& ' LVWULEXWLRQ ZLWKLQ WKH 5D P VDU DUHD	
(FRV\VWHP FR P SRQHQWV DQ SURFHVVHV	' HVFULSWLRQ
3K\VLFR FKHP LFD0 VDOLQ\	.QRZ0HGJH JDS
: DWHU UHJLP H	.QRZ0HGJH JDS
+DELWDW DYDLODELOLW\	+DELWDWV F0RVH WR FRDVW XVXD0\ ZLWKLQ N P V LQF0XGLQJ DUHDV RI 0RZ VD P SKLUH KHUE0DQG &KHQRSRGLX P KHUEÅH0GV RU VKUXE0DQGV GR P LQDWHG E\ 6KUXEE\ *0DVV ZRUW RU *UH\ *0DVV ZRUW 6R P HW P HV IRXQG LQ SDWFKHV RI FR0RQLQJ S0DQWV RQ EHDFKHV RU GXQH I0RQW0D JHV RU D0RQJ URFN\ VKRUHV IHHGLQJ RQ VWUDQGLQH S0DQWV VXFK VHD URFNHW &DN0H P DUW P H FR P SHW0RQ DQG SUHGDWRQ D0H SRRU\ XQGHUVWRRG

/L P LWV RI DFFHSWDE0H FKDQJH DQG WUDIÀF 0L JK W DVVHVV P HQW ,W LV QRW SRVVLE0H WR HVWDE0LVK WKH VL]H RI WKH SRSX0DWLRQ RI WKLV VSHFLHV XVLQJ WKH &RRURJ DQG /DNHV 5D P VDU VLWH D W RU DURXQG WKH WL P H WKH VLWH ZDV 5D P VDU 0LVWHG : K0H WKHUH KDV EHHQ ZRUN GRQH WR HVWL P DWH WKH H[WHQW RI 0LNH0\ KDELWDW VHH DERYH WKH DXWKRUV KDYH QRW EHHQ DE0H WR JDLQ DXWKRUL WDWLYH DGYLFH RQ WKH YHUDFLW\ RI WKLV P RGH0LQJ QRU WKH VL]H RI WKH SRSX0DWLRQ WKDW RYHU Z LQWHUV LQ WKH VLWH WRGD\ )XUWKHU ZRUN LV QHHGHG WR GHWHU P LQH ERWK WKH SRSX0DWLRQ VL]H DQG H[WHQW RI WKH KDELWDWV UHTXLUHG E\ WKLV HQGDQJHUHG VSHFLHV ZLWKLQ WKH 5D P VDU VLWH VR WKDW DS SURSULDWH S0DQQLQJ DQG P DQDJH P HQW FDQ EH SURYLGHG)UR P WKH SHUVSHFWLYH RI VHWWLQJ 0L P LWV RI DFFHSWDE0H WKHUH DUH IRXU SUL P DU\ FRQVLGHUDWLRQV DV IR00R Z V

3RSX0DWLRQ VL]H ³ QR HVWL P DWH RI WKH SRSX0DWLRQ XVLQJ WKH VLWH WRGD\ LV DYDL0DE0H 8QWL0 VXFK WL P H DV D SUHFLVH SRSX0DWLRQ HVWL P DWH LV SRVVLE0H DQG QDWXUD0 YDULDWLRQV ZLWKLQ WKDW SRSX0DWLRQ DUH EHWWHU XQGHUVWRRG WKH SUHFDXWLRQDU\ DSSURDFK VXJJHVWV D 0L P LW RI DFFHSWDE0H FKDQJH ,Q WKLV FRQWH[W WKLV LV LQWHQGHG WR P HDQ WKDW QR DFWLRQV VKRX0G EH SU P LWWHG WKDW P D\ WKUHDWHQ WKLV V P D00 SRSX0DWLRQ $UHD0 H[WHQW RI SUL P DU\ KDELWDWV ³ QR DGYLFH KDV EHHQ IRUWKFR P LQJ RQ WKH SUL P DU\ KDELWDW DUHDV 2QFH WKLV LQIRU P DWLRQ LV FR00HFWHG RU SURYLGHG WKHQ WKLV FDQ EH XVHG WR HVWDE0LVK D UREXVW 0L P LW RI FKDQJH)RU DQ HQGDQJHUHG VSHFLHV ZLWK D WRWD0 QDWLRQD0 SRSX0DWLRQ HVWL P DWHG DW EL0GV D 0L P LW RI DFFHSWDE0H change would be indicated.

&RQGLWLRQ RI WKH SUL P DU\ KDELWDWV ³ QR VXLWDE0H 0L P LWV RI DFFHSWDE0H FKDQJH FDQ EH LQGLFDWHG XQWL0 WKHVH habitats are known.

&RQFHWLYLW\ EHWZHHQ SUL P DU\ KDELWDWV ³ WKLV P D\ RU P D\ QRW EH D IDFWRU 1R VXLWDE0H 0L P LWV RI DFFHSWDE0H FKDQJH FDQ EH LQGLFDWHG XQWL0 WKHVH habitats are known.

7UDIÀF 0L JK W DVVHVV P HQW

: K0H WKH SRSX0DWLRQ VL]H DQG DUHD0 H[WHQW RI LWV SUL P DU\ KDELWDWV ZLWKLQ WKH 5D P VDU VLWH UH P DLQV XQNQRZQ WKLV UDLQJ LV J1YHQ WDNLQJ LQWR FRQVLGHUDWLRQ WKDW WKH VSHFLHV LV 0LVWHG DV HQGDQJHUHG QDWLRQD0\ DQG WKDW UHFRYHU\ DFWLRQV are underway. Without the latter, the rating would be 'red'.

6RXWKHUQ %H (UR J					
&R P P RQ QD P H	6FLHQWLÅF QD P H	5D P VDU FUDHUD	1DWLRQDO 6WDWXV	,8&1 6WDWXV	6$ 6WDWXV
6RXWKHUQ %H (UR J	*/WRUD UDQIRU P LV*		V	(	V

6RXWKHUQ %H (UR J

6RXWKHUQ %H (UR J

4 XDOLWDWLYH GHVFULSWLRQ

$ 6X P P DU\ OLIH KLVWRU\ GHWDLOV

([WUDFWV IUR P ' (+ ZHE VLWH Z Z Z GHK FR P DX

'/WRUD UDQIRU P LV LV XVXDO\ IRXQG LQ DVVRFLDWLRQ ZLWK GD P V SRQGV DQG P DUVKHV HLWKHU D P RQJ VW VHGJHV DQG RWKHU VH P L DTXDWLF YHJHWDWLRQ RU VKHOWHUQJ XQGHU ORJV DQG URFNV * LOOHVSLH HW D (0) 7KH VSHFLHV DS SHDUV WR EH DVVRFLDWHG ZLWK SHU P DQHQW ZDWHUERGLHV WKRXJK LW is unclear whether, like */ DXUHD* WKH VSHFLHV DOVR XWLOLVHV HSKH P HUD SRROV 0 DKRQ\ 7KH VSHFLHV RFFXUV ERWK LQ ZRRGDQG DQG DUHDV RI L P SUYHG SDVWXUH * LOOHVSLH HW D (0) $GXOWV DUH RSSRUWXQLVWLF SUHGDWRUV SUH\LQJ RQ RWKHU IURJV DQG DUH DOVR NQRZQ WR EH FDQQLEDOLVWLF +HR HW D (0) * LOOHVSLH HW D (0)

,Q 6$ WKH VSHFLHV LV NQRZQ WR RFFXU DORQJ WKH ORZHU 5LYHU 0 XUD\ YDOOH\ WKH ORZHU 6RXWK (DVW WR QHDU . HLWK DQG D V P DO DSSDUHQW\ LQWURGXFHG SRSXODWLRQ LQ WKH $GHDLGH +LOOV 7\HU LQ 0 DKRQ\

' HFLQHV KDYH RFFXUHG LQ VHFWLRQV RI WKH VSHFLHV UDQJH 0 DKRQ\ « ,W LV FXUUHQW\ ZLGHVSUHDG WKURXJKRXW WKH 5LYHU 0 XUD\ YDOOH\ EXW KDV GLVDSSHDUHG IUR P D QX P EHU RI VLWHV DORQJ WKH 0 XUX P ELG JHH 5LYHU 0 DKRQ\

/LWWOH LV NQRZQ DERXW WKH ELRORJ\ RI WKLV VSHFLHV KRZHYHU LW LV OLNH\ WR EH VL P LDU WR WKDW RI */ DXUHD* * LOOHVSLH HW D (0)

0 DUHV FDQ IUR P $XJXVW² $SUL +HR HW D (0) 7KH VSHFLHV EUHHGV LQ SHU P DQHQW SRQGV RU VZD P SV XVXDO\ ZLWK H[WHQVLYH DUHDV RI VHGJHV DQG UXVKHV IUR P ZKLFK DGXOWV FDQ * LOOHVSLH HW D (0) $ERXW HJJV DUH 0DLG LQ D 0RRVH F0X P S +HR HW D (0) +HR : DUHQ0 XQSXE0LVKHG 7DGSR0HV DUH IUHH VZL P P LQJ DQG GHYH0RS RYHU VX P P HU DQG DXWX P Q * LOOHVSLH HW D (0) 0 HW D P RUSKRVLV WDNHV S0DFH EHWZHHQ 0DWH VX P P HU DQG DXWX P Q D0KRXJK WDGSR0HV P D\ RYHUZLQWHU DQG P HWD P RUSKRVH WKH IR0RZLQJ VHDVRQ * LOOHVSLH HW D (0) .

$FFRUGLQJ WR WKH 6RXWK $XVWUDOLDQ (3$ WKH GLVWULEXWLRQ RI WKLV VSHFLHV LQ WKH 6WDWH LV DV VKRZQ LQ)LJXUH 7KLV P DS LV GHULYHG IUR P WKH)UR J &HQVXV GDWD FR0HFWHG WKURXJK WKH (3$·V FR P P XQLW\ SUR JUD P VLQFH 7KLV VSHFLHV KDV D0VR EHHQ UHFRUGHG DW 7R0GHUR E\ WKH : HW0DQGV %DVH0LQH 6XUYH\ 5 0 & : 0 %

7KH UHSRUW IUR P WKH)UR J &HQVXV (3$ LQGLFDWHV WKDW LQ WKDW \HDU RQ\ HLJKW 6RXWKHUQ %H (UR J V ZHUH UHFRUGHG WKURXJKRXW WKH 0 XUUD\ 9D0H\ DQG LQ WKH 6RXWK (DVW RI WKH 6WDWH 7KH QX P EHU RI UHFRUGLQJ V LQFUHDVHG WR DIWHU WKH ZHW FRQGLWLRQV WKDW SUHYD0HG EHWZHHQ DQG D0 RI WKHVH EHLQJ ZHW KDELWDWV VXFK DV ULYHUV VZD P SV DQG ZHW0DQGV

,W LV QRWHG WKDW DW SUHVHQW D QD0LRQD0 5HFRYHU\ 3 0DQ LV EHLQJ SUHSDUHG IRU WKLV VSHFLHV DQG WKLV ZL0 QHHG WR EH WDNHQ LQWR FRQVLGHU0DWLRQ ZLWK IXWXUH LQYHVWL J DWLRQV LQWR WKH P DQD J H P HQW UHTXLU H P HQW V RI WKH VSHFLHV ZLWKLQ WKH 5D P VDU OLVWHG DUHD

% , P SRUDQFH RI WKH &RRURQJ DQG /DNHV 5D P VDU VLWH	
(FRORJLFDO\	,W LV DSSDUHQW IURP WKH)URJ &HQVXV DQG : HWDQG %DVHOLQH 6XUYH\ GDWD UHIHUUHG WR DERYH WKDW WKLV VSHFLHV FRQWLQXHV WR H[LVW ZLWKLQ WKH 5D P VDU VLWH DWKRXJK SUHFLVH\ ZKHUH DQG LQ ZKDW QX P EHUV LV QRW NQRZQ DW SUHVHQW
+DELWDW UHTXLUH P HQWV	6XUYH\V KDYH VKRZQ WKDW WKH VSHFLHV KDV D SUHIHUHQFH IRU SHU P DQHQW IUHVKZDWHU DUHDV XVXDO\ DVVRFLDWHG ZLWK VZD P SV DQG P DUVKHV ZLWK VHGJHV DQG RWKHU VH P L DTXDWLF YHJHWDWLRQ ,W KDV DOVR EHHQ UHFRUGHG LQ GD P V DQG GUDLQV LUULJDWLRQ GUDLQV LW LV DVVX P HG
3RSXODWLRQ HVWL P DWH IRU	1RW NQRZQ
3RSXODWLRQ HVWL P DWH IRU	1RW NQRZQ

& 'LVWULEXWLRQ DQG KDELWDW DVVRFLDWLRQV ZLWKLQ WKH 5D P VDU DUHD

*LYHQ WKH SDXFLW\ RI VXUYH\ GDWD IUR P ZLWKLQ WKH Ramsar site the distribution cannot be indicated. With WKH DSSDUHQW SUHIHUHQFH RI WKH VSHFLHV IRU SHU P DQHQW IUHVKZDWHU P DUVKHV DQG VZD P SV ZLWK IULQJLQJ VHGJHV DQG RWKHU VH P L DTXDWLF YHJHWDWLRQ LW LV OLNH\ WKH VSHFLHV ZLOO EH IRXQG RQFH VXUYH\V DUH XQGHUWDNHQ DVVRFLDWHG ZLWK these habitats around Lakes Albert and Alexandrina and their tributaries.

