Strength Training For Women Rowers

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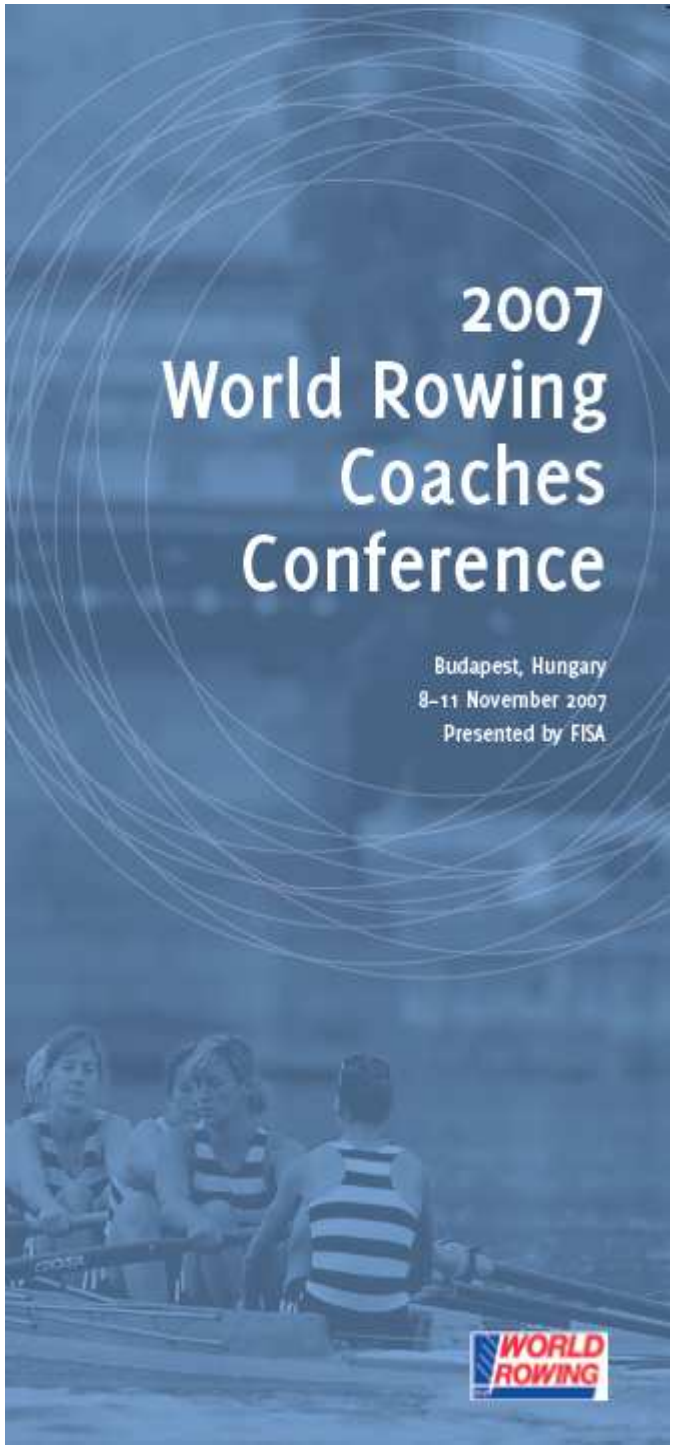
ROWING AUSTRALIA



Competitive Rowing for Heavyweight = Open Women's Category

Rowing is a sport of "Optimal"(s)
in a variety of boat classes
(5 Olympic + 1 Non Olympic)

Rowing (speed) is a sport of high averages where available maximum speed could make the difference

Competitive rowing winners are attaining very high (optimal) averages

High rowing performances are achieved by outstanding individuals

Rowing Crew environment brings together individuals in a complementary approach

Genetic Limitations for women in:

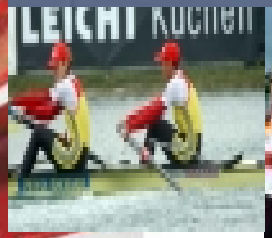
•body size(compare to men)

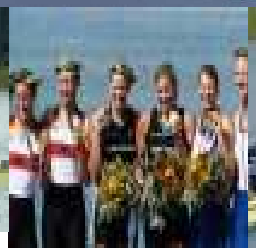
•functional (way of delivering power)
- psychology
- weaknesses

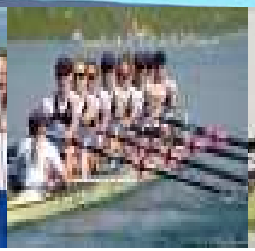
Women's Rowing in the 1980's

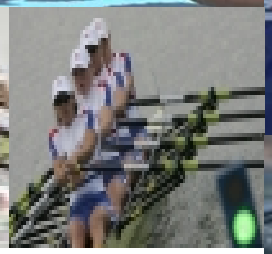
Women's Rowing in the 1990's

Women's Rowing in Our Day









Today's Rowing Women

ANTHROPOMETRICAL REQUIRED ATTRIBUTES - RECRUITING

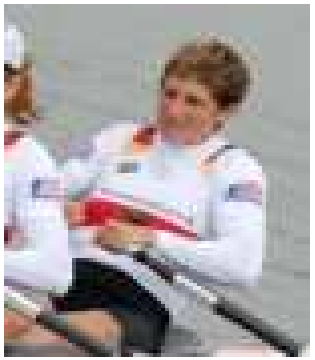
1980 - 1988

HWT WOMEN

1		2		3	
HEIGHT(cm)	%	SPAN(cm)	%	WEIGHT(Kg)	%
188	104.44	194	104.30	11	88.30
187	103.89	193	103.76	10	89.25
186	103.33	192	103.23	9	90.22
185	102.78	191	102.69	8	91.21
184	102.22	190	102.15	7	92.22
183	101.67	189	101.61	6	93.26
182	101.11	188	101.08	5	94.32
181	100.56	187	100.54	4	95.40
180	**100.00**	**186**	**100.00**	**[H-100]+3-7**	**100.00**
179	99.44	185	99.46	-8	90.00
178	98.89	184	98.92	-9	88.75
177	98.33	183	98.39	-10	87.50
176	97.78	182	97.85	-11	86.25
175	97.22	181	97.31	-12	85.00
174	96.67	180	96.77	-13	83.75
173	96.11	179	96.24	-14	82.50
172	95.56	178	95.70	-15	81.25
171	95.00	177	95.16	-16	80.00
170	94.44	176	94.62	-17	78.75
169	93.89	175	94.09	-18	77.50
168	93.33	174	93.55	-19	76.25

[(1)+(2)+(3)]/3		%			
		MINIMUM %			
AGE Y.O.	19	99.0			
	18	98.5			
	17	98.0			
	16	97.5			
	15	97.0			

LWT WOMEN (> 18)					
176+/- 5	100	+ (4 - 6)	100	62*	[+2-2]



ANTHROPOMETRICAL REQUIRED ATTRIBUTES - RECRUITING

2005 -2012

HWT WOMEN

1		2		3	
HEIGHT(cm)	%	SPAN(cm)	%	WEIGHT(Kg)	%
194	104.44	200	104.17	4	88.30
193	103.89	199	103.65	3.5	89.25
192	103.33	198	103.13	3	90.22
191	102.78	197	102.60	2.5	91.21
190	102.22	196	102.08	2	92.22
189	101.67	195	101.56	1.5	93.26
188	101.11	194	101.04	1	94.32
187	100.56	193	100.52	0.5	96.51
186	**100.00**	**192**	**100.00**	**[H-100]From: -4 - (-14)**	**100.00**
185	99.44	191	99.48	-13	90.00
184	98.89	190	98.96	-14	88.75
183	98.33	189	98.44	-10	87.50
182	97.78	188	97.92	-11	86.25
181	97.22	187	97.40	-12	85.00
180	96.67	186	96.88	-13	83.75
179	96.11	185	96.35	-14	82.50
178	95.56	184	95.83	-15	81.25
177	95.00	183	95.31	-16	80.00
176	94.44	182	94.79	-17	78.75
175	93.89	181	94.27	-18	77.50
174	93.33	180	93.75	-19	76.25

