-.367**	.424**	-.307**	-.497**	1	-.217**	-.485**	.546**
	Sig. (2-tailed)	.000	.000	.000	.000	.000		.000	.000	.000
	N	1606	1606	1561	1664	1659	1670	1635	1666	1604
Side Bridge total seconds	Pearson Correlation	.353**	.350**	-.351**	.292**	.189**	-.217**	1	.453**	-.307**
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000		.000	.000
	N	1674	1675	1622	1743	1734	1635	1747	1745	1627
Inverted Pull	Pearson Correlation	.585**	.476**	-.497**	.533**	.462**	-.485**	.453**	1	-.519**
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000		.000
	N	1712	1712	1659	1781	1771	1666	1745	1785	1658

		Push Up	Sit Up	1.5 mile total seconds	Pull ups	Long Jump (inches)	T-Test seconds	Side Bridge total seconds	Inverted Pull	300 yd shuttle total seconds
300 yd shuttle total seconds	Pearson Correlation	-.431**	-.439**	.584**	-.353**	-.443**	.546**	-.307**	-.519**	1
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000	.000	
	N	1597	1597	1551	1656	1651	1604	1627	1658	1663

** . Correlation is significant at the 0.01 level (2-tailed).

Correlation Strength & Relationship Guide

If $r = +.70$ or higher Very strong positive relationship

+.40 to +.69 Strong positive relationship

+.30 to +.39 Moderate positive relationship

+.20 to +.29 weak positive relationship

+.01 to +.19 No or negligible relationship

-.01 to -.19 No or negligible relationship

-.20 to -.29 weak negative relationship

-.30 to -.39 Moderate negative relationship

-.40 to -.69 Strong negative relationship

-.70 or higher Very strong negative relationship