' .H\ HFRORJLFDO SURFHVVHV

:LWKRXW P RUH VSHFLÀF LQIRU P DWLRQ DERXW WKH P LFUR KDELWDW QHHGV RI WKH VSHFLHV WKHVH FDQQRW EH VSHFLÀHG

(6X P P DU\ FRQFHSWXDO P RGH DQG OL P LWV RI DFFHSWDEOH FKDQJH

$V DERYH 3ULRULW\ VKRXG EH J LYHQ WR VXUYH\V WR HVWDEOLVK WKH GLVWULEXWLRQ SRSXODWLRQ VL]H P LFUR KDELWDW DQG RWKHU QHHGV RI WKLV VSHFLHV VR WKDW WKH NH\ HFRORJLFDO SURFHVVHV FDQ EH VSHFLÀHG DQG OL P LWV RI DFFHSWDEOH FKDQJH SURYLGHG *LYHQ WKH QDWLRQDO GHFLQH RI WKLV VSHFLHV DFURVV P XFK RI LWV IRU P HU GLVWULEXWLRQ LW LV OLNH\ WKHUH ZLOO EH YHU\ QDUURZ OL P LWV RI FKDQJH LQGLFDWHG

/L P LWV RI DFFHSWDEOH FKDQJH DQG WUDLÀ OL JK DVVHVV P HQW There is so little known about the distribution, abundance DQG KDELWDW SUHIHUHQFHV RI WKLV VSHFLHV LQ WKH 5D P VDU listed area to be able to make any recommendations RQ OL P LWV RI DFFHSWDEOH FKDQJH DW WKLV WL P H 2QFH WKLV LQIRU P DWLRQ LV DYDLODEOH WKHUH DUH IRXU SUL P DU\ FRQVLGHUDWLRQV DV IROORZV

3RSXODWLRQ VL]H ³ D SUHFLVH SRSXODWLRQ HVWL P DWH LV QHHGHG DQG VR P H XQGHUVWDQGLQJ RI WKH QDWXUD YDULDWLRQV ZLWKLQ WKDW SRSXODWLRQ

$UHD H[WHQW RI SUL P DU\ KDELWDW ³ P DS SLQJ RI WKH SUL P DU\ KDELWDW DUHDV LV QHHGHG WR HQVXUH DS SURSULDWH P DQDJH P HQW RI WKHVH

&RQGLWLRQ RI WKH SUL P DU\ KDELWDWV ³ P DLQWDLQLQJ WKH FRQGLWLRQ RI WKH SUL P DU\ KDELWDWV LV YLWD0 IRU SURWHFWLQJ WKLV VSHFLHV ZLWKLQ WKH 5D P VDU VLWH

&RQGHFWLYLW\ EHWZHHQ SUL P DU\ KDELWDWV ³ WKLV P D\ RU P D\ QRW EH D IDFWRU

7UDÀF OLJKW DVVHVV P HQW

' HVSLWH WKH 0DFN RI FR P SUHKHQVLYH GDWD WKLV rating is recommended taking into consideration WKH YX0QHUDE0H VWDWXV RI WKH VSHFLHV FRQFHUQHG DQG DSS0\LQJ WKH SUHFDXWLRQDU\ DSSURDFK 7KH WUDÀF OLJKW DVVHVV P HQW IRU P DQ\ RI WKH 0NH0\ KDELWDWV RI WKLV VSHFLHV ZLWKLQ WKH 5D P VDU VLWH VHH 6HFWLRQ LV D0VR D IDFWRU 6XUYH\V DUH UHFR P P HQGHG DV D KJK SURUW\ WR F0DUL\ WKH VLWXDWLRQ DQG LI LQGLFDWHG WR LQWURGXFH VSHFLÀF P DQDJ H P HQW LQWHUYHQWLRQV

)LJXUH 'LVWULEXWLRQ RI 6RXWKHUQ %HH)URJ LQ 6RXWK $XVWUDOLD

Q 7KH VLWH VXSSRUWV D KLJK GLYHUVLW\ RI VSHFLHV DQG DVVH P E0D J HV L P SRUWDQW IRU FRQVHUYLQJ ELRGLYHUVLW\ DW WKH ELRUH J LRQD0 VFD0H 5D P VDU &ULWHULD

7KH GUDIW UHYLVHG 5,6 IRU WKLV 5D P VDU VLWH $SSHQGL[& LQGLFDWHV WKDW WKHUH DUH D QX P EHU RI S0DQW DQG DQL P D0 VSHFLHV WKDW FDQ EH FRQVLGHUHG L P SRUWDQW IRU FRQVHUYLQJ ELRGLYHUVLW\ DW WKH ELRUH J LRQD0 VFD0H 5D P VDU &ULWHULRQ 1DWXUD00\ WKLV D0VR LQF0XGHV WKRVH VSHFLHV DQG HFR0R J LFD0 FR P P XQLWLHV WKDW TXD0LÀHG WKH VLWH XQGHU 5D P VDU Criterion 2, being either globally or nationally threatened, HQGDQJHUHG HWF 7KHVH DUH FRQVLGHUHG LQ 6HFWLRQ and so not reconsidered here.

7KH GHFLVLRQ UX0HV DS S0LHG LQ UH0DWLRQ WR &ULWHULD LQGLFDWH WKDW WKH VSHFLHV RU FR P P XQLWLHV RI VL J QLÀFDQFH DUH WKRVH WKDW DUH 0LVWHG DV YX0QHUDE0H RU HQGDQJHUHG EXW QRW UDUH XQGHU 6RXWK $XVWUD0LDQ 0H J LV0DWLRQ DQG RU WKRVH S0DQW VSHFLHV 0LVWHG DV WKUHDWHQHG YX0QHUDE0H RU HQGDQJHUHG UH J LRQD00\ IRU WKH 6RXWKUQ /RIW\ RU 0 XUUD\ ERWDQLFD0 UH J LRQV ,QF0XGHG D0VR LV WKH SURYLVLRQD00\ 0LVWHG E\ 6$ ' (+ WKUHDWHQHG HFRV\VWHP P RI *Gahnia* VSS)RU QDWLYH ÀVK WKRVH LQF0XGHG DUH WKRVH WKDW DUH 0LVWHG DW WKH 6WDWH 0HYH0 DV 3 ³ SURWHFWHG XQGHU WKH *)LVKHULHV $FW* RU & ³ SURYLVLRQD0 6WDWH FRQVHUYDWLRQ FRQFHUQ XQGHU WKH GUDIW 7KUHDWHQHG 6SHFLHV 6FKHGX0H 13 : 6$ DUH LQF0XGHG IRU QRZ ,W LV XQGHUVWRRG WKDW WKH VWDWXV RI VR P H RI WKH 0DWWHU VSHFLHV LV VWLO0 EH LQ J GLVFXVVHG D P RQ J JRYHUQ P HQW GHSDUW P HQWV LQ 6RXWK $XVWUD0LD

%DVHG RQ WKHVH GHFLVLRQ UX0HV WKHUH LV RQH YH J HWDWLRQ DVVRFLDWLRQ RQH S0DQW VSHFLHV ÀVK VSHFLHV DQG ÀYH EUG VSHFLHV WKDW FRQWULEXWH WR WKH VLWH TXD0LI\LQ J D J D0LQVW WKLV &ULWHULRQ VHH 7DE0HV DQG &RQVLGHUDWLRQ RI WKH S0DQW VSHFLHV LV SURYLGHG LQ 6HFWLRQ WKH ÀVK VSHFLHV LQ 6HFWLRQ DQG WKH EUG VSHFLHV LQ 6HFWLRQ 0HDYLQJ RQ0\ WKH YH J HWDWLRQ DVVRFLDWLRQ WR H[D P LQHG EH0RZ

&R P S0H[DTXDWLF YH J HWDWLRQ LV EH0LQ J VL P S0LÀHG E\ VWDWLF 0DNH 0HYH0V DQG 0DFN RI ARZV

Gahnia YHJHWDWLRQ DVVRFLDWLRQ

*DKQLD YHJHWDWLRQ DVVRFLDWLRQ					
&RPPRQQDPH	6FLHQWLAFQDPH	5DPVDU FULWHULD	1DWLRQD0 6WDWXV	.8&1 6WDWXV	6$ 6WDWXV
&XWWLQJ JUDVVHV	*DKLQD À0XP *DKQLD WULÀGD	3			V

$V DGYLVHG LQ 6HFWLRQ WKH 6RXWK $XVWUDOLDQ ' HSDUWPHQW IRU (QYLURQPHQW DQG +HULWDJH KDV FRPSLOHG D SURYLVLRQD0 OLVW RI WKUHDWHQHG HFRV\VWHPV 7KH YHJHWDWLRQ DVVRFLDWLRQ RI *Gahnia* VSS LV LGHQWLÀHG DV D YX0QHUDE0H HFRV\VWHP ZLWKLQ WKH DJULFX0WXUD0 GLVWULFW RI South Australia.

4XDOLWDWLYH GHVFULSWLRQ

$ 6XPPDU\ 0LIH KLVWRU\ GHWDLOV

*DKQLD À0XP LV D WXVVRFN VHGJH WKDW ARZHUV WKURXJKRXW WKH \HDU DQG KDV WD00 VWHPV ZLWK VHYHUD0 QRGHV DQG 0RQJ VPRRWK 0HDYHV WDSHULQJ LQWR SXUS0H EUDFWV %0DFN

*DKQLD WULÀGD is extremely similar and can be GLVWLQJXLVKHG E\ WKH VKDUS FXWWLQJ HGJHV WR LWV 0HDYHV 7KH\ ERWK JURZ LQ VZDPS\ DUHDV ZLWK * À0XP SUHIHUULQJ more saline areas and * WULÀGD SUHIHUULQJ IUHVKHU FUHHN KDELWDWV %RWK S0DQWV IRUP EDQGV RI WXVVRFNV DW RU QHDU WKH KLJK ZDWHU 0HYH0 PDUN DQG WHQG WR RFFXU LQ DVVRFLDWLRQ ZLWK RWKHU VHGJHV DQG UHHGV VDPSKLUH FRPPXQLWLHV DQG 0H0D0HXFD KD0PDWXRUXP 6ZDPS SDSHUEDUN GHSHQGLQJ RQ ZDWHU UHJLPH 7KH\ DUH VD0W WR0HUDQW DQG DE0H WR VXUYLYH H[WHQGHG SHULRGV RI GURXJKW : RUN E\ WKH *RR0ZD WR : H00LQJWRQ /RFD0 $FWLRQ 30DQQLQJ %RDUG VKRZV WKDW WKH VHHGV JHUPLQDWH UHDGL0\ SDUWLFX0DU0\ IR00RZLQJ H[SRVXUH WR VPRNH XQSXE0 GDWD

* À0XP and * WULÀGD YHJHWDWLRQ DVVRFLDWLRQV KDYH EHHQ LQF0XGHG E\ 6$ ' (+ RQ WKHLU SURYLVLRQD0 OLVW RI WKUHDWHQHG HFRV\VWHPV 6HDPDQ 7KHVH YHJHWDWLRQ associations or communities are sedgelands located in GUDLQDJH 0LQHV DQG GHSUHVVLRQV : LWKLQ WKH DJULFX0WXUD0 GLVWULFW RI WKH 6WDWH WKH\ DUH PRVW0\ FRQÀQHG WR D QXPEHU RI VPD00 DUHDV ZLWKLQ 13 : 6$ 5HVHUYHV 7KH HQWLUH RFFXUUHQFH RI *DKQLD À0XP and *DKQLD WULÀGD FXWWLQJ JUDVV VHGJH0DQGV LQ WKH 6$ 0XUUD\ ' DU0LQJ %DVLQ 6$ 0 ' % LV ZLWKLQ WKH &RRURQJ DQG /DNHV UHJLRQ .DKULPDQLV HW D0

6HDPDQ XVHG WKH &RRURQJ DQG /DNHV +DELWDW ' DWDEDVH WR GRFXPHQW RFFXUUHQFHV RI WKHVH *Gahnia* VSS YHJHWDWLRQ DVVRFLDWLRQV ZLWKLQ WKH 5DPVDU DUHD 7KLV IRXQG DSSUR[LPDWH0\ KHFWDUHV RI WKH DVVRFLDWLRQ GLVWULEXWHG D0RQJ WKH QRUWKHUQ VKRUH0LQH RI WKH)LQQLVV 5LYHU WKH ZHVWHUQ VKRUH0LQH RI /DNH $0H[DQGULQD ZLWK RWKHU VFDWWHUHG UHPQDQWV DURXQG WKH /DNHV 6HDPDQ UHSRUWV WKDW ZLWKLQ WKH &RRURQJ 1DWLRQD0 3DUN JRRG UHPQDQWV UHPDLQ VRXWK RI 3DUQND 3RLQW FRPSULVLQJ RI DSSUR[LPDWH0\ KHFWDUHV VHH)LJXUH 0DQ\ RI WKH UHPQDQW *Gahnia* VSS VHGJH0DQGV LQ WKH &RRURQJ DQG /DNHV DUHD DUH JUD]HG DQG LW LV FXUUHQW0\ XQNQRZQ ZKDW LPSDFWV WKLV PD\ KDYH RQ WKH FRPPXQLWLHV ' XULQJ WKH ¶SHHU UHYLHZ· RI WKLV UHSRUW RWKHU VLWHV ZLWK *Gahnia* associations were PHQWLRQHG DQG WKHVH DUH \HW WR EH YHULÀHG

*DKQLD À0XP &RRURQJ 1DWLRQD0 3DUN

% , P SRUDQFH RI WKH &RRURQJ DQG /DNHV 5D P VDU VLWH	
(FRORJLFDO\	7KH RQ\ RFFXUUHQFH RI *DKQLD ÀXP and * WULÀGD LQ WKH 6RXWK $XVWUDOLDQ SRUWLRQ RI WKH 0XUUD\ 'DUOQJ %DVLQ LV ZLWKLQ WKH &RRURQJ /DNHV DQG WULEXWDULHV ,W LV WKRXJKW WKDW RI WKH UHPDLQLQJ SRSXODWLRQV LV FRQVHUYDWLYHO\ ZLWKLQ WKHVH VLWHV .DKQLP DQLV HW DO 7KLV FRQVLGHUHG LP SRUWDQW KDELWDW IRU 0RXQW /RIW\ 5DQJHV 6RXWKUQ (P X ZUHQ VHH 6HFWLRQ
+DELWDW UHTXLUH P HQWV	+LJK ZDWHU 0HYHO WXVVRFNV WKDW DUH VDW WRUHUDQW EXW UHTXLUH IUHTXHQW IUHVK ZDWHU LQXQGDWLRQ 'HDUV RQ WL P LQJ IUHTXHQF\ DQG GXUDWLRQ RI WKHVH IUHVK ZDWHU ÁXVKHV DUH SRRU\ XQGHUVWRRG
3RSXODWLRQ HVWL P DWH IRU	.QRZ0HGJH JDS
3RSXODWLRQ HVWL P DWH IRU	KD DS SUR[L P DWH0\

& 'LVWULEXWLRQ DQG KDELWDW DVVRFLDWLRQV ZLWKLQ WKH 5D P VDU DUHD

:LWKLQ WKH 5D P VDU DUHD WKH VSHFLHV LV IRXQG DW WKH IR0R ZLQJ 0RFDWLRQV ZLWKLQ WKH /DNH $0H[DQGULQD /DNH Albert, Tributary wetlands and South Lagoon system XQLWV VHH 6HFWLRQ *Gahnia* VSS WHQG WR RFFXU ZLWK RWKHU VHGJHV DQG UHHGV LQ IUHVKHU DUHDV VXFK DV)LQQLVV 5LYHU %0DFN 6ZDP S DQG +LQG P DUVK ,V0DQG ,Q P RUH saline areas, *Gahnia* VSS RIWHQ IRU P EDQGV DURXQG VDOLQH GHSUHVVLRQV FRQWDLQLQJ VD P SKLUH DQG JUDGH into *0 H0D0HXFD KD0 P DWXUR P* ZRRG0DQGV DV H0HYDWLRQ increases. *Gahnia* VSS WXVVRFNV FDQ SURYLGH SURWHFWLRQ IUR P JUD]LQJ IRU RWKHU S0DQWV VXFK DV *6WLSD* VSS

' .H\ HFR0RJLFD0 FR P SRQHQWV DQG SURFHVVHV *Gahnia* VSS SDUWLFX0DU\ * *À0X P* DUH UH0DWLYH0\ VD0W WR0HUDQW DQG DE0H WR ZKVWDQG VHYH U D \HDU RI GURXJKW +R ZHYHU 0LWW0H LV NQRZQ DERXW WKH VSHFLÁFLWHV RI *Gahnia* VSS ZDWHU UHJL P H DQG UHFXLW P HQW UHTXLUH P HQWV WKXV NH\ HFR0RJLFD0 SURFHVVHV DUH GI0ÁFX0W WR GHÀQH 7KH &RRURQJ DQG /DNHV 5D P VDU VLWH LV WKRXJKW WR FRQWDLQ RI WKH UH P QDQW SRSX0DWLRQV RI *Gahnia* VSS LQ WKH 6RXWK $XVWUDOLDQ 0 XUUD\ 'DUOQJ %DVLQ

6R P H LQVLJKWV LQWR WKH HFR0RJLFD0 QHHGV RI WKLV VSHFLHV FDQ EH JDLQHG IUR P WKH LQIRU P DWLRQ UH0DWLQJ WR ZHWDQG W\SHV 0 DQG : LQ 6HFWLRQ SDJHV DQG UHVSHFWLYH0\

/L P LWV RI DFFHSWDE0H FKDQJH DQG WUDÀF 0LJKW DVVHVV P HQW ,W LV QRW SRVVLE0H WR HVWDE0LVK WKH DUHD0 H[HQW RI WKLV ZHWDQG W\SH DW RU DURXQG WKH WL P H WKH VLWH ZDV 5D P VDU 0LVWHG DQG HYHQ WRGD\ WKH DUHD LQG LFDWHG KD LV FRQVLGHUHG DQ HVWL P DWH XQLO IXUWKHU GHWDLOHG JURXQG VXUYH\V DUH FR P S0HWHG)UR P WKH SHUVSHFWLYH RI VHWWLQJ 0L P LWV RI DFFHSWDE0H FKDQJH WKHUH DUH WKUHH SUL P DU\ FRQVLGHUDWLRQV DV IR0R ZV

$UHD0 H[HQW ³ ZKI0H WKH IX0 DUHA0 H[HQW LV \HW WR EH FRQÀU P HG WKH DVVRFLDWLRQ LV SURYLVLRQDO0\ 0LVWHG DV D YX0QHUDE0H HFRV\VWH P ZLWKLQ WKH DJULFX0XUD0 G:LVWULFW RI 6RXWK $XVWUDOLD *LYHQ WKLV WKH SUHFDXWLRQDU\ DSSURDFK LQGLFDWHV WKDW D 0L P LW RI DFFHSWDE0H FKDQJH RI LV DSSURSULDWH XQO0 IXUWKHU LQIRU P DWLRQ LV obtained that may or may not alter this.