[(1)+(2)+(3)]/3		%			
		MINIMUM %			
AGE Y.O.	19	99.0			
	18	98.5			
	17	98.0			
	16	97.5			
	15	97.0			

LWT WOMEN (> 18)					
176+/- 5	100	+ (4 - 6)	100	62*	[+2-2]

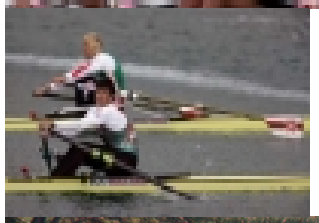
Rowing Forces

✓ …**Maximal force** applied to the oar handle can be evaluated using the table

Force Max.(N)	Very Low (Less than)	Low (Less than)	Average	High (More than)	Very High (More than)
Men Scull	593	680	766	853	940
M.Light Scull	579	636	692	749	805
Men Sweep	491	581	671	761	850
M.Light Sweep	467	528	590	652	714
Women Scull	394	471	547	624	701
W.Light Scull	355	416	477	538	599
Women Sweep	345	412	479	547	614

✓ …**Average force** applied to the oar handle during the drive phase can be evaluated using the table:

Force Aver.(N)	Very Low	Low	Average	High	Very High
Men Scull	308	356	405	454	502
M.Light Scull	284	322	360	398	435
Men Sweep	242	286	331	376	421
M.Light Sweep	224	259	294	329	364
Women Scull	194	240	286	332	378
W.Light Scull	189	221	253	285	317
Women Sweep	169	203	238	273	307



Applied Forces in women's rowing

Boat	Time	Body Weight	Height	Power	Rate	Angle	Fmax	Fav
W1x	7:07.7	85	1.85	410	34.1	107	74.8	38.9
W2x	6:38.8	80	1.85	390	35.9	107	67.6	35.1
W4x	6:10.8	80	1.85	392	37.4	110	65.4	34.0
W2-	6:53.8	85	1.85	394	37.4	87	65.6	34.1
W8+	5:55.5	80	1.85	397	39.1	89	63.3	32.9
LW2x	6:49.8	60	1.70	324	36.1	99	60.7	31.6

Women's Rowing – Required Qualities

1.Anthropometric:

1.1 Body Sizes

1.2 Body Composition

2. Functional:

2.1 Endurance = > 80%

2.2 Strength

2.3 Speed

2.4 Balance and Coordination

3. Attitude and Commitment

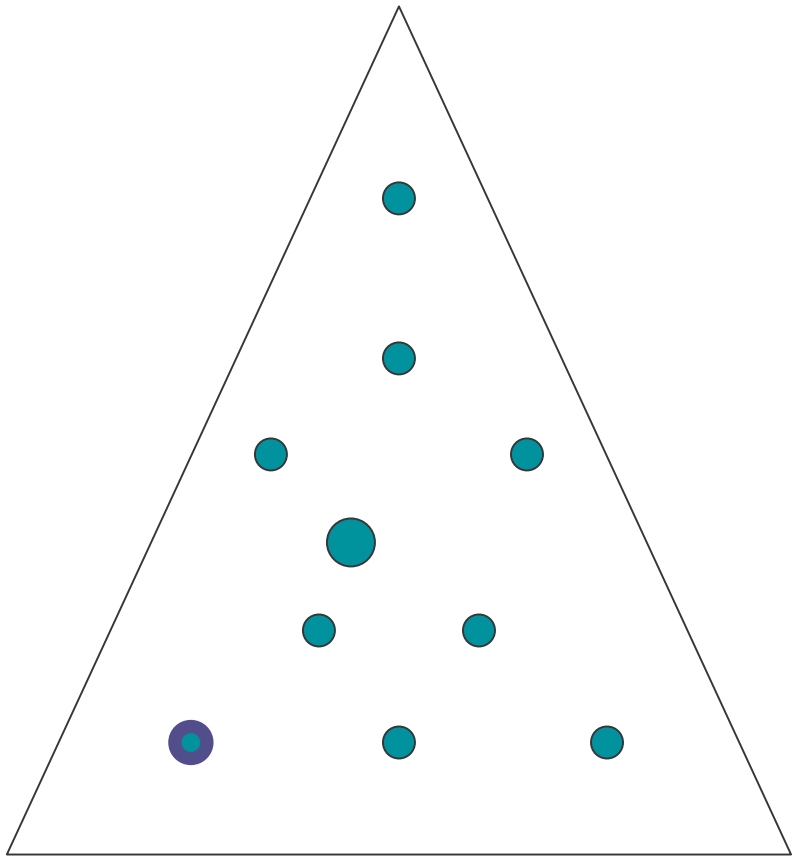
Rowing versus Other Sports

DIFFERENT SPORTS/EVENTS WITH SIMILAR COMPETTITION TIME		
I	RUNNING	< 200 m
	CYCLING	200 M
II	SWIMMING	100 m
	RUNNING	400 m
	SKATING	500 m
	CANOEING	200 m
III	SWIMMING	200 m
	RUNNING	800 m - 1000 m
	SKATING	1000 -1500 m
	CANOEING	500 m
IV	ROWING	1000 m
	CANOEING	1000 m
	SWIMMING	400 m
	SKATING	3000 m
	RUNNING	1500 m
V	ROWING	2000 m
	SWIMMING	800 m
	RUNNING	3000 m
	SKATING	5000 m
VI	RUNNING	5000m-10000m
	SKATING	10000 m
	SWIMMING	1500 m
	SKIING	5000 m
	ROWING	> 5000 m
VII	CANOEING	10000 m
	SKIING	10000 m
VIII	CYCLING	100 km
	MARATHON	42.195 m
	SKIING	30 km
IX	SKIING	>50 km
	CYCLING Road	>175 km