&RQGLWLRQ RI WKH YHJHWDWLRQ DVVRFLDWLRQ ³ QR VXLWDE0H 0L P LW RI FKDQJH FDQ EH UHFR P P HQGHG DW SUHVHQW &RQQHFWLYLW\ EHWZHHQ WKH YHJHWDWLRQ DVVRFLDWLRQ ³WKLV P D\ RU P D\ QRW EH D FRQVLGHUDWLRQ GHSHQGLQJ RQ WKH AQGLQJV RI IXWXUH UHVHDUFK WR HVWDE0LVK WKH IX0 ecological roles.

7UDÀF 0L JKW DVVHVV P HQW

:KH WKH DUHA0 H[HQW RI WKLV DVVRFLDWLRQ LV FRQVLGHUHG DS SUR[L P DWH WKLV UDWLQJ LV J:LYHQ taking into consideration that the Coorong and /DNH 5D P VDU VLWH LV WKRXJKW WR FRQWDLQ RI WKH UH P QDQW SRSX0DWLRQV ZLWKLQ WKH 6RXWK $XVWUDOLDQ SRUWLRQ RI WKH 0XUUD\ 'DUOQJ %DVLQ)XUWKHU VXUYH\V DQG VWXGLHV DUH QHHGHG DV D SUR0W\ WR F0DLI\ WKH VWDWXV DQG P DQDJH P HQW QHHGV RI WKLV DVVRFLDWLRQ

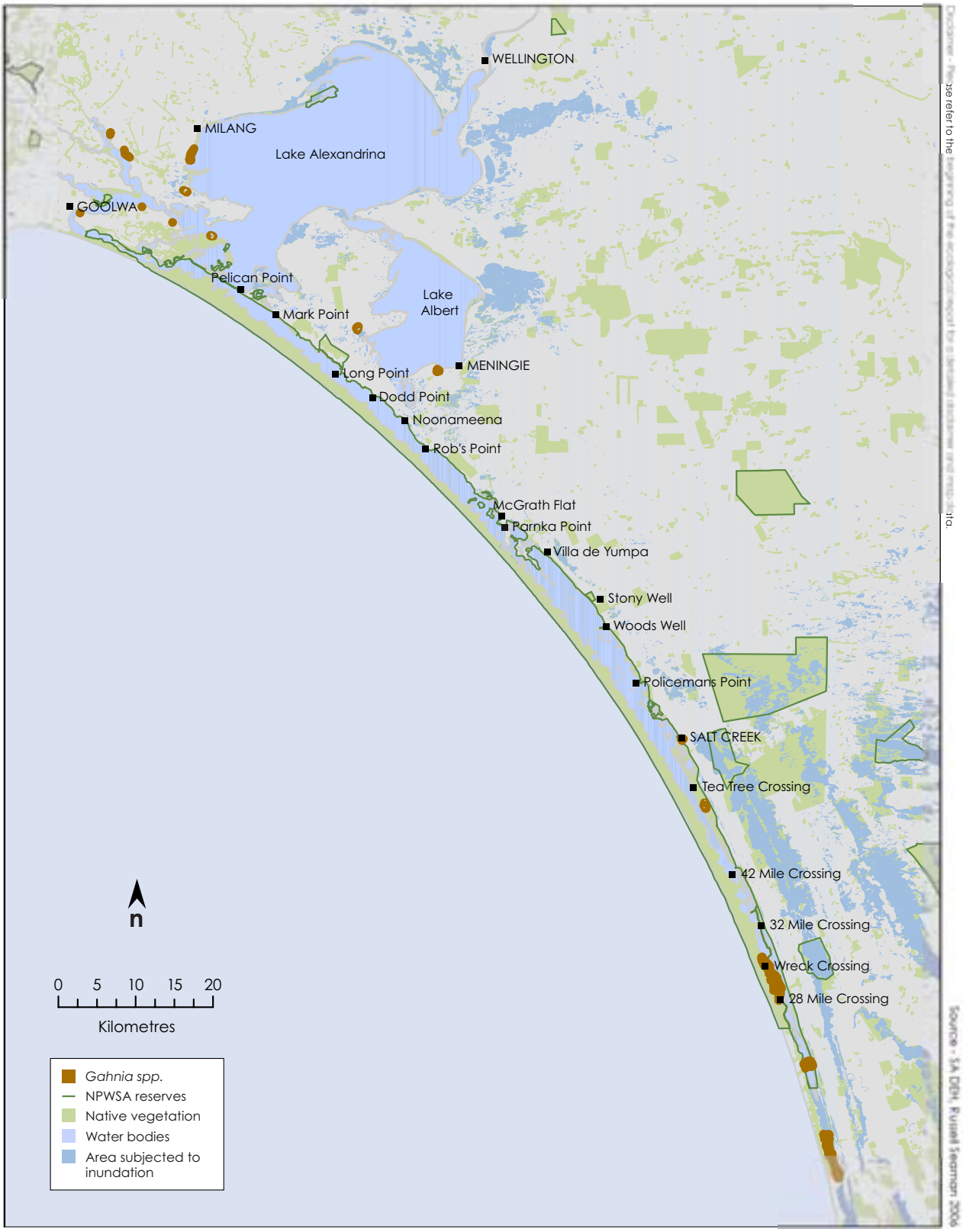

Figure 19 - Currently mapped distribution of Gahnia plant association

Q 7KH VLWH VXSSRUWV DQL P D0 WD[D DW FULWLFD0 VWDJHV RI WKHLU 0LIH F\F0H ³ EUHHGlQJ ZHW0DQG GHSHQGHQW ELUGV

5D P VDU &UWHUlRQ VHHNV WR lGHQWLI\ WKRVH VHFLHV WKDW DUH VXSSRUWHG E\ WKH VLWH DW FULWLFD0 VWDJHV RI WKHLU 0LIH F\F0H)RU WKH &RRURQJ DQG /DNHV 5D P VDU VLWH WKHUH DUH D 0DU JH QX P EHU RI ÀVK DQG ZHW0DQG GHSHQGHQW ELUG VHFLHV RI QRWH lQ WKLV UHJDUG 7KHVH DUH GHWDUHG lQ $WWDFK P HQW RI WKH GUDIW UHYLVHG 5D P VDU ,QIRU P DWlRQ 6KHHW $SSHQGl[& DQG D0VR VKRZQ lQ 7DE0HV DQG RI WKLV UHSRUW

$ P RQJ WKH AVK WKDW KH0S TXD0lI\ WKH VLWH XQGHU WKLV FULWHULRQ WKHUH DUH GlDGUR P RXV VHFLHV WKDW P RYH EHWZHHQ WKH IUHVKZDWHU HVWXDULQH DQG P DULQH SDUW RI WKH V\VWH P IRU VSDZQlQJ DQG D0VR WKRVH VHFLHV NQRZQ WR VSDZQ lQ WKH 5D P VDU VLWH LWVH0I ' HWDUHG FRQVlGHUDWlRQ RI WKHVH VlJQlÀFDQW ÀVK VHFLHV FDQ EH IRXQG lQ 6HFWlRQ

$ P RQJ WKH ZHW0DQG GHSHQGHQW ELUG VHFLHV RI QRWH lQ WKLV FRQWH[W WKHUH DUH

- 7KRVH VHFLHV UHJXlDU\ XVlQJ WKH VLWH WKDW DUH lVWHG XQGHU WKH -$ 0%$ RU &$ 0%$ P lJUDWRU\ ELUG DJUHH P HQW $XVWUDlD KDV ZlWK -DSDQ DQG &KlQD UHVSHFWlYH0\
- 6R P H RWKHU VHFLHV WKDW KDYH P RU H 0RFD0lVHG migrations within Australia (among these is the 2UDQJH EH0lHG 3DUURW ³ VHH 6HFWlRQ
- 6HYHUD0 VHFLHV WKDW KDYH EHHQ UHJXlDU\ UHFRUGHG XVlQJ WKH VLWH lQ QX P EHUV H[FHHGlQJ WKHlU SRSX0DWlRQ RU VXE SRSX0DWlRQ 0HYH0 7KHVH DUH 3lHG 2\VWHUFDWFKHU 5HG FDSSHG 3 0RYHU 5HG QHFNHG $YRFHW)DlU\ 7HUQ DQG &DVSlDQ 7HUQ 7KHVH TXD0lI\ DJDlQVW 5D P VDU &UWHUlRQ ³ VHH $WWDFK P HQW ³ $SSHQGl[&
- 7KRVH VHFLHV WKDW XVH WKH VLWH RQ D UHJXlDU EDVlV DW 0HDVW WKUHH \HDUV lQ ÀYH RQ DYHUDJH RU EHWWHU IRU EUHHGlQJ

)RU WKH SXUSRVHV RI WKLV GHVFULSWlRQ RI HFR0RJlFD0 FKDUDFWHU lW lV RQ0\ WKLV 0DWHU JURXS RI VHFLHV WKDW EUHHG DW WKH VLWH ZKlFK DUH FRQVlGHUHG EH0RZ 0lJUDWRU\ DQG RWKHU ELUGV RI QRWH DUH FRQVlGHUHG lQ 6HFWlRQ

%UHHGlQJ ZHW0DQG GHSHQGHQW ELUGV

4XD0lW\DWLYH GHVFULSWlRQ

7KH IR0RZlQJ WDE0H 0lVWV ZHW0DQG GHSHQGHQW ELUG VHFLHV WKDW DUH NQRZQ WR EUHHG RU lW lV VXSSHFWHG WKH\ P lJKW ZlWKlQ WKH &RRURQJ DQG /DNHV 5D P VDU VLWH 7KlV YHU\ KlJK QX P EHU UHÁHFWV WKH GlYHUVlW\ RI VHFLHV DQG KDElWDWV WKDW WKlV V\VWH P VXSSRUWV P DNlQJ lW SRVVlE0\ RQH RI WKH P RVW l P SRUWDQ ZDWHUELUG EUHHGlQJ DUHDV lQ WKH 0 XUUD\ ' DUlQJ %DVlQ DQG SRVVlE0\ lQ VRXWKHUQ $XVWUDlD

7KH 0RXQW /RI\ 5DQJHV 6RXWKHUQ (P X ZUHQ lV D0VR IRXQG within the Ramsar area and breeds there, but has been FRQVlGHUHG H0VHZKHUH lQ WKlV UHSRUW VHH 6HFWlRQ

([D P lQDWlRQ RI WKH VX P P DU\ 0LIH KlVWRU\ lQIRU P DWlRQ DERXW WKH VHFLHV 7DE0H VKRZV D ZlGH UDQJH RI EUHHGlQJ DQG IHHGlQJ KDElWDW SUHIHUHQFHV DQG SUHIHUUHG SUH\ lWH P V WKXV P DNlQJ WKlV SDUW RI WKH HFR0RJlFD0 FKDUDFWHU EHQFK P DUNlQJ H[HUFlVH YHU\ FKD0HQJlQJ ,Q JHQHUD0 WHU P V WKHVH VHFLHV FDQ EH JURXSHG DV IR0RZV EDVHG RQ WKHlU SUHIHUUHG EUHHGlQJ KDElWDWV

- &RDVWD0 EHDFK GXQH RU lV0DQGV EUHHGHUV 3lHG &RU P RUDQW 3lHG 2\VWHUFDWFKHU +RRGHG 3 0RYHU)DlU\ 7HUQ &DVSlDQ 7HUQ 6 0YHU * X0 DQG $XVWUD0lDQ 3HlFDQ QRW D0ZD\V FRDVWD0
- ,Q0DQG VKXXE0DQGV UHHGEHGV UXVKHV DQG WXVVRFNV JUDVV0DQGV RU WUHH EUHHGHUV 7KlV JURXS lQF0XGHV JURXQG QHVWlQJ VHFLHV WKRVH WKDW SUHIHU WR EH secluded in rushes or reedbeds and also those that use tree hollows. The common theme running through this JURXS lV WKHlU SUHIHUHQFH lQ P RVW FDVHV WR EH QHDU IUHVKZDWHU ZHW0DQGV lQ JHQHUD0 2QH H[FHSWlRQ WR WKlV JURXS RI P RU H lQ0DQG EUHHGHUV lV WKH 5HG QHFNHG $YRFHW WKDW W\SlFD0\ EUHHGV DW lQ0DQG VD0W 0DNHV RQ the ground.