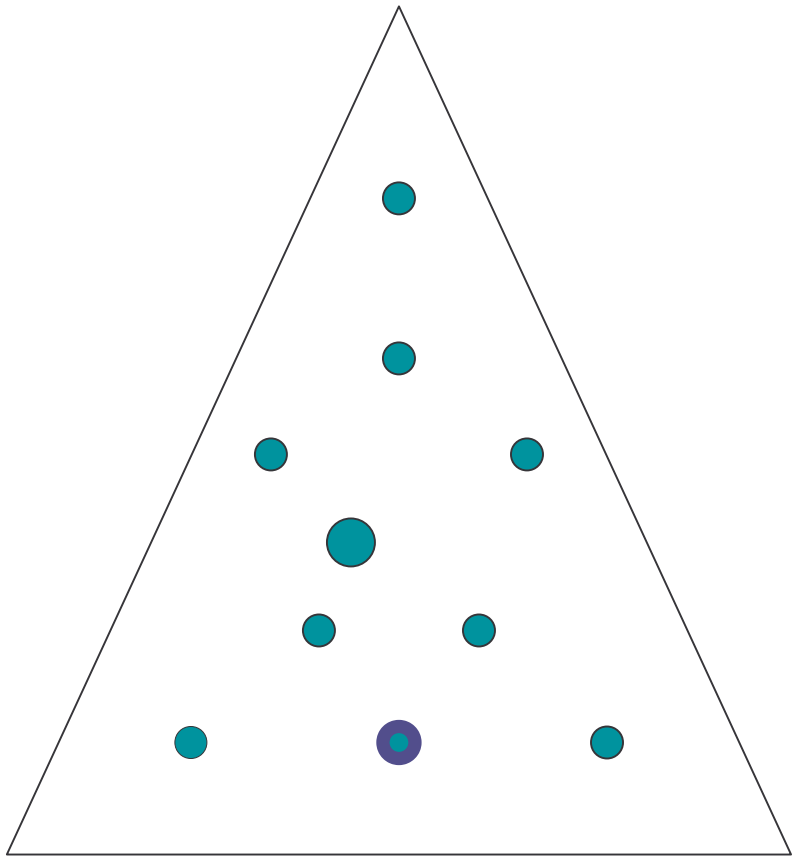
FATIGUE

IN DIFFERENT SPORTS / EVENTS

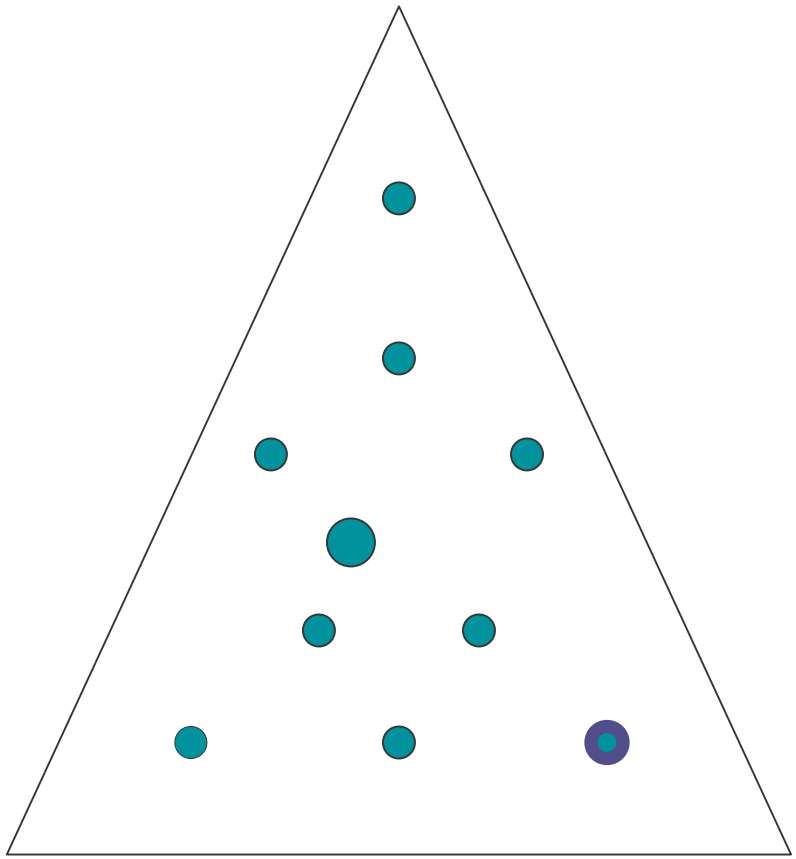
SPORT / EVENT	NEURAL FACTORS	DEPLEITE ATP/CP	MUSCLE LACTIC ACID	DEPLETED GLYCOGEN	DEPLEITE BLOOD GLUCOSE	HYPERTHERMIA
TRACK AND FIELD						
100m;200m	X	X				
400m		X	X			
800m;1500m		X	X			
5000m;10000m			X	X		
CYCLING						
200m/kierin	X	X				
1000m	X	X	X			
kierin-time trials			X	X	X	
Track endurance			X	X	X	
MARATHON				X	X	X
TRIATHLON				X	X	X
VAULTING	X					
THROWING	X					
BOXING	X	X	X			
DIVING	X					
FENCING	X	X				
GYMNASTICS	X	X				
JUDO	X	X				
CANOEING						
500m;1000m		X	X			
10000m			X	X		
ROWING						
2000m		X	X	X		
SHOOTING	X					
SWIMMING						
100m;200m;400m		X	X			
800m;1500m			X	X		
VOLLEYBALL	X					
HANDBALL	X	X	X			
WRESTLING	X	X				
WEIGHTLIFTING	X					
BASKETBALL	X	X				