7DEOH 5D P VDU VLWH ZHWODQG GHSHQGHQW ELUGV EUHHGLQJ DQG VX P P DU\ OLIH KLVWRU\ LQIRU P DWLRQ							
&R P P RQ QD P H	6FLHQWLÀF QD P H	**Ramsar** FULWHULD	5HVLGHQW 5 P L J UDWRU\ 0 RU RF FDVLRQDO YLVLWRU 2	6\VWH P XQLWV ZKHUH IRXQG†	3UHIHUUHG EUHHGLQJ KDELWDW	3UHIHUUHG IHHGLQJ KDELWDW	3UHIHUUHG IRRG
3HOLFDQV)D P LO\ 3HOHFDQLGDH							
Australian 3HOLFDO	*3HOHFDQXV FRQVSLFLOODWXV*	5.2, 5.3	R		%UHHGV RQ ORZ secluded sandy islets or shores among scattered YH J HWDWLRQ +$1=$%	2 SHQ ZDWHU in terrestrial, estuarine marine waters +$1=$%	)LVK DTXDWLF LQYHUWHEUDWHV
' DUWHUV)D P LO\ $QKLQJLGDH							
Australian ' DUWHU	*$QKLQJD P HODQR J DVWHU*	"	5 0	mainly	1 HVWV LQ WUHHV RU VKUXEV RYHU ZDWHU +$1=$%	2 SHQ ZDWHU	)LVK DTXDWLF LQYHUWHEUDWHV
&RU P RUDQWV)D P LO\ 3KDODFURFRUDFLGDH							
/LWWOH 3LHG Cormorant	*3KDODFURFRUD[P HODQROHXFRV*		R		Shrubland, P DLQO\ IUHVK ZDWHU wetlands +$1=$%	2 SHQ ZDWHU	Aquatic LQYHUWHEUDWHV ÀVK
3LHG Cormorant	*3KDODFURFRUD[YDULXV*		R		Coastal rocky or sandy islands, or in estuaries, in WUHHV +$1=$%	2 SHQ ZDWHU	)LVK
/LWWOH %ODFN Cormorant	*3KDODFURFRUD[VXOFLURVWULV*	5.2	R		Shrubland in IUHVK ZDWHU wetlands, IDYRXULQJ ÁRRGHG trees in larger V\VWH P V +$1=$%	2 SHQ ZDWHU	)LVK DTXDWLF LQYHUWHEUDWHV
*UHDW %ODFN Cormorant	*3KDODFURFRUD[FDUER*	5.2	R		Shrubland or trees in or near water. Sometimes RQ FRDVWDO FOLIIV +$1=$%	2 SHQ ZDWHU	)LVK
*HHVH VZDQV DQG GXFNV)D P LO\ $QDWLGDH							
%ODFN 6ZDQ	*&\ J QXV DWUDWXV*	5.3	R		Reedbeds, ARDWLQJ YH J HWDWLRQ RSHQ ZDWHU LQ IUHVK brackish or saline, but not tidal ZDWHUV +$1=$%	*UDVV DQG weeds, bare P DU J LQV RSHQ water	3DVWXUH SODQWV aquatic SODQWV (submerged P DFURSK\WHV 6FKRO]
Australasian 6KRYHOHU	*$QDV UK\QFKRWLV*		R		*UDVV DQG ZHHGV QHDU IUHVK ZDWHU wetlands, either WH P SRUDU\ RU SHU P DQHQW +$1=$%	*UDVV DQG weeds, bare P DU J LQV RSHQ water	Aquatic LQYHUWHEUDWHV
0 XVN ' XFN#	*%LJLXUD OREDWD*	"	R		Tussocks, reedbeds	2 SHQ ZDWHU	Aquatic LQYHUWHEUDWHV ÀVK DTXDWLF SODQWV

ª FRQWLQXHG RYHUOHDI ª

7DEOH 5DPVDUVLWH ZHWODQG GHSHQGHQW ELUGV EUHHGLQJ DQG VXP PDU\ OLIH KLVWRU\ LQIRUPDWLRQ FRQWLQXHG							
&RP PRQ QDPH	6FLHQWLÀF QDPH	**Ramsar** FULWHULD	5HVLGHQW 5 PLJUDWRU\ 0 RU RFFDVLRQDO YLVLWRU 2	6\VWHP XQLWV ZKHUH IRXQG†	3UHIHUUHG EUHHGLQJ KDELWDW	3UHIHUUHG IHHGLQJ KDELWDW	3UHIHUUHG IRRG
Australian Shelduck	*7DGRUQD WDGRUQRLGHV*	5.2, 5.3	R		Shrubland, grass and weeds, sometime in trees or beneath shrubs in saltmarsh +$1=$%	%DUH PDUJLQV RSHQ ZDWHU	Aquatic LQYHUWHEUDWHV DQG SODQWV some molluscs 6FKRO]
Chestnut Teal	*$QDV FDVWDQHD*	5.2, 5.3	R		0RVWO\ LQ WUHH hollows mainly in coastal regions, or on islands or VKRUHV +$1=$%	%DUH PDUJLQV RSHQ ZDWHU	Aquatic LQYHUWHEUDWHV DQG SODQWV
5DLOV FUDNHV VZDPSKHQV FRRW)DPLO\ 5DOOLGDH							
6SRWOHVV Crake#	*3RU]DQD WDEXHQVLV*		"	"	Shrubland, reedbeds, tussocks	)RUDJH RQ PXG or shallow water near to reeds +$1=$%	Aquatic LQYHUWHEUDWHV DQG SODQWV
'XVN\ 0RRUKHQ	**DOOLQXOD WHQHEURVD*		R		Reedbeds	*UDVV DQG weeds, bare PDUJLQV RSHQ water	Aquatic LQYHUWHEUDWHV DQG SODQWV
3XUSOH 6ZDPSKHQ	*3RUSK\ULR SRUSK\ULR*		R		Reedbeds	Shrubland, reedbeds, UXVKHV ÁRDWLQJ YHJHWDWLRQ grass and weeds, bare PDUJLQV RSHQ water	Aquatic SODQWV DQG SDVWXUH SODQWV
+HURQV HJUHWV ELWWHUQV)DPLO\ $UGHLGDH							
Australasian %LWWHUQ#	*%RWDXUXV SRLFLORSWLOXV*	"	"		%UHHGV LQ GHHS GHQVH YHJHWDWHG UXVKHV RYHU shallow water +$1=$%	Terrestrial wetlands and occasionally HVWXDULHV SUHIHUV ZHWODQGV with tall dense YHJHWDWLRQ DQG IRUDJHV LQ VWLOO shallow water. +$1=$%	.QRZOHGJH JDS
/LWWOH (JUHW	*$UGHD JDU]HWWD*		R		1HVWV LQ WUHHV QHDU YHJHWDWHG ZHWODQGV IUHVK brackish, marine RU VDOLQH +$1=$%	Shrubland, grass and weeds, bare margins	)LVK DTXDWLF LQYHUWHEUDWHV and YHUWHEUDWHV
&DWWOH (JUHW	*$UGHD LELV*		0		1HVWV LQ GHQVHO\ wooded areas in RU QHDU VZDPSV +$1=$%	Terrestrial wetlands, and DOVR JUDVVODQGV RIWHQ IRUDJH on grasslands RU SDVWXUH +$1=$%	*UDVVKRSSHUV insects mostly +$1=$%

7DEOH 5DPVDU VLWH ZHWODQG GHSHQGHQW EUGV EUHHGLQJ DQG VXPPDU\ OLIH KLVWRU\ LQIRUPDWLRQ FRQWXHG

&RPPRQ QDPH	6FLHQWLÀF QDPH	**Ramsar** FULWHULD	5HVLGHQW 5PLJUDWRU\ 0RU RFFDVLRQDO YLVLWRU 2	6\VWHP XQLW ZKHUH IRXQG†	3UHIHUUHG EUHHGLQJ KDELWDW	3UHIHUUHG IHHGLQJ KDELWDW	3UHIHUUHG IRRG
*UHDW (JUHW	*$UGHD D0ED*		R		Shrubland or ÁRRGHG WUHHV +$1=$%	5XVKHV ÁRDWLQJ YHJHWDWLRQ grass and weeds, bare margins	)LVK DTXDWLF LQYHUWHEUDWHV and YHUWHEUDWHV
:KLWH IDFHG +HURO	*$UGHD ORYDHKRWDQGLDH*		R		Shrubland or trees not necessarily near water 6FKR]	)ORDWLQJ YHJHWDWLRQ grass and weeds, bare margins	)LVK DTXDWLF YHUWHEUDWHV crustaceans 6FKR]
5XIRXV 1LJKW +HURQ	*1\FWRFRUD[FDUHGRQLFXV*		R		1HVWV LQ YDULRXV 0RFDWLRQV WUHHV RII VKRUH LVODQGV on the ground HWF +$1=$%	Littoral, estuarine or LQODQG ZHWODQGV mainly nocturnal IRUDJLQJ LQ VWUO RU VWRZ PRYLQJ shallow water +$1=$%	&DUQLYRUH mostly AVK DVR insects and crustaceans 6FKR]
,ELVHV VSRRQELOOV)D PLO\ 7KUHVNLRUQLGDH							
*ORVV\ ,ELV	*3HJDGLV ID0FLQH0XV*		R		%UHHGV LQ IUHVK RU EUDFNLVK ZHWODQGV among reeds, lignum, rushes, shrubs or trees +$1=$%	)RUDJH LQ shallow ZDWHUV RYHU VRIW VXEVWUDWH or muddy HGJHV RI wetlands, either IUHVKZDWHU or sheltered marine +$1=$%	Aquatic LQYHUWHEUDWHV and insects +$1=$%
6WDZ QHFNHG ,ELV	*7KUHVNLRUQLV VS1QFR0LV*		R		Shrubland, UHHGEHGV FDQ IRU P 0DUJH colonies, breeding RIWHQ WLJ JHUHG E\ ÁRRG1QJ +$1=$%	*UDVV DQG weeds	)LVK DTXDWLF LQYHUWHEUDWHV and YHUWHEUDWHV
Australian :KLWH ,ELV	*7KUHVNLRUQLV P R0XFFD*		R		Shrubland, reedbeds	*UDVV DQG weeds	)LVK DTXDWLF LQYHUWHEUDWHV and YHUWHEUDWHV
5R\DO 6SRRQELO	*3DWDODHD UHJ1D*		5"		6KUXE0DQG RYHU or near water +$1=$% RU WUHHV 6FKR]	2SHQ ZDWHU	)LVK DTXDWLF LQYHUWHEUDWHV
<H0ORZ E00HG 6SRRQEL0	*3DWDODHD ÁDYLSHV*		5"		Shrubland in IUHVKZDWHU wetlands +$1=$% RU WUHHV 6FKR]	2SHQ ZDWHU	Aquatic LQYHUWHEUDWHV ÁVK

ª FRQWXHG RYHUHDI ª

7DEOH 5DPVDU VLWH ZHWODQG GHSHQGHQW EUGV EUHHGLQJ DQG VXPPDU\ OIH KLVWRU\ LQIRUPDWLRQ FRQQXHG

&RPPRQ QDPH	6FLHQWLFAF QDPH	**Ramsar** FULWHULD	5HVLGHQW 5PLJUDWRU\ 0RU RFFDVLRQDO YLVLWRU 2	6\VWHP XQLW ZKHUH IRXQG†	3UHIHUUHG EUHHGLQJ KDELWDW	3UHIHUUHG IHHGLQJ KDELWDW	3UHIHUUHG IRRG
2\VWHUFDWFKHUV)DPLO\ +DHPDWRSRGLGDH							
3LHG 2\VWHUFDWFKHU	*+DHPDWRSXV 0RQJLURVWLV*		R		1HVWV RQ VDQG VKHO JUW RU VKLQJOH IXW DERYH KLJK water mark on EHDFKHV RU VDQG EDU +$1=$%	)HHGV RQ HSRVHG VDQG mud, rock or FRUDO +$1=$%	.QRZ0HGJH JDS
/DSZLQJV SURYHUV GRWHUHOV)DPLO\ &KDUDGULLGDH							
+RRGHG 3RYHU	*&KDUDGULXV UXEULFR0LV*		R		%UHHGV DW VL PLDU locations to ZKHUH WKH\ IHHG W\S LFD0\ F0RVH WR WKH IRUH GXQH YHJHWDWLRQ +$1=$%	3UHIHUV Z\GH ÁDW RFHDQ beaches, HVSHFLD0\ WKRVH with seaweed SUHVHQW +$1=$%	.QRZ0HGJH JDS
5HG FDSSHG 3RYHU	*&KDUDGULXV UXAFDSL0XV*		5"		%UHHGV LQ RSHQ areas or low YHJHWDWLRQ around the PDUJLQV RI terrestrial wetlands, H[SRVHG VDQG\ shorelines or on PDWV RI ZHHGV +$1=$%	)HHGV RQ sand and PXGADWV D0RQJ the edges RI HVWXDULHV lagoons and 0DNHV DQG HYHQ DW LPHV JUDYH0 or shellgrit +$1=$%	.QRZ0HGJH JDS
0DVNHG /DSZLQJ	*9DQHO0XV PLHV*		R		1HVWV RQ JURXQG in short grass FP RU VWRQ\ ground on small LV0DQGV ÁRDWLQJ UHHGV 6FKR0]	)RUDJHV D0RXQG natural (and PRGLÅHG LQ0DQG wetlands, either IUHVK ZDWHU RU saline, and both SHU PDQHQW DQG WH PSRUD0\ wetlands. +$1=$%	0R0XVFV worms, insects, crustaceans, and occasionally VHHGV 6FKR0]
6WLOWV DYRFHWV)DPLO\ 5HFXUYLURVWULGDH							
%0DFN Z\QJHG Stilt	*+LPDQWRSXV K\PDQWRSXV*		5 0		1HVWV RQ LV0HWV or hummocks surrounded by shallow water. +$1=$%	)RUDJHV LQ shallow water, IUHVK RU VDLQH RQ VDQGÁDWV RIWHQ ZKHUH there is dense YHJHWDWLRQ RI grass or other emergents. +$1=$%	0R0XVFV crustaceans, and occasionally YHJHWDWLYH matter and seeds 6FKR0]

7DEOH 5DPVDU VLWH ZHWDQG GHSHQGHQW EUGV EUHHGLQJ DQG VXPPDU\ OLIH KLVWRU\ LQIRUPDWLRQ FRQWLQXHG							
&RPPRQ QDPH	6FLHQWLÀF QDPH	**Ramsar** FULWHULD	5HVLGHQW 5PLJUDWRU\ 0RU RFFDVLRQDO YLVLWRU 2	6\VWHP XQLW ZKHUH IRXQG†	3UHIHUUHG EUHHGLQJ KDELWDW	3UHIHUUHG IHHGLQJ KDELWDW	3UHIHUUHG IRRG
5HG QHFNHG $YRFHW#	*5HFXUYLURVWUD ORYDHKROODQGLDH*	"	0 5		%UHHGV PRVW\ DW LQDQG VDW ODNHV nesting on bare ground or in ORZ YHJHWDWLRQ +$1=$%	)RXQG LQ HSKHPHUDO LQDQG IUHVK saline and K\SHU VDOLQH wetlands, HVSHFLDOO\ drying salt lakes.)HHGV LQ VRIW mud areas, wading to their EHO\ +$1=$%	0RVWO\ crustaceans, and occasionally YHJHWDWLYH matter and seeds 6FKR] occasionally V P DOO ÀVK
*XOOV WHUQV HWF)DPLO\ /DULGDH							
)DU\ 7HUQ	*6WHUQD QHUHLV*		R		1HVWV DERYH high water on sheltered EHDFKHV VSLWV RU VDQG EDUV RIWHQ LQ estuaries and on LVODQGV +$1=$%	Sheltered coasts DQG HVWXDULHV IUHVK RU VDOLQH QHDU FRDVWDO wetlands +$1=$%	6P DOO ÀVK
Crested Tern	*6WHUQD EHUJLL*	5.2	R		%UHHGV RQ LVODQGV sandy cays and EDQNV JUHJDULRXV when breeding +$1=$%	)HHG IUR P VXUIDFH RI sea, mainly in LQ VKRUH ZDWHUV +$1=$%	)LVK
&DVSLDQ 7HUQ	*+\GURSURJQH WVFKHJUDYD +\GURSURJQH FDVSLD*		R		%UHHGV RQ LVODQGV sandy cays and EDQNV +$1=$%	)RUDJHV LQ RSHQ ZHWDQGV RIWHQ LQ sheltered water areas near the margins +$1=$%	)LVK crustaceans
Whiskered Tern#	*&KOLGRQLDV K\EULGXV*	" 5.2, 5.3	R		2IWHQ QHVWV LQ WH P SRUDU\ ARRGHG LQDQG ZHWDQG ADWV FUD\ SDQV D P RQJ inundated YHJHWDWLRQ +$1=$%	,QDQG ZHWDQGV with emergent and submerged YHJHWDWLRQ +$1=$%	)LVK LQVHFWV crustaceans, FDUQLYRURXV
3DFLÀF *XO#	*/DUXV SDFLÀFXV*	"	R		%UHHGV RQ RII shore rocky islets P RVW\ VR P HWL P HV on sandy islets RU VDQGÁDWV +$1=$%	)RUDJHV along coast between high DQG ORZ WLGH shallow waters, sandy beaches DQG H[SRVHG P XGÁDWV	.QRZOHGJH JDS
6OYHU *XO	*/DUXV ODYDHKROODQGLDH*	5.2, 5.3	R		3UHIHUV RII VKRUH islands, but will breed in many KDELWDWV +$1=$%	&RV P RSRQWDQ IRXQG DFURVV D UDQJH RI natural and EXLW HQYLURQV +$1=$%	2 P QLYRURXV VFDYHQJHU

7DE0H 5D P VDU VLWH ZHWDQG GHSHQGHQW EUGV EUHHGLQJ DQG VX P P DU\ 0LIH KLVWRU\ LQIRU P DWLRQ FRQWLQXHG							
&R P P RQ ULD P H	6FLHQWLÁF ULD P H	**Ramsar** FULWHULD	5HVLGHQW 5 P LJUDWRU\ 0 RU RFFDVLRQDO YLVLWRU 2	6\VWH P XQLV ZKHUH IRXQG†	3UHIHUUHG EUHHGLQJ KDELWDW	3UHIHUUHG IHHGLQJ KDELWDW	3UHIHUUHG IRRG
2 0G ZRUG ZDUE0HUV)D P LO\ 6\0YLLGDH							
* UHDW 2 ULHQWDO 5HHG : DUE0HU	*\$FURFHSKDOXV DUXQGLQDFHXV*		0		. QRZ0HGJH JDS	. QRZ0HGJH JDS	.QYHUWHEUDWHV
/LWWOH * UDVVELUG	*0 HJDOXUXV JUD P LQHXV*		0		. QRZ0HGJH JDS	. QRZ0HGJH JDS	.QYHUWHEUDWHV
* R0GHQ headed Cisticola#	*&LVWLFR0D H[LOLV*	"	0		. QRZ0HGJH JDS	)RUDJHV LQ reedbeds, tussocks DQG ÁRDWLQJ YHJHWDWLRQ in shallow VZD P SV DQG HYHQ VKRUHLQHV RI GHHSHU wetlands 6HD P DQ	.QYHUWHEUDWHV

7KH RUGHU XVHG DERYH IR0R ZV WKDW RI *)LH0G * XLGH WR WKH %LUGV RI \$XVWUDOLD* WK (GLWLRQ E\ 6L P SVRQ DQG ' D\

KEY

Shrubland – *0 H0DHDXFD KD0P DWXUR P* 5HHGEHGV ³ VWDQGV RI 7*SKD* VSS DQG *3KUDJ P LWHV DXVWUDOLV* 5XVKHV ³ ' LYHUVH EHGV 7XVVRFN ³ P DLQ\ *Gahnia ÁXX P*)0RDWLQJ YHJHWDWLRQ ³ *7UJ0RFKQ SURFHUX P* DQG RWKHU S0DQWV IQ IUHVK ZDWHU %DUH P DU JLQV ³ VXE0HF WR LQXQGDWLRQ RU G0\ 2 SHQ ZDWHU ³ DHD RI ZDWHU Z LWK QR H P HU JHQW RU RYH0KDJLQJ YHJHWDWLRQ

² 0 X0D\ 0 RXWK DQG (VWXD\ ² 1R0WK /DJRRQ ² 6RXWK /DJRRQ ² /DNH \$0EHW ² /DNH \$0H[DQG0LQD ² 7LE XWD\ ZHWDQGV ,QIRU P DWLRQ P RV\ IUR P (DWKWHFK FWHG DV 3 \$ 3DWRQ EDVHG RQ -DHQVFK DQG SHUVRQD REVHUYDWLRQV DQG +\$1=\$% DQG

²)RU WKHVH VSHFLHV WKHUH KDV EHHQ QR FRQÀU P DWLRQ WKDW WKH\ EHHG ZLWKLQ WKH 5D P VDU VLWH DWKRXJK LW LV FRQVLGHUHG 0LNH0\ : KHUH IRXQG 6\VWH P XQLV

6RU0FH (DWKWHFK FWHG DV 3 \$ 3DWRQ EDVHG RQ -DHQVFK DQG SHUVRQD REVHUYDWLRQV DQG +\$1=\$% DQG XQHVV RWKHUZLVH LQGLFDWHG

Crested Tern

.H\ GULYHUV 0HYHUV FR P SRQHQWV DQG SURFHVVHV *LYHQ WKH GLYHUVLW\ RI VSHFLHV DQG DV KLJKLJKWHG DERYH WKHLU UDQJH RI EUHHGLQJ IHHGLQJ DQG GLHWDU\ SUHIHUHQFHV LW LV QRW SRVVLE0H KHUH WR GHWDLO WKH NH\ GULYHUV 0HYHUV FR P SRQHQWV DQG SURFHVVHV IRU HDFK RI WKH VSHFLHV RU HYHQ IRU DVVH P E0D J HV

: K00H SDVW VXUYH\V KDYH LGHQWLAHG VR P H DUHDV RI WKH Coorong and Lakes where waterbirds breed, there has QRW EHHQ D IX00 LQYHQWRU\ RU DQ\ RQ JRLQJ P RQLWRULQJ WR D00R Z DQ DS SUHFLDWLRQ RI KR Z EUHHGLQJ SDWWHUQV RU VXFFHVV UDWHV YDU\ VHDVRQD00\ RU RYHU 0RQJ HU SHULRGV 6R P H RI WKH EUHHGLQJ REVHUYDWLRQV GRFX P HQWHG LQ UH0DWLRQ WR WKH YDULRXV ZHW0DQGV W\SHV RI WKH V\VWH P LQ 6HFWLRQ KDYH EHHQ VX P P DULVHG LQ WKH IR00R Z LQJ WDE0H &0HDU0\ WKHVH GR QRW UHÀHFW WKH IX00 UDQJH RI KDELWDWV XVHG E\ WKH ZHW0DQG GHSHQGHQW ELUGV RI WKH &RRURQJ DQG /DNHV 5D P VDU VLWH KR Z HYHU WKH\ GR SURYLGH some insights.

7KLV 0DFN RI VSHFLÀF GDWD 0L P LWV WKH RS SRUWXQLWLHV IRU VHWWLQJ 0L P LWV RI DFFHSWDE0H FKDQJH IRU WKHVH YDULRXV VSHFLHV VHH WKH IR00R Z LQJ SDJH D0WKRXJK 3DWRQ E SURYLGHV VR P H IXUWKHU GDWD WKDW LV QRWDE0H IRU VR P H RI WKHVH VSHFLHV

7DEOH 6XPPDU\ RI QRWHG ELUG EUHHGLQJ KDELWDWV DURXQG WKH &RRURQJ DQG /DNHV 5DPVDU VLWH		
:HWDQG W\SH	6\VWHP 8QLW	%UHHGLQJ REVHUYDWLRQV
)UHVKZDWHU V\VWHPV XQLWV		
' ² 5RFN\ PDULQH VKRUHV LQFOXGHV URFN\ RIIVKRUH LVODQGV VHD FOLIIV	Lake Alexandrina	7KLV KDELWDW\SH LV OLNHO\ WR EH DQ LPSRWDQW QHVWLQJ VLWH IRU VRPH ELUG VSHFLHV DQG WKH FRPSOH[VKRUHOLQHV DUH OLNHO\ WR EH LPSRWDQW IRU ÀVK DQG RWKHU DTXDWLF ELRWD 7KHVH URFN\ DUHDV DUH ORFDWHG • HDVWHUQ VKRUH RI /DNH $OH[DQGULQD EHORZ :HOLQJWRQ 3RWD2ORFK 3ODLQV • VRXWKHUQ HGJH RI 3RLQW 6WXUW • LQ SDWFKHV DORQJ ODNHVKRUH EHWZHHQ &OD\WRQ DQG 3RLQW 6WXUW
7S ² 3HUPDQHQW IUHVKZDWHU PDUVKHV SRRU SRQGV EHORZ KD PDUVKHV DQG VZDPS SV RQ LQRUJDQLF VRLO ZLWK H P HUJHQW YHJHWDWLRQ ZDWHU JHG IRU DW 0HDVW P RVW RI WKH JURZLQJ season	Lake Alexandrina, Lake Albert	7KH DUHDV RI UHHGEHGV WKDW ZHUH UHFRUGHG DV ZDWHUEUG URRNHULHV SUH EDUDJH FRQVWUXFWLRQ VWLO H[LVW DQG VXSSRUW VHDVRQDO EUHHGLQJ FRURQHV : DWHUEUG EUHHGLQJ DUHDV RQ /DNH $OH[DQGULQD LQF0XGH 7RGHUR 3RLQW 6QDNH ,V0DQG 0 RVTXWR 3RLQW %RJ J \ /DNH DUHD 6RXWK RI 0 LDQJ .LQGDUXDU &RUQHU 5HHG\ 3RLQW 2 SSRVVXP &OD\WRQ * RDW ,V0DQG * RRVH ,V0DQG)LQQLVV 5LYHU P RXWK &XUUHQF\ &UHHN P RXWK 6DW /DJRRQ LV0DQGV &RRNGZHUK /DJRRQ 5DW ,V0DQG DQG 5XVK\ ,V0DQG (DUK7HFK 2 WKHU DUHDV RI H[WHQVLYH DQG GHQVH P P HU J HQW YHJHWDWLRQ LQF0XGH /RYHGD\ %D\ FRQQHFWLRQ EHWZHHQ 0 XG ,V0DQG DQG /RJ ,V0DQG 3HLFDQ /DJRRQ 5LYHU 0 XUD\ FRQÁXHQFH QHDU : HOQJWRQ DQG WULEXWDU\ FRQÁXHQFHV 7KH UHHGEHGV LQ WKH 1DUURZ DQG RWKHU DUHDV KDYH EHFR P H QRWHG DV 0RQ J WHU P URRNHU\ VLWHV IRU VHYHUDO VSHFLHV RI LELV VSRRQEL0 DQG FRU P RUDQWV 7KH SURWHFWHG VKD0RZ ZHW0DQG DUHDV RQ WKH LQVKRUH DUHDV RI WKH UHHGEHGV DUH LP SRWDQW KDEWDW IRU V P D0 AVK VSHFLHV 0 '%& ,Q /DNH $0EHUW WKLV KDEWDW LV LGHQWLÅHG DV FULWLFDO ELUG KDEWDW LQ WKH IR0RZLQJ DUHDV I0RP 3DWRQ • 1DUXQJ 1DUURZ ³ ZDWHUEUGV DQG LELV DUHD LQFRUSRUDWHV 7S 2 : DQG 6V KDEWDWV • 5HHG\ 3RLQW ³ ZDWHUEUGV SHLFDQV 7S 2 • : DWRZD 6ZDPS ³ ZDWHU IRZ0 ZDWHUEUGV ZDGHUV 7S 6V : • : DULQJHH 3RLQW ³ ZDWHU IRZ0 ZDGHUV 7S 2
W – 6KUXE GR P LQDWHG ZHW0DQGV VKUXE VZDP SV VKUXE GR P LQDWHG IUHVKZDWHU marshes, shrub carr, alder thicket on inorganic soils	Lake Alexandrina, Lake Albert	5H P QDQW VD P SKUH FR P PXQLWLHV VXSSRUW GLYHUVH IDXQD0 DVVH P E0DJHV : KHQ FR P E0QHG ZLWK 0LJQX P RU SDSHUEDUN WKH\ EHFR P H L P SRWDQW URRNHU\ VLWHV DQG D0R RIIHU VKH0WHUHG IHHG0QJ JURXQGV LQ VH P L SHU P DQHQW 0DJRRQV 0 '%&)RU H[D P S0H &RR0QGHUZHUK /DJRRQ LV D 6ZDP S 3DSHUEDUN I0QJHG VD P SKUH ZHW0DQG UHSUHVHQWLQJ KDEWDW WKD W LV QRZ FRQVLGHUHG YHU\ UDUH LQ WKH /DNHV 6D P SKUH ZHW0DQGV 7\SH : RFFXU LQ D QX P EHU RI DUHDV ZKLFK DUH FRQVLGHUHG DV FULWLFD0 KDEWDW IRU ZDWHUEUGV I0RP 3DWRQ • +LQG P DUVK ,V0DQG DQG RWKHU EDUDJH LV0DQGV ³ ZDWHUIRZ0 ZDGHUV ZDWHUEUGV DQG &DSH %DUHQ * HHVH LQF0XGHV KDEWDW\SHV : • 0 0DQJ VKRUH ³ ZDWHUIRZ0 ZDGHUV ZDWHUEUGV : 7V 7S • 0 0DQJ 7RZQ ³ /DKD P ·V 6QLSH : • : HOQJWRQ 3RLQW ³ 'UWHUV ZDWHUEUGV : • 3RWD0RFK ³ ZDWHUIRZ0 ZDGHUV ZDWHUEUGV : 6V • <D0NXU DQG 6D0 0DJRRQ ³ ZDWHUIRZ0 ZDGHUV 7S : ;I • FRU P RUDQW QHVWLQJ VLWH 6D0 /DJRRQ &RQVHUYDWLRQ 3DUN /XFHQQH ,V0DQG : ;I
:I ²)UHVKZDWHU WUHH GR P LQDWHG ZHW0DQGV LQF0XGHV IUHVKZDWHU VZDP S IRUHVWV VHDVRQDO0\ ÁRRGHG IRUHVWV ZRRGHG VZDP SV RQ LQRUJDQLF soils	Lake Alexandrina, Tributaries	&RR0QGHUZHUK /DJRRQ DQG 'XQQ·V /DJRRQ DUH 6ZDP S 3DSHUEDUN I0QJHG ZHW0DQGV UHSUHVHQWLQJ KDELWDW WKDW LV QRZ FRQVLGHUHG YHU\ UDUH LQ WKH 0DNHV 7KH ZHW0DQG ÁRU0D D WKHVH VLWHV LV FR P S0H[G0LYHG E\ YDULDWLRQ LQ VRL0 VD0LQW\ 0HYH0V DQG WRSRJUDSK\ 7KHVH KDELWDWV VXSSRUW GLYHUVH IDXQD0 DVVH P E0DJHV ZKH WKH SDSHUEDUN EH0QJ LP SRWDQW URRNHU\ VLWHV DQG QHVWLQJ DQG IRUDJ0QJ JURXQGV IRU D Z0GH UDQJH RI ZDWHUEUGV -HQVHQ HW D0 7KH\ D0R RIIHU VKH0WHUHG IHHG0QJ JURXQGV LQ VH P L SHU P DQHQW 0DJRRQV 0 '%&
6D0LQH HVWXDU0QH V\VWHPV XQLWV		
' ² 5RFN\ PDULQH VKRUHV LQF0XGHV URFN\ RIIVKRUH LV0DQGV VHD FOLIIV	0 XUD\ 0 RXWK DQG (VWXDU\ 1 RUWK /DJRRQ South Lagoon	,VR0DWHG SDWFK RI URFN\ LQ0DQG VKRUHV RI DSSUR[P DWH0\ KD LQ WKH 0 XQGRR &KDQH0 FR P SUVHG RI H[SRVHG FD0FUHWH RXW0FURSV S0XV D WKLQ EDQG D0RJ WKH QRWK ZHVWHUQ VKRUH0LQH RI 1 RUWK /DJRRQ DQG LVR0DWHG SDWFKHV RQ WKH QRUWKH0Q SDW RI 6RXWK /DJRRQ 7KHVH DUHDV DUH LP SRWDQW IRU E0G IRUDJ1QJ HVSHFL0\ HJ0HWV DQG 0DJ HU ZDWHUEUGV $V ZDWHU UHFHGHV LQ WKH VSUQJ WKHVH DUHDV EHFR P HV L P SRWDQW QHVWLQJ VLWHV IRU ZDWHUIRZ0 VXFK DV SH0FDQV DQG &DVS1DQ 7HUQ SDUWLFX0U\ LQ WKH LV0DQG DUHDV 2 ERUQH