Weightlifting
- Mostly Strength
- Other Sports
  - Power lifting

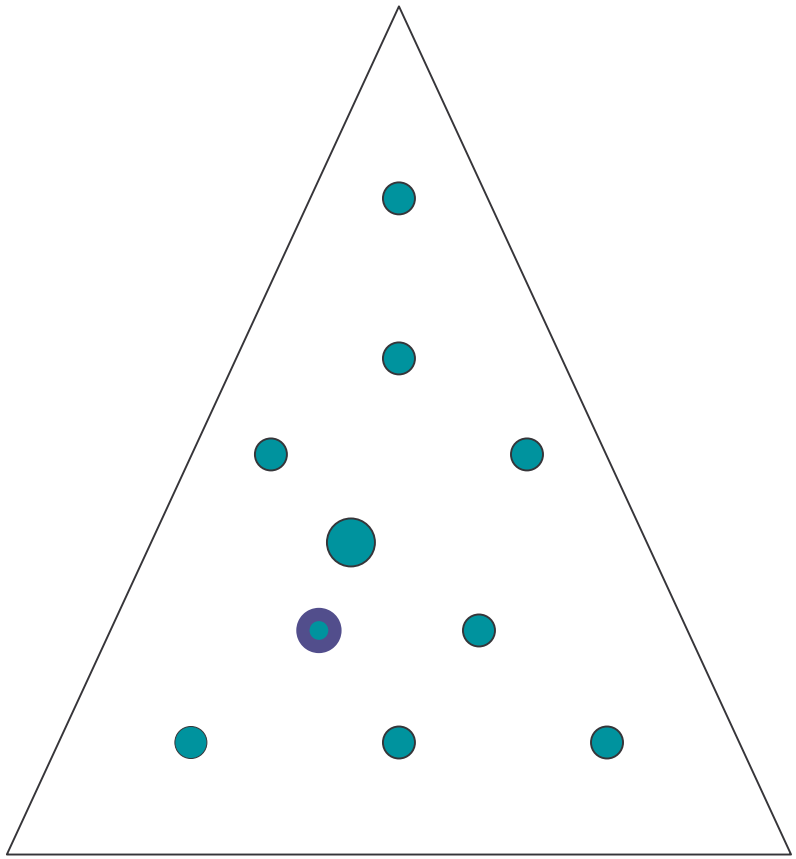


Sprint Cycling
•Combination of Strength and Speed
•Power



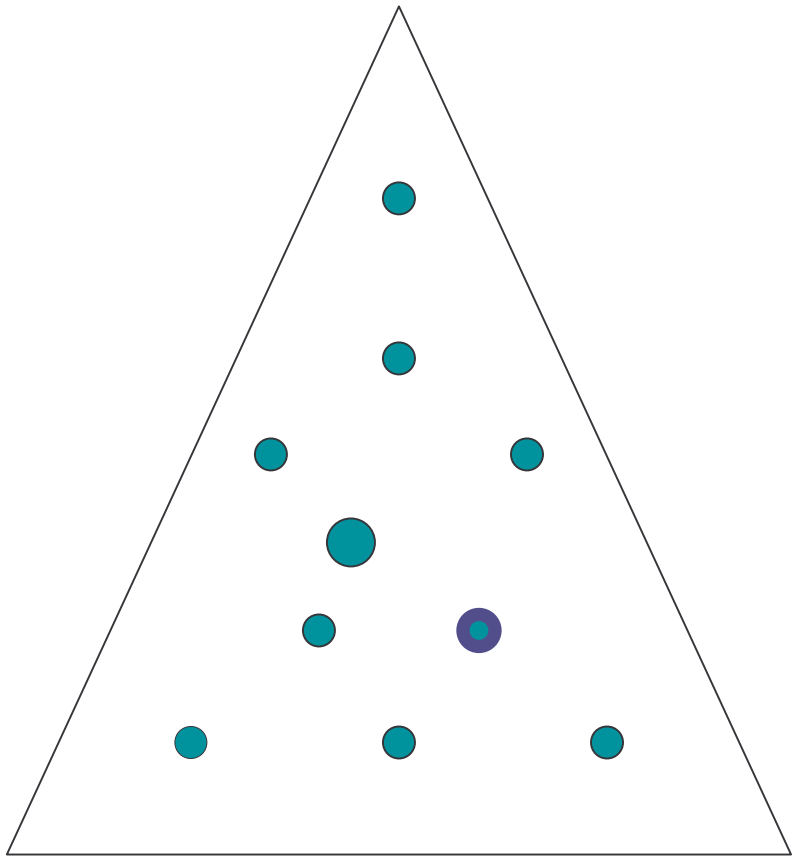
Athletics - Sprinting

- Mostly Speed
- Other Events Include:
  - Fencing
  - Martial Arts



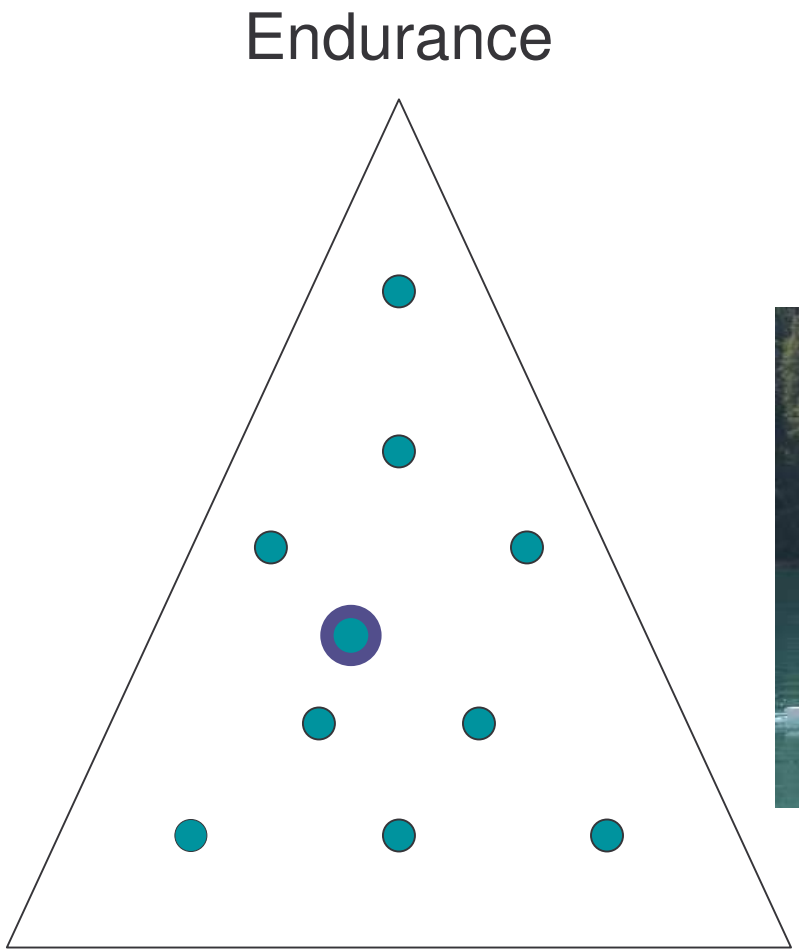
Sprint Kayak

•Lots of Strength, Some Speed, Some Endurance



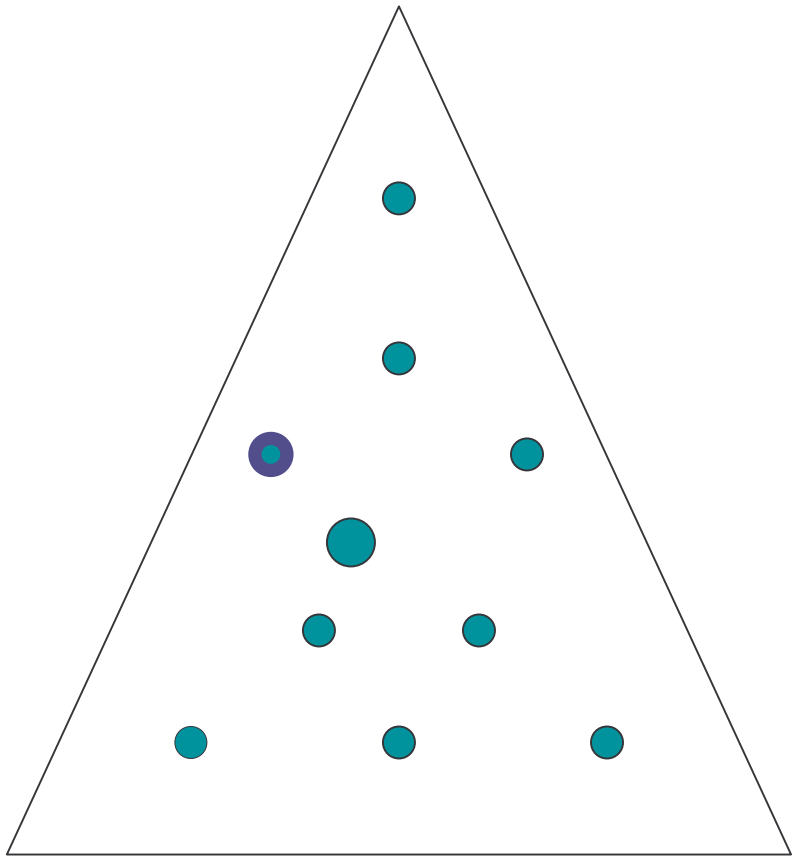
Sprint Swimming

•Lots of Speed, Some Strength, Some Endurance