7DEOH 6XPPDU\ RI QRWHG EUG EUHHGLQJ KDELWDWV DURXQG WKH &RRURQJ DQG /DNHV 5DPVDU VLWH FRQWLQXHG		
: HWDQG W\SH	6\VWHP 8QLW	%UHHGLQJ REVHUYDWLRQV
6DLQH HVWXDULQH V\VWHP XQLWV		
+ ² ,QWHUWLGDO PDUVKHV includes salt marshes, salt meadows, saltings, UDLVHG VDW PDUVKHV includes tidal brackish DQG IUHVKZDWHU marshes	0 XUD\ 0RXWK DQG (VWXDU\ 1RUWK /DJRRQ	7KHVH ZHWODQGV DUH DUHDV WKDW DUH LQXQGDWHG GLXUQDO\ ZLWK WLGDO ÅRZ DURQJ WKH *RRZD FKDQQHO DQG LQWR WKH 1RUWK /DJRRQ 7KH\ DVR UHFHLYH VR P H IUHVKZDWHU LQSXW IUR P 0RFD FDWFK P HQW DQG JURXQGZDWHU 7KHVH DUHDV DUH FRQVLGHUHG L P SRUWDQW IRUDJLQJ DUHDV IRU UDUV FUDNHV DQG ZDWHUKHQ QHVWLQJ KDELWDW IRU D UDJH RI ZDWHUEUGV DV ZHO DV UHIXJH DUHDV IRU V P DO QDWLYH ÅVK %UDQGH
. ² ,QWHUWLGDO IRUHVWHG ZHWODQGV LQF0XGHV P DQJURYH VZDP SV QLSDK VZDP SV DQG WLGDO IUHVKZDWHU VZDP S IRUHVWV	0 XUD\ 0RXWK DQG (VWXDU\	6P DO DUHD DSSUR[L P DWH0\ KD LQ WKH 0 XQGRR &KDQQH0 QHDU WKH FRQÅXHQFH RI +XQWHU·V &UHHN DQG 0 XUD\ 0RXWK (VWXDU\ 7KH WUHHV UHSUHVHQW DQ L P SRUWDQW QHVWLQJ VLWH IRU D UDJH RI ZDWHUEUGV -HQVHQ HW D ,Q DGGLWLRQ WKH UHHGEHGV SURYLGH QHVWLQJ DQG IRUDJLQJ KDELWDW IRU VR P H ZDWHUEUG VSHFLHV DQG ZKHQ IXQGDWHG KDELWDW IRU DTXDWLF IQYHUWHEUDWHV
. ² &RDVWDO IUHVKZDWHU 0DJRRQ IQF0XGHV IUHVKZDWHU GH0D lagoons	0 XUD\ 0RXWK DQG (VWXDU\ 1RUWK /DJRRQ	,VR0DWHG SDWFKHV RI GLVFKDUJLQJ IUHVK JURXQGZDWHU DSSHDU DURQJ WKH GXQHV SDUWLFX0DU\ WKH VRXWKHUQ VKRUH RI 1RUWK /DJRRQ 2 IWHQ DVVRFLDWHG ZLWK VD P SKUH FR P P XQLWHV WKHVH SDWFKHV RI UHHGV SURYLGH D UDQJH RI ELUGV ZLWK QHVWLQJ DQG IRUDJLQJ KDELWDW

3DWRQ SURYLGHV GHWDLOHG GDWD RQ WKH GLVWULEXWLRQ DQG DEXQGDQFH RI DTXDWLF EUGV WKDW LV QRW RQ\ ZDGHU VSHFLHV LQ WKH &RRURQJ IRU WKH SHULRG ² DQG KH FRQF0XGHV WKDW VHYHUD0 RI WKH AVK HDWLQJ EUG VSHFLHV KDG UHGXFHG QX P EHUV DQG EUHHGLQJ DFWLYLWLHV in the South Lagoon, due, it is assumed to the reduced DYDLODEL0W\ RI IRRG LWH P V DQG 6 P D0 P RXWKH +DUG\KHDG (*\$WKHULQRVR P D P LFrURVR P D LQ SDUWLFX0DU 7KLV LQF0XGHV VSHFLHV VXFK DV \$XVWUD0DQ 3H0LFDQ VR P H ZDWHUIRZ0 VPHFLHV)DLU\ 7HUQ DQG +RU\ KHDGHG *UHEH 7KLV UHÁHFWV D VLJQLÅFDQW FKDQJH LQ WKH HFR0RJLFD0 FKDUDFWHU RI WKLV SDUW RI WKH VLWH 6HFWLRQ H[D P LQHV RWKHU DVSHFWV RI WKH 3DWRQ UHSRUW D0VR

,Q SDUWLFX0DU 3DWRQ E QRWHV WKH IR0RZLQJ

\$XVWUD0LDQ 3H0LFDQ ³ QX P EHUV VXEVWDQWL0\ 0RZHU in 2003–2005 than 2000–2002, with these declines occurring mostly in the South Lagoon. There has EHHQ 0LWW0H RU QR SH0LFDQ EUHHGLQJ RQ WKH LV0DQGV QHDU 3R0LFH P DQ·V 3RLQW GHVSLWH WKHUH EH0LQJ D 0DUJH EUHHGLQJ FR0RQ\ WKHUH LQ WKH SDW 7KLV GHF0LQH SURREDE0\ UHÁHFWV UHGXFHG DYDL0DE0LW\ RI V P D0 ÀVK DV UHFRUGHG LQ WKH IRRG WH P V UHVHDUFK UHSRUWHG RQ LQ 6HFWLRQ

2. 2WKHU SUHGR P LQDQW0\ ÀVK HDWLQJ VSHFLHV ³ WKHUH KDYH EHHQ UHGXFHG WLQ WKH QX P EHUV RI)DLU\ 7HUQ &DVSLDQ 7HUQ DQG YDULRXV H JUHWV DQG KHURQV 3DWRQ QRWHV WKH IR0RZLQJ WR L0XVWUDWH WKH HFR0RJLFD0 FKDQJHV LQ WKH South Lagoon.

D)DLU\ 7HUQ ³ 3DWRQ E QRWHV WKH FDVH RI)DLU\ 7HUQ D VSHFLHV IRU ZKLFK KDG\KHDG ÀVK LV WKH NH\ SUH\ LWH P +H QRWHV DV IR0RZV ¶Q WKH V LQ H[FHVV RI)DLU\ 7HUQV XVHG WKH 6RXWK /DJRRQ D0RQH ,Q ² EHWZHHQ WR)DLU\ Terns were counted throughout the Coorong, but VLQFH WKHQ WKH QX P EHUV KDYH EHHQ FRQVLVWHQW\ EH0RZ DQG GUPSSLQJ EH0RZ LQ -DQXDU\ )XUWKHU P R0H WKH QX P EHUV RI 0XYHQ0H EUGV KDYH DFFRXQWHG IRU 0HVV WKDQ RI WKH)DLU\ 7HUQV LQ UHFHQW FRXQWV VXJJHVWLQJ UHSURGXFWLYH VXFFHVV KDV EHHQ 0RZ LQ UHFHQW \HDUV)DLU\ 7HUQV 0LNH RWKHU SVFLYLRRXV VPHFLHV KDYH 0DJH0\ YDFDWHG WKH VRXWKHUQ &RRURQJ GXLQJ DQG UHÁHFWLQJ WKH UHGXFWLRQV LQ WKH DEXQGDQFH RI KDUG\KHDG ÀVK LQ WKLV SDUW RI WKH &RRURQJ 1R EUHHGLQJ FR0RQLHV RI)DLU\ 7HUQV KDYH EHHQ GHWHFWHG LQ WKH VRXWKHUQ Coorong during the last two years, although V P D0 QX P EHUV RI EUGV KDYH EUHG QHDU WKH 0 XUD\ 0 RXWK ·

E +RU\ KHDGHG *UHEH ³ ¶\$0WKRXJK WKH WRWD0 QX P EHUV RI +RU\ KHDGHG *UHEHV LQ WKH &RRURQJ KDYH EHHQ UHDVRQDE0\ FRQVLVWHQW VLQFH WKH\ KDYH 0DJH0\ YDFDWHG WKH VRXWKHUQ &RRURQJ LQ WKH 0DVW WZR \HDUV ,Q -DQXDU\ WKH\ ZHUH YLUWXDO\ DEVHQW IUR P WKH VRXWKHUQ &RRURQJ DQG FRQFHQWUDWHG LQ WKH P LGG0H VHFWLRQV RI WKH 1RUWK /DJRRQ ZKHUH KDG\KHDG ÀVK ZHUH P RUH DEXQGDQW)RU FR P SDUVRQ LQ -DQXDU\ RYHU +RU\ KHDGHG *UHEHV ZHUH XVLQJ WKH 6RXWK /DJRRQ DQG LQ WKH V RYHU ZHUH FRQWHG just in the South Lagoon.'

6XSSRUWLQJ WKH DERVH QRWHV DERXW GHF0LQHV LQ EUHHGLQJ HIIRUW DQG SUHVHQFH RI VR P H VSHFLHV LQ WKH &RRURQJ DUH WKH IR0RZLQJ REVHUYDWLRQV IUR P WKH 1 JDULQGHHU FR P P XQW\ DQG WKUHH RI WKH 0RQ WHU P ÀVKLQJ ID P LOLHV RI WKH &RRURQJ VHH 6HFWLRQ IRU IX0 DFFRXQWV

Ngarrindjeri community

Bird numbers, both resident and migratory species, have declined dramatically and breeding of all species is very low, even for pelicans and sea gulls. Of particular note is the loss of Black Swans and Eastern Curlews. In the 1960s, the water of the Coorong lagoons was black with swans and now they are rarely seen due to the lack of their preferred 'swan weed' food. Today they stay in the freshwater areas around the lakes in order to get food from the submerged plant beds on the fringes of the lakes. Swans are also seen in paddocks getting green feed now because of the lack of swan weed in the Coorong. Similarly, Eastern Curlews were seen every year in large numbers in the Coorong Lagoons but now only a few are seen near the Murray Mouth.

Neil and Nancy Ferguson—long-term residents of South East South Australia and Coorong fishing for 30 years

The pelicans are still breeding on Pelican Island but there are not many at all now and they have to fly to the lakes to get food so lots of the young ones are dying from lack of food. Not many at are making it now.

2003 was the major turning point, before then pelicans would move around here in mobs of 40 to 50, Oystercatchers stopped nesting about two years ago too, no feed.

Bob Hera-Singh—Coorong fisher and hunter, 1940s to present

Swan Island used to be covered in swan nests. The last swan nests on the Coorong. They haven't nested there for 12 years. There are still a few swans breeding around the lakes but nowhere near what there were and none on the Coorong. If you go south of Pelican Point you might see 50 pelicans on a good day, there used to be thousands.

Right up until a few years ago, pelicans were still breeding in good numbers on Pelican Island but now there are very few and unlikely to successfully fledge. Seagulls also used to nest so densely on the islands that you couldn't walk for eggs.

Frank Gibbs—Coorong fisher and hunter from the 1930s to present

We used to hear swans flying all night—it kept us awake.

/L P LWV RI DFFHSWDE0H FKDQJH DQG WUDIÀF 0L J KW DVVHVV P HQW $W SUHVHQW WKHUH LV QR V\VWH P DWLFD00\ FR0HFWHG IQIRU P DWLRQ WR LQGLFDWH WKH VL]H GLVWULEXWLRQ DQQXD0 RU VHDVRQD0 YDULDWLRQV DQG VXFFHVV RI WKHVH EUHHGLQJ SRSX0DWLRQV ZLWKLQ WKH 5D P VDU VLWH WKXV P DNLQJ LW L P SRVVLE0H WR VHW P HDQLQJ IX0 0L P LWV RI DFFHSWDE0H FKDQJH DFURVV WKLV UDQJH RI VSHFLHV 2QFH P RUH V\VWH P DWLF VXUYH\V DUH FRQGXFWHG WR P DS DQG DVVHVV WKH IX0 H[WHQW RI EUHHGLQJ DUHDV LW VKRX0G EH SRVVLE0H WR VHW 0L P LWV RI DFFHSWDE0H FKDQJH ' HSHQGLQJ RQ WKH VSHFLHV WKLV P D\ VHW 0L P LWV RI DFFHSWDE0H FKDQJH RI EHWZHHQ DQG)RU VSHFLHV VXFK DV $XVWUD0DVLDQ %LWWHUQ DQG +RRGHG 3ORYHU WKDW DUH WKUHDWHQHG VSHFLHV HLWKHU QDWLRQD0\ RU DW VWDWH 0HYH0 LW LV H[SHFWHG WKH 0L P LWV RI DFFHSWDE0H FKDQJH ZRX0G EH $Q L P SRUWDQW H0H P HQW RI WKHVH VXUYH\V ZL00 EH WR GHWHU P LQH LI VHSFLHV EUHHG WKHUH HYHU\ \HDU GR VR WZR RU WKUHH \HDUV RXW RI ÀYH RU RQ\ YHU\ RFFDVLRQD00\ 7KLV ZL00 D00RZ 0L P LWV RI DFFHSWDE0H FKDQJH WR EH GHYH0RSHG WKDW can indicate when managers need to be concerned VKRX0G D FHUWDLQ VSHFLHV GLVFRQQXH EUHHGLQJ DFWLYLWLHV at the site.

6XUYH\V ZL00 D0VR LGHQWLI\ WKH SUP DU\ EUHHGLQJ KDELWDWV DQG D00RZ 0L P LWV RI DFFHSWDE0H FKDQJH WR EH GHYH0RSHG WKDW FRQVLGHU IRU H[D P S0H WKH DUHD0 H[WHQW DQG FRQGLWLRQ RI LQ0DQG VKXE0DQGV UHGEHGV UXVKHV WXVVRFNV DQG JUDVV0DQGV HWF $W SUHVHQW 0L P LWV RI DFFHSWDE0H FKDQJH KDYH EHHQ VHW IRU HDFK ZHW0DQG W\SH IRXQG ZLWKLQ WKH 5D P VDU VLWH LQ 6HFWLRQ DQG WKHVH ZL00 SURYLGH DQ LQWHUP LQGLFDWLRQ IRU P DQD J HUV XQWL0 P RUH GHWDL0HG EUHHGLQJ habitat data is collected.

7KH GDWD IUR P 3DWRQ E VXJ J HVW WKDW IRU VHYHUD0 ÀVK HDWLQJ VSHFLHV EUHHGLQJ HIIRUW LQ WKH 6RXWK /DJRRQ KDV GHF0LQHG FRQVLGHUDE0\ LQ UHFHQW \HDUV DSSDUHQW\ FRLQFLGHQW ZLWK GHF0LQHV LQ WKH SRSX0DWLRQ RI KD0G\KHDG ÀVK 7KLV LQF0XGHV WKH $XVWUD0LDQ 3H0LFDQ)DU\ 7HUQ DQG +RU\ KHDGHG *UHEHV 2UD0 KLVWRU\ DFFRXQWV IUR P WKH 1 J DUULQGHUL FR P P XQW\ DQG WKUHH RI WKH 0RJ WHU P ÀVKLQJ ID P L0HV D0VR UDLVH FRQFHUQV DERXW SH0LFDQ %0DFN 6ZDQ 2\VWHUFDWFKHUV DQG 6L0YHU *X00 2Q IDFH YD0XH WKHVH P D\ VHH P QRW WR D00RZ IRU WKH VHWWLQJ RI UREXVW ¶0L P LWV RI DFFHSWDE0H FKDQJH· +RZHYHU WKH UHGXFWLRQ DQG SRVVLE0H FHVVDWLRQ RI SH0LFDQ EUHHGLQJ LQ WKH 6RXWK /DJRRQ LV QRW DE0H LQ WKLV FRQWH[W DV DUH 3DWRQ·V E REVHUYDWLRQV IRU)DU\ 7HUQ DQG +RU\ KHDGHG *UHEH

3HOLFDQV $QLFRQ RI WKH &RRURQJ KDYH UHGXFHG WKHLU EUHHGLQJ HIIRUW LQ WKH 6RXWK /DJRRQ RYHU UHFHQW \HDUV DV KDYH VHYHUDO RWKHU ZDWHUELUG VSHFLHV GHSHQGHQW RQ ÀVK DQG DTXDWLF SUDQW DV IRRG LWH P V

7UDIAF OLJKW DVVHVV P HQW

8UJHQW DFWLRQ LV QHHGHG WR SURYLGH WKH HFRORJLFDO FRQGLWLRQV WKDW VXSSRUW ZDWHUELUG EUHHGLQJ LQ SDUWLFXODU WR DUHVW WKH GHFOLQHV RI WKH NH\ IRRG items *5XSSLD WXEHURVD* DQG 6P DO P RXWKHG +DUG\KHDG VHH 6HFWLRQ

LQGLFDWLYH DV WKH\ VHH P WR EH RI WKH 0RVV RI KDUG\KHDG ÀVK IUR P WKLV SDUW RI WKH &RRURQJ (TXD00\ WKH REVHUYHG reduction in swan numbers and breeding success, linked to the documented decline in 'swan weed' (*5XSSLD WXEHURVD* VHH 6HFWLRQV DQG LV DOVR VWURQJ0\ LQGLFDWLYH RI D P DIRU FKDQJH LQ WKH HFRORJLFDO FKDUDFWHU RI WKH 6RXWK /DJRRQ

)RU WKHVH VSHFLHV WKH 0L P LWV RI DFFHSWDE0H FKDQJH QHHG WR UHÁHFW D FRQWLQXDWLRQ RI WKHLU EUHHGLQJ HIIRUW DQG success at or near that witnessed around the time the VLWH ZDV 5D P VDU 0LVWHG LQ ,W KDV QRW EHHQ SRVVLE0H IRU WKLV SURHFW WR VRXFH DQ\ VXFK GDWD DQG VR LW LV UHFR P P HQGHG WKDW WKLV EH SDUW RI WKH IR0RZ XS DFWLRQV $W WKH YHU\ 0HDVW LW VKRX0G EH UHFR J QLVHG WKDW WKH GHF0LQH RU FHVVDWLRQ RI EUHHGLQJ DFWLYLWLHV E\ WKHVH VSHFLHV LQ WKH 6RXWK /DJRRQ LQGLFDWHV WKH QHHG IRU XU J HQW UH P HGLD0 DFWLRQ WR UHFRYHU WKH IRU P HU HFR0RJLFD0 FKDUDFWHU

Q 7KH VLWH VXSSRUWV VLJQLÀFDQW QXPEHUV DQG GLYHUVLW\ RI ZDGLQJ ELUGV LQF0XGLQJ PLJUDWRU\ VSHFLHV 0LVWHG XQGHU WKH -$0%$ DQG &$0%$ DJUHHPHQWV

7KH SUHFHGLQJ VHFWLRQ QRWHG WKDW D PRQJ WKH ZHWDQG GHSHQGHQW EUG VSHFLHV RI WKH &RRURQJ DQG Lakes Ramsar site, there are those that migrate, either internationally or within the country, and those that use WKH VLWH RQ D UHJXODU EDVLV IRU EUHHGLQJ 7KHUH LV VR P H RYHU0DS EHWZHHQ WKHVH WZR JURXSV 6HFWLRQ FRQVLGHUV WKRVH WKDW EUHHG ZLWKLQ WKH VLWH ,Q WKLV VHFWLRQ WKH IRFXV LV RQ WKH VR FD0HG ZDGHUV 7KLV JURXS RI VSHFLHV EHLQJ WKRVH WKDW KDYH EHHQ UHJXODU\ REVHUYHG LQ WKH ZDGHU VXUYH\V XQGHUWDNHQ D0RQJ WKH &RRURQJ XQLV RI WKH 5D P VDU VLWH WKH 6RXWK DQG 1RUWK /DJRRQV DQG WKH 0 XUUD\ 0RXWK DQG (VWXDU\ E\ YDULRXV REVHUYHUV VR P H RI WKLV ZRUN GDWLQJ EDFN WR : KLOH WKHVH VHFWLHV DUH not restricted to the more saline and estuarine system XQLWV RI WKH 5D P VDU VLWH WKHLU UHJXODU SUHVHQFH WR JHWKHU LGHQWLÀHV WKH P DV VSHFLHV WKDW VKDUH VWURQJ VL P LODULWLHV LQ WKHLU IRUDJLQJ KDELWDW SUHIHUHQFHV)LYH VSHFLHV IUR P WKH ZDGHUV JURXS D0R EUHHG DW WKH VLWH DQG VR WKH\ DUH considered in both Sections 5.3 and below.

With the breeding and migratory birds considered in 6HFWLRQV DQG KHUH WKLV 0HDYHV IUR P D P RQJ WKH QRWDE0H EUG VSHFLHV RI WKH VLWH D IXUWKHU VHYHQ VSHFLHV and these are considered in Section 5.5.

4 XDOLWDWLYH GHWDLOV

7KH VSHFLHV FRQVLGHUHG KHUH DUH WKRVH ZDGHUV P DQ\ RI ZKLFK DUH OLVWHG XQGHU $XVWUDOLD·V ELDGHUDO P LJUDWRU\ EUG D JUHH P HQWV ZLWK -DSDQ DQG &KLQD WKDW KDYH EHHQ UHJXODU\ UHFRUGHG DV XVLQJ WKH &RRURQJ FR P SRQHQWV RI WKH 5D P VDU VLWH LQ VXUYH\V FRQGXFWHG IUR P RQZDUGV $: 6 * : DGHU 6XUYH\V * RVEH00 DQG &KULVWLH 5HIHUHQFH WR 7DE0H OLVWLQJ WKHVH VSHFLHV LQGLFDWHV WKDW LQ EURDG WHU P V WKH\ IRUD J H LQ RQ RU QHDU the waterline in shallow water areas or on sandy or P XGG\ VXUIDFHV QHDUE\ : KL0H HDFK H[KLELWV GLIIHUHQFHV LQ WKHLU IRUD J LQJ SUHIHUHQFHV DQG EHKDYLRXUV WKH\ KDYH EHHQ IRU P DQ\ \HDUV VWURQJ\ DWWUDFWHG WR WKH &RRURQJ as shown by the large numbers that aggregate there at WL P HV 7DE0H WDNHQ IUR P * RVEH00 DQG &KULVWLH $: 6 * VKRZV WKHVH 0DU J H QX P EHUV H[FHHGLQJ LQ DS SUR[L P DWH0\ LQ DQG F0RVH WR LQ 7KH VXUYH\ IRU GLG QRW LQF0XGH WKH 6RXWK /DJRRQ V\VWH P XQLW 1RWDE0H D0R DUH WKH VXUYH\ UHVX0V IUR P P RU0 UHFHQW \HDUV VKRZLQJ JUHDW0\ UHGXFHG WRWD0V RI ² D0KRXJK WKHVH QHHG WR EH LQWHUSUHWHG ZLWK FDUH VHH EH0RZ XQGHU ¶LQWHUSUHWLQJ WKH GDWD·

7DE0H EH0RZ D0VR LQGLFDWHV WKDW P DQ\ RI WKHVH VHFLHV DUH QRW UHVWULFWHG WR WKH (VXDU\ DQG 0DJRRQ RI WKH &RRURQJ DQG /DNHV 5D P VDU VLWH 0 RUH JHQHUDOLVW VSHFLHV DUH IRXQG DW WL P HV D0RXQG WKH 0DNHV DV ZH00 ,W LV D0R L P SRUWDQW WR QRWH WKDW /DNHV $0EHUW DQG $0[DQGULQD KDYH VLJQLÀFDQW DUHDV RI P XGÀDWV VHDVRQDO VDOLQHV P DUKHV VDOLQDV VD P SKLUH DQG VDW P DUVK FR P P XQLWLHV WKDW DUH D0R VXLWDE0H KDELWDW IRU P DQ\ ZDGHU VSHFLHV VHH 6HFWLRQ (D P S0HV LQF0XGH : D0RZD 6ZD P S RQ WKH HDVWHUQ HG J H RI /DNH $0EHUW D VHULHV RI VHSDUDWH VDOLQD EDVLQV LQWHUFRQQHFWHG DW KLJK 0DNH 0HYH0V ZLWK each other and the Lake. Around Lake Alexandrina, 3R0WD0RFK 30DLQV QHDU : H0LQJWRQ +LGG P DUVK ,V0DQG DQG 0 XQGRR ,V0DQG KDYH WKH JUHDWHVW FRQFHQWUDWLRQ RI WKHVH salinas and are considered key habitat.

7DEOH 6LJQLÀFDQW ZDGHU VSHFLHV IRXQG ZLWKLQ WKH 5DPVDU VLWH DQG VXP PDU\ OLIH KLVWRU\ LQIRUPDWLRQ						
&RP PRQ QDPH	6FLHQWLÀF QDPH	**Ramsar** FULWHULD	- &$0%$ RU&06	6$ 6WDWXV	6\VWHP XQLWV ZKHUH IRXQG	+DELWDW DQG RWKHU OLIH KLVWRU\ LQIRUPDWLRQ EDVHG RQ VSHFLHV DFFRXQWV LQ WKH +$1=$%
&XUOHZV VDQGSLSHUV VQLSHV JRGZLWV SKDODURSHV)DPLO\ 6FRORSDFLGDH						
6KDUS WDLOHG 6DQGSLSHU	*&DOLGULV DFXPLQDWD*		- &$0%$ &06			)RUDJH PDLQO\ LQ VKDOORZ ZDWHU XS WR FP GHHS RQ EDUH ZHW mud or sand in intertidal areas. Also use areas with saltmarsh, grasses or sedges.
&XUOHZ 6DQGSLSHU	*&DOLGULV IHUUXJLQHD*		- &$0%$ &06			)HHGV PDLQO\ LQ VKDOORZ ZDWHU RQ PXGÁDWV RU VDQGÁDWV
&RP PRQ 6DQGSLSHU	*7ULQJD K\SROHXFRV*		- &$0%$ &06			Uses both coastal and inland ZHWODQGV *HQHUDOO\ IRUDJHV LQ shallow water with bare mud DQG QHDU SURWUXGLQJ REVWDFOHV such as rocks or roots.
0DUVK 6DQGSLSHU	*7ULQJD VWDJQDWLOLV*		&$0%$ &06		2, 3,	3UHIHUV LQWHUWLGDO PXGÁDWV although does also use a range RI KDELWDW W\SHV LQFOXGLQJ VKDOORZ IUHVKZDWHU DUHDV)HHGV DPRQJ PXG DQG YHJHWDWLRQ
7HUHN 6DQGSLSHU	*;HQXV FLQHUHXV* (*Tringa WHUHN*		- &$0%$ &06			)RUDJHV LQ VDOLQH LQWHUWLGDO PXGADWV LQ VKHOWHUHG HVWXDULHV 8VXDOO\ IHHGV LQ WKH RSHQ RQ VRIW LQWHUWLGDO PXGADWV QHDU PDQJURYHV DQG DW WLPHV LQ VDPSKLUH
3HFWRUDO 6DQGSLSHU	*&DOLGULV PHODQRWRV*		-$0%$ &06		5	3UHIHUV VKDOORZ ZDWHU RU VRIW PXG W\SLFDOO\ FORVH WR ORZ IULQJLQJ RU HPHUJHQW YHJHWDWLRQ
5HG QHFNHG 6WLQW	*&DOLGULV UXÀFROOLV*		- &$0%$ &06			)RUDJHV PDLQO\ LQ VKDOORZ ZDWHU XS WR FP GHHS RYHU VDQG DQG PXGÁDWV
Sanderling	*&URFHWKLD DOED*		- &$0%$ &06			)RUDJHV RQ VDQG\ EHDFKHV H[SRVHG VDQG EDUV LQ WKH ZDYH ZDVK]RQH $W WLPHV DOVR XVHV WKH HGJHV RI VKDOORZ SRROV RQ VDQGVSLWV DQG QHDU WR PXGÁDWV
&RP PRQ *UHHQVKDQN	*7ULQJD QHEXODULD*		- &$0%$ &06			Uses both inland and coastal ZHWODQGV IRUDJLQJ LQ WKH VRIW mud near the water's edge and also around emerging YHJHWDWLRQ VXFK DV VDOWPDUVKHV 2IWHQ IRXQG LQ GHHSHU ZDWHU ² FP GHHS LQ &RRURQJ UHJLRQ ' 3DWRQ SHUV FRPP
(DVWHUQ &XUOHZ	*1XPHQLXV PDGDJDVFDULHQVLV*		- &$0%$ &06	V		0DLQO\ IRUDJHV RQ VRIW LQWHUWLGDO VDQG RU PXGÁDWV ZLWKRXW VHDJUDVV FRYHU 6RPHWLPH DOVR uses saltmarshes.
%DU WDLOHG *RGZLW	*/LPRVD ODSSRQLFD*		- &$0%$ &06			)HHGV QHDU ZDWHU·V HGJH RU VKDOORZ ZDWHU SUHIHUULQJ H[SRVHG VDQG\ VXEVWUDWHV RQ LQWHUWLGDO ÁDWV $OVR IHHGV LQ VRIW PXG RIWHQ ZLWK EHGV RI HHOJUDVV or other seagrasses.