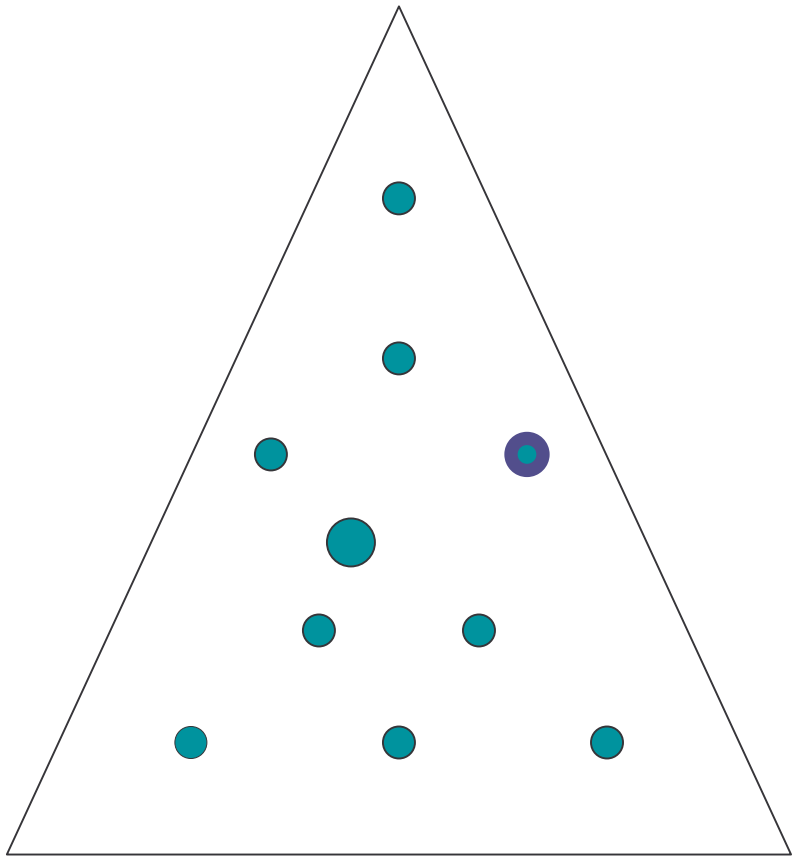
Rowing

- Some Strength, Some Speed, Some Endurance
- Other Sports
  - Team Sports



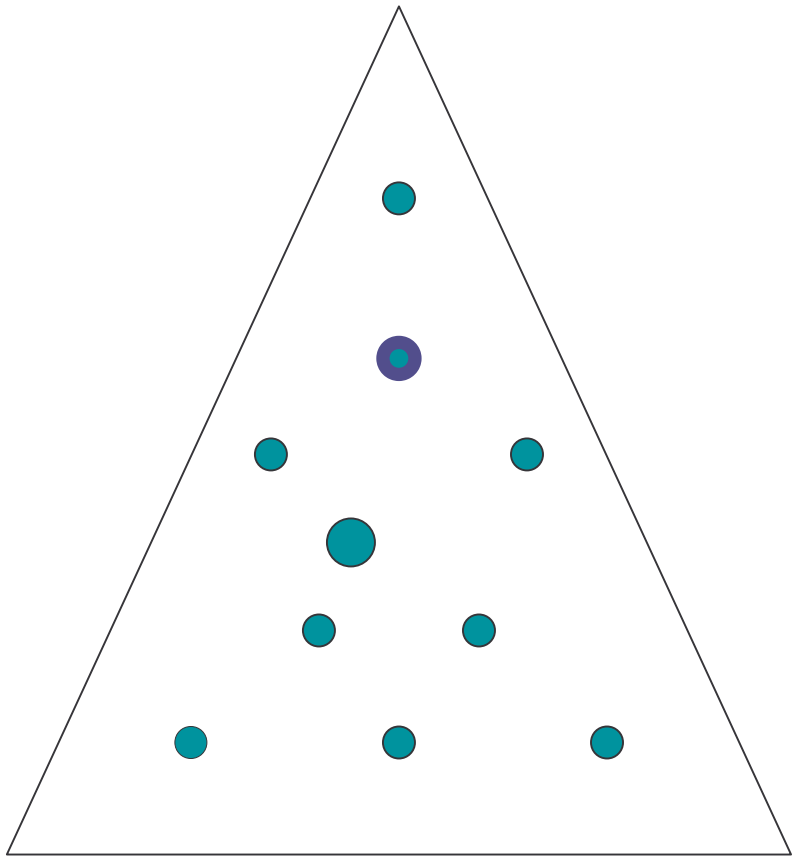
Sailing

- Combination of Strength and Endurance
- Other Sports
  - Wrestling



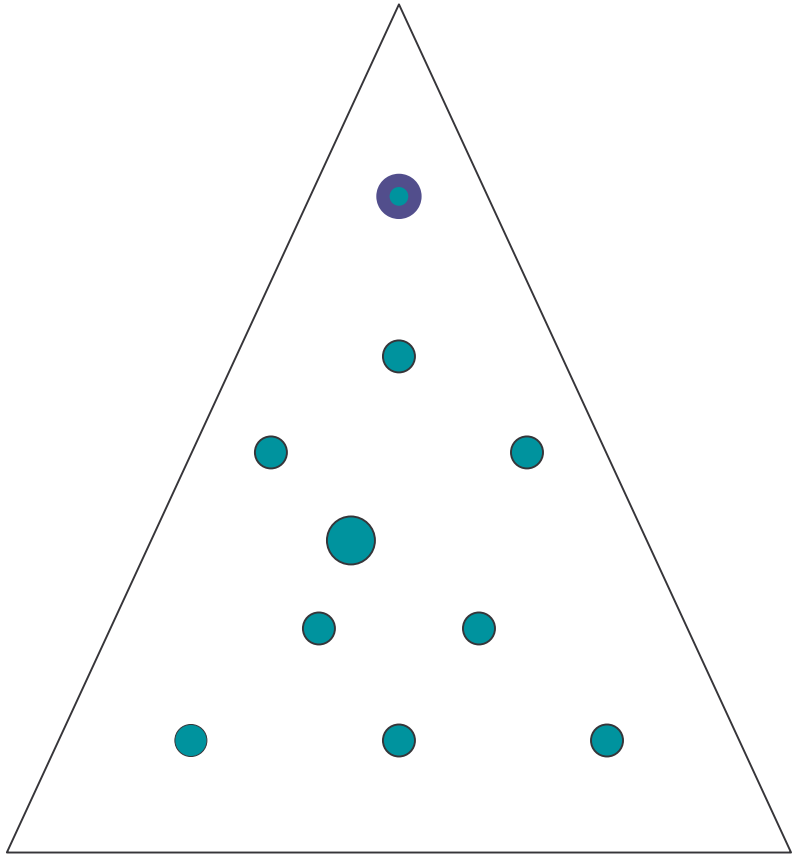
Middle Distance

- Combination of Speed and Endurance
- Other Sports:
  - Speed Skating



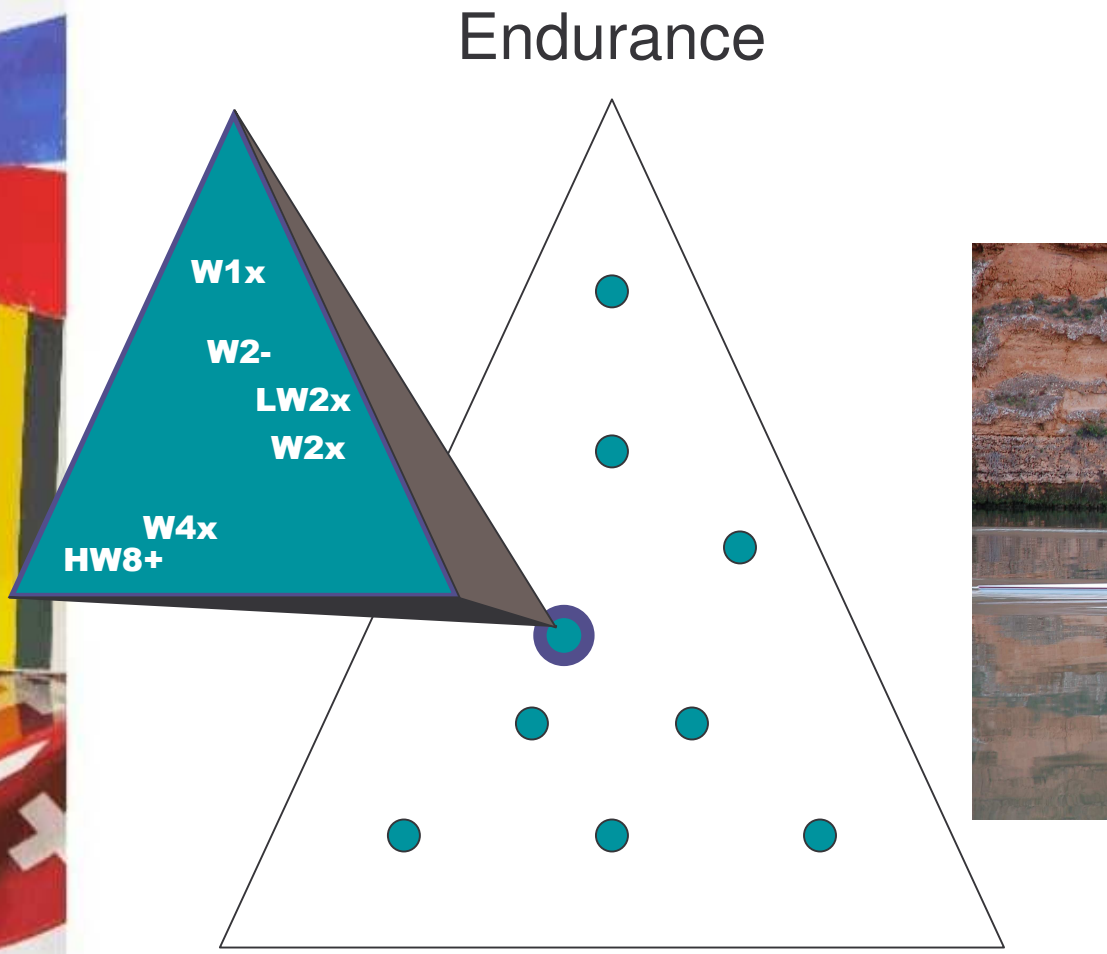
Road Cycling

- Mostly Endurance, Some Speed and Strength
- Other Sports:
  - Cross Country Skiing



Marathon

- Mostly Endurance
  - Other events: Road Cycling; Iron Women


Endurance
W1x
W2-
LW2x
W2x
W4x
HW8+
Strength
Speed

Strength and Conditioning
General Considerations

Endurance

- Aerobic Capacity:
  Transport and Utilize the O2 (VO2 max and Muscle Adaptation)
- Anaerobic Capacity:
  improvement by increasing the rate of glycolysis and lactate tolerance.
- Strength:
  the right balance in rowing with both important:
  - mass and
  - accelerations

Strength

•Maximum Strength versus relative Strength

•General Strength versus Specific Strength

•Strength x Speed = Power

•Strength Training Methods

Planning Considerations

• Training yearly plans and periodization: Tasks & Considerations

•Training for developmental elite athletes

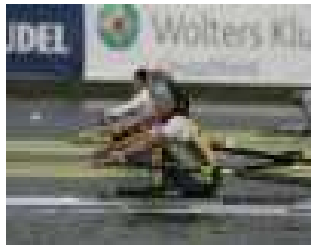
•Training for experienced elite athletes

•Specificity and individualization

•Training to train, compete, win.

Strength and Conditioning: Roles and Responsibilities

- Provide physical preparation support in the areas of:
  - Injury Prevention
  - Injury Rehabilitation
  - Anatomical Adaptation
  - Strength Development
  - Power and Speed Development



- Liase with head coach to design strength training program in association with on water/ergo program to maximise strength training adaptations.
- Liase with medical support staff to individualise strength training programs to optimise outcomes.

Strength and Conditioning: Identification of Areas to Address

***Example** – Individual athlete physical requirements/deficiencies.*

Step 1

- **What?** Identification: Boat Class, Technical deficiencies due to physical ability, Injury history, Strength training history.

Step 2

- **Who?** Consultant/s: Coach, Biomechanist, Doctor, Physiotherapist, Strength and conditioning coach.

Step 3

- **When?** Timing of Strength Training: Determined by Annual Plan

Step 4

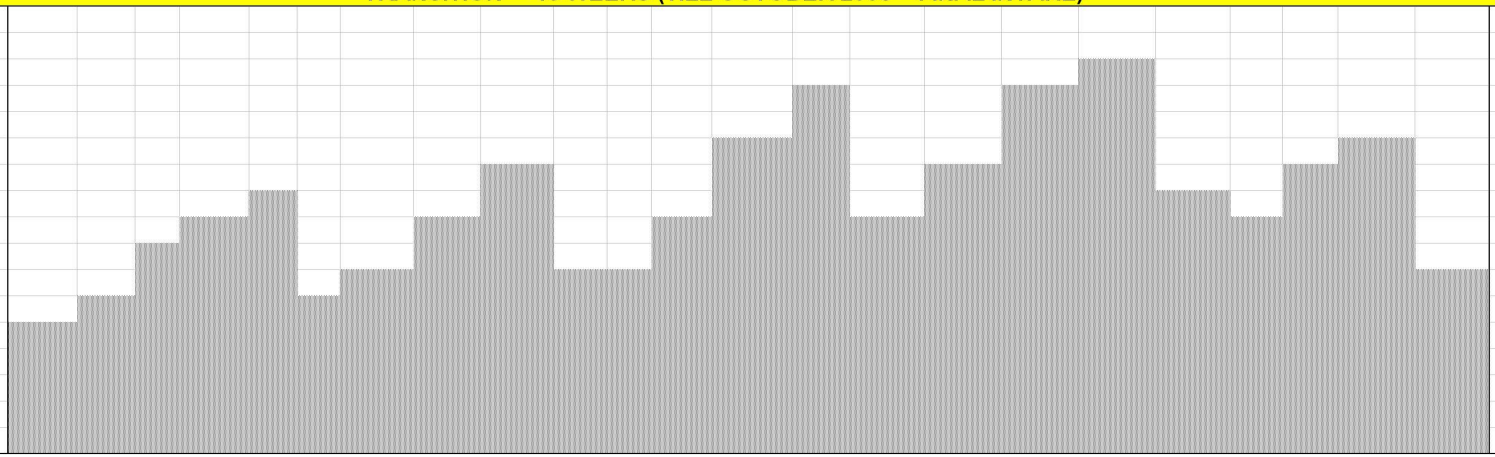
- **Why?** Specificity: Sculling v Sweep, Poor power transfer, Predisposed to injury, Limited strength training options

Annual Training Plan

2005 - 2006 SASI ROWING PROGRAM

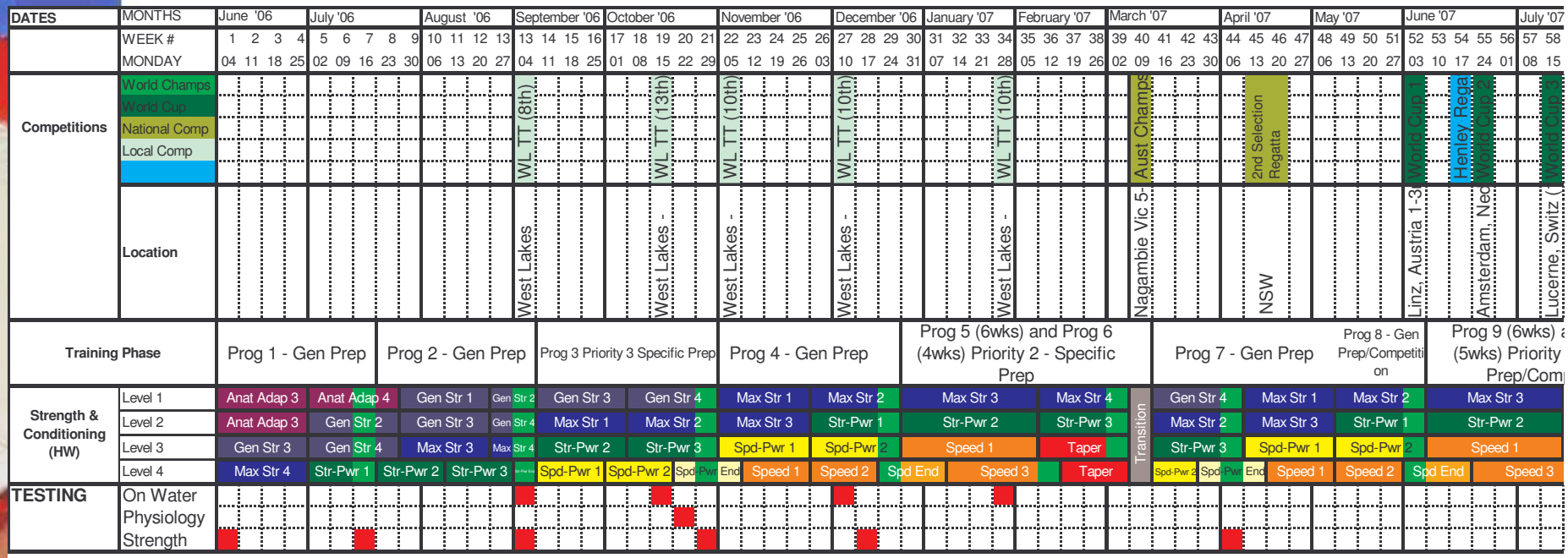
JUNE 20th - OCTOBER 16th 2005

TRANSITION = 19 WEEKS (TILL OCTOBER 2005 = FINAL INTAKE)



WEEK #	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	19		WEEK-END
WEEK-END	12-Jun	19-Jun	26-Jun	03-Jul	10-Jul	17-Jul	24-Jul	31-Jul	07-Aug	14-Aug	21-Aug	28-Aug	04-Sep	11-Sep	18-Sep	25-Sep	02-Oct	09-Oct	16-Oct	23-Oct	30-Oct	06-Nov	13-Nov	WEEKS		
TESTS		ERGO 6000					ERGO 6000				ERGO 6000					ERGO 6000				LAB TESTING 2 IR 1 SJ+2km(All Athletes)				TOTAL		TEST
NTC Time Trials; EVENTS	NTCTT # 1 4.8 KM-SB					NTCTT # 2 4.8 KM-SB				NTCTT # 3 4.8 KM-SB					NTCTT # 4 4.8 KM-SB				NTCTT # 5 4.8 KM-SB		SASI FINAL INTAKE - 2006 Squad Announcement		NTCTT # 6 4.8 KM-SB (Qualifier)			RACE& REGATTAS
International EVENTS		FISA WORLD CUP- Munich			FISA WORLD CUP- Luzern		World Under 23 Championships Amsterdam, Nederland		World Junior Championships: Brandenburg, Germany				World Championships- GIFU, Japan													
KM	40	40	50	60	70	40	50	60	70	44	55	60	70	44	54	60	54	64	74	72	62	62	50	1305	100%	KM
BOAT	30	30	40	50	54	34	42	48	58	36	45	48	58	36	42	48	42	48	64	60	50	50	42	1055	80.84%	BOAT
ERGO	10	10	10	10	16	6	8	12	12	8	10	12	12	8	12	12	12	16	10	12	12	12	8	250	19.16%	ERGO
SESSIONS	12	12	12	13	11	8	12	13	13	10	12	13	13	10	12	12	13	11	9	12	11	11	8	263	100%	SESSIONS
BOAT	3	3	3	4	4	3	3	4	4	3	3	4	4	3	3	3	4	4	4	4	3	3	3	79	30.04%	BOAT
GYM+ERGO	3	3	3	3	2	1	3	3	3	2	3	3	3	2	3	3	3	2	1	3	3	3	1	59	22.43%	GYM+ERGO
SWIM	2	2	2	2	1	1	2	2	2	1	2	2	2	1	2	2	2	1	1	1	1	1	1	36	13.69%	SWIM
BIKE	2	2	2	2	2	1	2	2	2	2	2	2	2	2	2	2	2	2	1	2	2	2	1	43	16.35%	BIKE
RUN	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	23	8.75%	RUN
RECOVERY	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	23	8.75%	RECOVERY

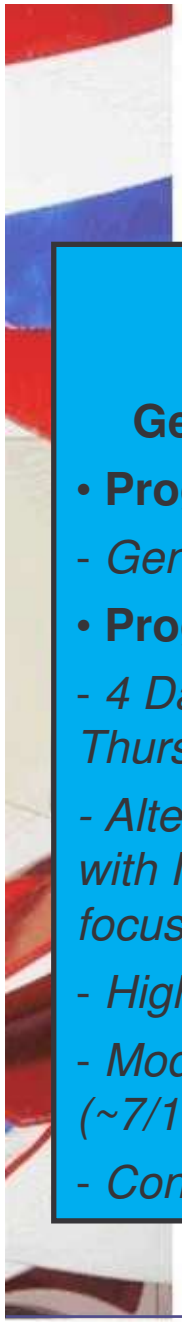
Strength and Conditioning: Annual Plan



Program Level Selection Criteria:
Strength Test Results (relative to body weight)

		Lower body		Upper body	
	Program Level	Squat //	Deadlift	Press	Pull
Train to Train	1	0.00	0.00	0.00	0.00
Train to Train	2	1.00	1.00	0.59	0.60
Train to Compete	3	1.33	1.50	0.79	0.80
Train to win	4	2.00	2.00	1.00	1.00

Strength and Conditioning: Progression and Variation



Program 1

(level 3)

General Preparation

- **Program Goal**

- General Strength

- **Program Structure**

- 4 Days/wk (Mon, Tues, Thurs, Fri),

- Alternate heavy/light split with Injury prevention focus.

- High Volume

- Moderate Intensity (~7/10)

- Controlled Velocity.

Program 2

(level 3)

General Preparation

- **Program Goal**

- Max Strength

- **Program Structure**

- 4 Days/wk (Mon, Tues, Thurs, Fri),

- Alternate heavy/light split with Max Strength focus.

- Moderate Volume

-High Intensity (~9/10)

- Slow Velocity (due to load).

Program 3

(level 3)

Specific Preparation

- **Program Goal**

- Max Strength Power

- **Program Structure**

- 4 Days/wk (Mon, Tues, Thurs, Fri),

- Alternate heavy/light split with Max Strength focus.

- Moderate Volume

-Mon,Thurs - High Intensity (~9/10), Tues,Fri - Moderate Intensity (~7/10)

- Maximum Velocity (load dependent).

Strength Training - Means

LAND

- ***Ergometers (Concept II; Rowperfect) - drag***

- ***Ergometer Concept Dyno***

- ***Various Gym Programs***

- ***Other (bikes; uphill run; stairs; swimming)***

- ***Other (games; multi event – triathlon)***

Strength

- Maximum Strength versus relative Strength

- General Strength versus Specific Strength

- Strength x Speed = Power

- Strength Training Methods

BOAT

- *Rigging (heavier – lighter)*

- *Rowing on big boat - reduced crew #'s*

- *Rowing Upstream - Downstream*

- *Power Strokes – devices*

- *Speed Boat Towing*

Strength and Conditioning: Plan and Execution

GYM TRAINING

-Typical Rowing Land Training = 8 – 18 exercises

- Strength &Conditioning specialists = + 200 exercises

- Specialized Programs: Visual Training = + 8000 exercises

Injury Prevention & Rehabilitation

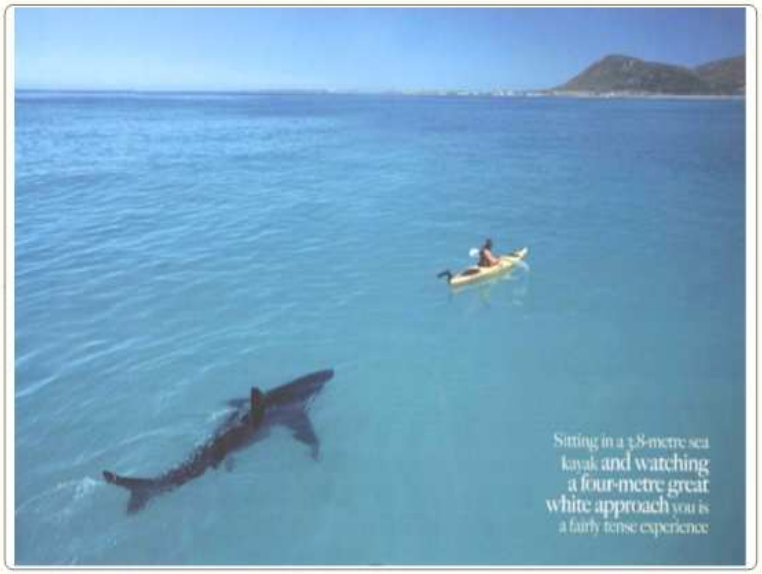
Injury Rehabilitation

INJURED ATHLETE

Coach
- Designs Individualised Programme, Supervise & Monitor Daily Training & Athletes Recovery

Doctor
- Assessment & Recommendations

Strength & Conditioning
Specific Rehabilitation & Individualised Exercises



Physiotherapist
- Assessment
- Recommended Exercises / Routines

Physiologist
-Modified Testing

Psychologist
Individual Planning & Consultation for return to DTE

Injury Prevention Exercises

- Abdominal/Core
  - Hanging Tuck with Rotation
- Lower back
  - Supine Brace <45^0 with Chest fly
- Shoulder
  - Single Arm Body Blade Shoulder Flexion/Extension
- Glutealis
  - SL Squat on Box Edge

Injury Prevention - Ball Exercises

- Abdominal/Core
  - Shoulder flexion to tuck
- Lower back
  - Reverse Back Extension
- Shoulder
  - Exercise Ball Push Up
- Glutealis
  - SL Supine Hip Extension

Plyometrics

Lower body

- On-Box Squat Jump
- Drop Jump to On Box Jump
- Repeated Shuttle Jump
- Repeated Full Squat Broad Jump

Upper body

- Concentric Bench Pull
- Ballistic Bench Pull

Power Production

- **Lower-body**
  - Concentric Leg Press
  - Ballistic Leg Press
- **Upper-body**
  - Concentric Bench Pull
  - Ballistic Bench Pull

Other Exercises

- Dyno
  - Push
  - Press
  - Leg Press

- Cability Straps
  - Shoulder Flexion

Land Training –Dyno Plan

Gym Training - Dyno Ergo

Women

PHASE		Duration	SESSION in WEEK	Mode	Work - minutes	Work - reps	Break - minutes
Preparation 1	24 June 2005 - 23 Oct 2005	20 weeks	**session 1**	No vents open	4x2	4x56	2
Preparation 1	24 June 2005 - 23 Oct 2005	20 weeks	**session 1**	No vents open	4x3	4x84	2
Preparation 2	24 October 2005 - 29 January 2006	13 weeks	**session 1**	No vents open	3x4	3x112	2
Preparation 2	24 October 2005 - 29 January 2006	13 weeks	**session 1**	No vents open	3x5	3x140	2
Preparation 3	30 January 2006 - 30 April 2006	13 weeks	**session 1**	No vents open	3x6	3x140	2
Preparation 3	30 January 2006 - 30 April 2006	13 weeks	**session 1**	No vents open	3x7	2x168	2
Preparation 1	24 June 2005 - 23 Oct 2005	20 weeks	**session 3**	Two vents open	4x1	4x35	3
Preparation 1	24 June 2005 - 23 Oct 2005	20 weeks	**session 3**	Two vents open	2x2	2x70	3
Preparation 2	24 October 2005 - 29 January 2006	13 weeks	**session 3**	Two vents open	2x3	2x105	3
Preparation 2	24 October 2005 - 29 January 2006	13 weeks	**session 3**	Two vents open	2x4	2x140	3
Preparation 3	30 January 2006 - 30 April 2006	13 weeks	**session 3**	Two vents open	2x4.5	2x140	3
Preparation 3	30 January 2006 - 30 April 2006	13 weeks	**session 3**	Two vents open	3x3	3x105	3
Preparation 1	24 June 2005 - 23 Oct 2005	20 weeks	**session 4**	Four vents open	4x1	4x40	3
Preparation 1	24 June 2005 - 23 Oct 2005	20 weeks	**session 4**	Four vents open	4x1'30"	4x60	3
Preparation 2	24 October 2005 - 29 January 2006	13 weeks	**session 4**	Four vents open	3x2	3x80	3
Preparation 2	24 October 2005 - 29 January 2006	13 weeks	**session 4**	Four vents open	3x2'30"	3x100	3
Preparation 3	30 January 2006 - 30 April 2006	13 weeks	**session 4**	Four vents open	3x3'	3x100	3
Preparation 3	30 January 2006 - 30 April 2006	13 weeks	**session 4**	Four vents open	4x2'	4x80	3

Land Training – Power Exercises Program

Dynamic Warm-up

Squat	1x5	Lateral Shuffle	2x4ea	Cross Hop	2x4ea
Power Squat	1x5	Carioca/Grapevine	2x4ea	Kung Fu Push-up	2x5
Sumo Balance	1x3ea	Inchworm	1x5	Pike Jump	2x3

Repetitions

Reps	Wk1	Wk2	Wk3	Wk4	Wk5	Wk6
A	(3), 3x6 @ 50%	(3), 3x7 @ 45%	(3), 2x8 @ 40%	(3), 3x7 @ 45%	(3), 3x8 @ 40%	(3), 2x9 @ 35%
B	(3), 3x8 @ 40%	(3), 3x9 @ 35%	(3), 2x10 @ 30%	(3), 3x9 @ 35%	(3), 3x10 @ 30%	(3), 2x10 @ 30%
C	(3), 3x10 @ 30%	(3), 3x10 @ 30%	(3), 2x10 @ 30%	(3), 3x10 @ 30%	(3), 3x10 @30%	(3), 2x10 @ 30%
D	(3), 3 x 6	(3), 6, 6, 5	(3), 6, 5	(3), 6, 5, 4	(3), 5, 5, 4	(3), 5, 4
E	(3), 3x20 Broken	(3), 3x25 Broken	(3), 2x30 Broken	(3), 3x25 Broken	(3), 3x30 Broken	(3), 2x35 Broken

Day 1 – Strength, Power & Power Endurance

Exercise	Variation	Loading	Sets/Reps	Tempo	Rest
Ballistic Leg Press	3,High,//,Neut	PtL	A	dr/rb/ex/fl	2min ss
Hang Pull	Sn,HBK,Neut	BB	B	dr/rb/ex/f	2min ss
Ballistic Leg Press	1,Low,//,Neut	PtL	C	dr/rb/ex/fl	2min ss
Power Pull	Cl,Flr,Neut	BB	A	ex/f/dr/set	2min ss
Incline Press	Nar,Pr	DB	D	dr/rb/ex/f	2min p
Deadlift	Cl,Flr,Neut	BB	D	ex/f/dr/set	2min p
Recline Pulldown	Wide,Pr,TT	PnL	D	ex/f/dr/rb	2min p
Power Jump on Shuttle	Half,Neut	Bunjee	E	dr/rb/ex/fl	30s/1min ss
Upright Row	Nar,Pr	BB	D	ex/f/dr/set	1min ss

Land Training – Power Exercises #2

Day 2 - Strength, Power & Power Endurance

Exercise	Variation	Loading	Sets/Reps	Tempo	Rest
Ballistic Leg Press	2,Mid,//,Neut	PtL	B	dr/rb/ex/fl	2min ss
Hang Pull	Cl,HAK,Neut	BB	C	dr/rb/ex/f	2min ss
Single-arm Bench Press	Nar,Pr	DB	D ea	dr/rb/ex/f	30s ss/2min p
Back Squat	Hi,//,Neut	BB	D	dr/rb/ex/f	2min p
Bent-over Row	Nar,Pr,Neut	DB	D	ex/f/dr/rb	2min p
Power Pull (3.5m.s^{-1})	Cl,Flr,Neut	BB	E	ex/f/dr/set	30s/2min p
Chin-up	Nar,Pr	B&W	D	ex/f/dr/rb	1min ss
Ballistic Leg Press (2.7m.s^{-1})	2,Mid,//,Neut	PtL	E	dr/rb/ex/fl	30s/1min ss

General Considerations

-Differences between men and women rowers

-Differences between open and lightweight women

-Elite female rowers after a development phase tend to reach a balance within (strength)

- Further improvements on performance by increasing efficiency

Australian Considerations & Requirements

-Two “summer” seasons: October – April (domestic) and May – September (international=overseas)

- Rowing on water all year round

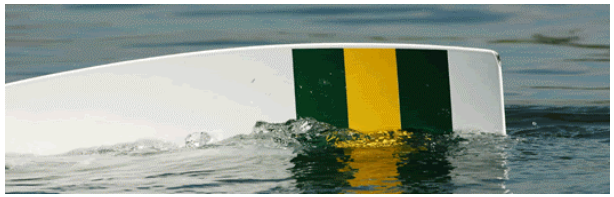
- National System/States based, Advanced Sport Science

- National, State requirements (competitions & tests)

- Elite Athletes Training: centralized/decentralized

- Strong Rowing Population: athletes, coaches, support staff, administrators

- Tradition, culture, proud rowing history (Oarsome Foursome; Auslightychicks; schools “Head of the River”; Kings Cup)



Why Strength?

- Ongoing and Complementary to boat training
- Rowing Posture
- Development & Maintenance
- Injury Prevention & Rehabilitation
- Variety & Enjoyment

Acknowledgments

- Rowing Coaches and Sport Scientists with books and articles on strength for women rowers

- SASI Sport Science

- **Questions?**

- Thank you.