ª FRQWLQXHG RYHUOHDI ª

7DEOH 6LJQLÀFDQW ZDGHU VSHFLHV IRXQG ZLWKLQ WKH 5DPVDU VLWH DQG VXPPDU\ OLIH KLVWRU\ LQIRUPDWLRQ FRQWLQXHG						
&RPPRQQDPH	6FLHQWLÀF QDPH	**Ramsar** FULWHULD	- &$0%$ RU &06	6$ 6WDWXV	6\VWHP XQLWV ZKHUH IRXQG	+DELWDW DQG RWKHU OLIH KLVWRU\ LQIRUPDWLRQ EDVHG RQ VSHFLHV DFFRXQWV LQ WKH +$1=$%
%ODFN WDLOHG *RGZLW	/LPRVD OLPRVD		- &$0%$ &06			)HHGV RQ ZLGH LQWHUWLGDO PXGADWV RU VDQGADWV DQG RFFDVLRQDOO\ LQ shallow estuaries, saltmarshes, VDOWADWV RU ULYHU ADWV
*UHDW .QRW	&DOLGULV WHQXLURVWULV		- &$0%$ &06			)RUDJHV RQ LQWHUWLGDO ÁDWV LQ VRIW sand and mud, usually at the HGJH RI VKDOORZ ZDWHU DV WKH WLGH IDOOV
5HG .QRW	&DOLGULV FDQXWXV		- &$0%$ &06			)HHG RQ VRIW VDQG DQG PXGÁDWV and occasionally on sand EHDFKHV URFN SODWIRUP UHHIV
Ruddy turnstone	$UHQDULD LQWHUSUHV		- &$0%$ &06			7HQGV WR EH IRXQG RQ H[SRVHG URFN RU UHHIV RIWHQ LQ VKDOORZ tidal water, and on shingle or VDQG EHDFKHV 2QO\ RFFDVLRQDOO\ IRUDJHV LQ VDOWPDUVK RU H[SRVHG seagrass areas.
5XII	3KLORPDFKXV SXJQD[		- &$0%$ &06		5	)HHGV RQ H[SRVHG PXGÁDWV LQ shallow water.
2\VWHUFDWFKHUV)DPLO\ +DHPDWRSRGLGDH						
3LHG 2\VWHUFDWFKHU VHH 6HFWLRQ DOVR	+DHPDWRSXV ORQJLURVWULV					)HHGV RQ H[SRVHG VDQG PXG rock or coral, near water's edge.
6RRW\ 2\VWHUFDWFKHU	+DHPDWRSXV IXOLJLQRVD	5.3				3UHIHUV URFN\ LQWHUWLGDO VKRUHOLQHV FRUDO UHHIV RU VDQG\ EHDFKHV QHDU PXGADWV
/DSZLQJV SORYHUV GRWWHUHOV)DPLO\ &KDUDGULLGDH						
*UH\ 3ORYHU	3OXYLDOLV VTXDWDUROD		- &$0%$ &06			0RVWO\ D FRDVWDO VSHFLHV IRXQG IRUDJLQJ RQ WLGDO PXG DQG VDQGÁDWV ,QODQG LW XVHV WKH HGJHV RI VDOW ODNHV DQG SDQV
3DFLÀF *ROGHQ 3ORYHU	3OXYLDOLV IXOYD		&06			)HHGV PRVWO\ RQ EHDFKHV DQG PXG DQG VDQG ÁDWV DOWKRXJK at times uses saltmarshes and SDVWXUH JUDVVHV
'RXEOH EDQGHG 3ORYHU	&KDUDGULXV ELFLQFWXV		&06			8VHV D ZLGH UDQJH RI IUHVKZDWHU DQG FRDVWDO ZHWODQGV ULYHU DQG HVWXDULQH ADWV LQFOXGHG
/HVVHU 6DQG 3ORYHU	&KDUDGULXV PRQJROXV		&06			0RVWO\ D FRDVWDO VSHFLHV SUHIHUULQJ EHDFKHV ZLGH LQWHUWLGDO ÁDWV DQG VRPHWLPHV VDOWPDUVKHV RU PDQJURYHV
2ULHQWDO 3ORYHU	&KDUDGULXV YHUHGXV		&06			0RVWO\ DQ LQODQG VSHFLHV IRXQG DVVRFLDWHG ZLWK RSHQ JUDVVODQGV 2QO\ RFFDVLRQDOO\ XVHV HVWXDULQH areas.
+RRGHG 3ORYHU VHH 6HFWLRQ DOVR	&KDUDGULXV UXEULFROOLV		&06	V		3UHIHUV ZLGH ÁDW RFHDQ EHDFKHV HVSHFLDOO\ WKRVH ZLWK VHDZHHG SUHVHQW

7DEOH 6LJQLÀFDQW ZDGHU VSHFLHV IRXQG ZLWKLQ WKH 5DPVDU VLWH DQG VXP PDU\ OLIH KLVWRU\ LQIRUPDWLRQ FRQWLQXHG						
&RP PRQ QDPH	6FLHQWLÀF QDPH	**Ramsar** FULWHULD	- &$0%$ RU &06	6$ 6WDWXV	6\VWHP XQLWV	+DELWDW DQG RWKHU OLIH KLVWRU\ LQIRUPDWLRQ EDVHG RQ VSHFLHV DFFRXQWV LQ WKH +$1=$%
5HG FDSSHG 3ORYHU VHH 6HFWLRQ DOVR	*&KDUDGULXV UXÀFDSLOOXV*		&06			)HHGV RQ VDQG DQG PXGÀDWV DORQJ WKH HGJHV RI HVWXDULHV)DJRRQV DQG ODNHV DQG HYHQ DW WLPHV JUDYHO RU VKHOOJULW
0DVNHG /DSZLQJ VHH 6HFWLRQ DOVR	*9DQHOOXV PLOHV*	5.3	&06			)RUDJHV DURXQG QDWXUDO DQG PRGLÀHG LQODQG ZHWODQGV HLWKHU IUHVKZDWHU RU VDOLQH DQG ERWK SHUPDQHQW DQG WHPSRUDU\ wetlands.
5HG NQHHG ' RWWHUHO	*(UWKURJRQ\V FLQFWXV*	5.3	&06			)RUDJHV DURXQG WKH PXGG\ HGJHV RI IUHVKZDWHU ZHWODQGV LQ JHQHUDO RU FDQ ZDGH XS WR FP GHHS
6WLOWV DYRFHWV)DPLO\ 5HFXUYLURVWULGDH						
%DQGHG 6WLOW	*&ODGRUK\QFKXV OHXFRFHSKDOXV*		&06			)HHGV LQ VKDOORZ VDOLQH RU K\SHU saline water or by wading or VZLP PLQJ LQWR GHHSHU ZDWHU
%ODFN ZLQJHG 6WLOW VHH 6HFWLRQ DOVR	*+LPDQWRSXV KLPDQWRSXV*	5.3	&06			)RUDJHV LQ VKDOORZ ZDWHU IUHVK RU VDOLQH RQ VDQGÁDWV RIWHQ ZKHUH WKHUH LV GHQVH YHJHWDWLRQ RI grass or other emergents.
5HG QHFNHG $YRFHW	*5HFXUYLURVWUD ORYDHKROODQGLDH*		&06			)RXQG LQ HSKHPHUDO LQODQG IUHVK VDOLQH DQG K\SHU VDOLQH ZHWODQGV HVSHFLDOO\ GU\LQJ VDOW)DNHV)HHGV LQ VRIW PXG DUHDV wading to their belly.

6\VWHP XQLWV ZKHUH IRXQG

² 0XUUD\ 0RXWK DQG (VWXDU\ ² 1RUWK /DJRRQ ² 6RXWK /DJRRQ ² /DNH $OEHUW ² /DNH $OH[DQGULQD ² 7ULEXWDU\ ZHWODQGV

7DEOH : DGHU VXUYH\ GDWD

6SHFLHV	<HDU								
%DFN WDUHG *RGZLW						0			
%DU WDUHG *RGZLW		0	3		0	0	20	5	
(DVWHUQ &XUHZ						2	2		
0 DUK 6DQGS LSHU	0	2	30	0	0			2	
*UHHQVKDQN					305	323		355	
7HUHN 6DQGS LSHU	0	0	0	0	0			0	
&RP PRQ 6DQGS LSHU				0			2	0	
Ruddy Turnstone	0		0		0			0	
*UHDW .QRW	3		0		0				
5HG .QRW			0		0	30			
Sanderling					53				235
6KDUS WDUHG 6DQGS LSHU									
3HFWRUDO 6DQGS LSHU	0		0	0	0	0			
5HG QHFNHG 6WLQW									
&XUHZ 6DQGS LSHU									
&R[·V 6DQGS LSHU	0	0		0	0	0			
3LHG 2\VWHUFDWFKHU								255	
6RRW\ 2\VWHUFDWFKHU	0	0	3	3	3				
%DFN ZLQJHG 6WLW									
%DQGHG 6WLW									
5HG QHFNHG $YRFHW									
3DFLÀF *RGHQ 3ORYHU		230						30	
*UH\ 3ORYHU		0	0		0	2	3		
5HG FDSSHG 3ORYHU			2533						
'RXEOH EDQGHG 3ORYHU	0	0		0	0				
%DFN IURQWHG 3ORYHU	0	2	0	0	0				
/HVVHU 6DQG 3ORYHU	0	0	0	0	0	2			
+RRGHG 3ORYHU	0	0		3					
5HG NQHHG 'RWWHUHO			0	0	0		3		
2UHQWDO 3ORYHU		0	0	0	0				
%DQGHG /DSZLQJ	0			0	0				
5XII	0	0	0		0				
0 DVNHG /DSZLQJ				233	355				
5HG QHFNHG 3KDODURSH	0	0	3	0	0				
8QLGHQWLÀHG V P D									55
727$/6									

*'DWD IURP WKH $XVWUDOLDQ :DGHU 6WXG\ *URXS *RVEHO DQG &KULVWPDV $:6*

: DGHUV IHHGLQJ LQ WKH VKDORZ ZDWHU RI WKH &RRURQJ

,QWHUSUHWLQJ WKH GDWD

,Q WHU P V RI WRWDO QX P EHUV UHFRUGHG 7DE0H VXJ JHVWV D GHFOLQH LQ WKH QX P EHU RI ZDGHUV YLVLWLQJ WKH &RRURQJ SRUWLRQ RI WKH 5D P VDU VLWH LQ P RUH UHFHQW \HDUV)UR P QX P EHUV UDQJLQJ EHWZHHQ DQG LQ WKH V P RUH UHFHQW VXUYH\V KDYH EHHQ LQ WKH UDQJH RI &0RVHU H[D P LQDWLRQ UHYHDOV WKDW WKHVH 0DU JH QX P EHUV DUH DWWULEXWDEOH WR D UH0DWLYH0\ V P D0 QX P EHU RI VSHFLHV ZLWK 6KDUS WD0HG 6DQGS1SHU 5HG QHFNHG 6WLQW &XUHZ 6DQGS1SHU DQG %DQGHG 6WLOW GR P1QDWLQJ WKH FRQWV 6SHFLHV VXFK DV *UHHQVKDQN 5HG QHFNHG $YRFHW 5HG FDSSHG 3 0RYHU 6DQGH0LQJ DQG 0DVNHG /DSZLQJ P DNH XS D VHFRQG JURXS RI VSHFLHV FR P P RQ\ UHFRUGHG EXW 1Q 0HVVHU QX P EHUV)RU WKH VSHFLHV WKDW KDYH GR P1QDWHG WKH FRQWV GHVS1WH VR P H YDU1DE0L\ WKHUH GRHV DSSHDU WR KDYH EHHQ GHF0QHV RYHU WL P H)RU H[D P S0H 6KDUS WD0HG 6DQGS1SHU UHFRUGHG 1Q WKH V DW 0HY0V RI DURXQG ² KDV 1Q WKH VXUYH\V RI ² EHHQ UHFRUGHG DW 0HY0V EHWZHHQ ² $ VL P L0DU WUHQG LV HYLGHQW IRU &XUHZ 6DQGS1SHU V

%URDG VFD0H VXUYH\V SURYLGH VR P H LQG1FDWLRQV RI 0RFD0 SRSX0DWLRQ QX P EHUV IRU WKHVH VSHFLHV DWKRXJK WKH\ DUH OL P LWHG WR WKH &RRURQJ 0DJRRQV DQG (VXDU\ XQ1WV DQG WKHUH LV JUHDW YDULDEL0\ RI WKH GDWD 7KH UHGXFWLRQ 1Q WRWD0 QX P EHUV REVHUYHG DQG HYHQ IRU VR P H VSHFLHV P D\ UHÁHFW HLWKHU D UHGXFWLRQ 1Q WKH VXLWDEL0\ RI WKH KDELWDW IRU WKHVH VSHFLHV RU SRSX0DWLRQ GHF0QHV IRU WKH VSHFLHV more generally. While the latter cannot be discounted, H[WHQVLYH VXUYH\V DQG RWKHU VWXG1HV E\ 3DWRQ DQG *HGGHV VHH IR00R Z1Q J SDJH 1Q SDUWLFX0DU KDYH UH1QIRUFHG WK1V GHF0QH 1Q QX P EHUV DWWULEXWLQJ LW WR UHGXFHG DYD0DE0L\ RI IRRG LWH P V 7K1V UHVX0V IUR P WKH FR P E1QHG 1 P SDFW RI UHGXFHG IUHVKZDWHU 1QÁR Z V WR WKH &RRURQJ RYHU WKH EDUUDJHV IUR P WKH 6RXWK (DVW RI 6RXWK $XVWUD0LD DQG

IUR P JURXQG ZDWHU 1QSXWV 7K1V KDV VHHQ WKH IRU P HU VD0LQL\ JUDG1HQW IUR P WKH P RXWK RI WKH 0 XUUD\ WR WKH VRXWKHUQ HQG RI WKH 6RXWK /DJRRQ G1VUSWHG 1QFUHDVHV 1Q VD0LQL\ 0HYH0V DQG UHGXFWLRQV 1Q WKH GD00\ G0LYHQ ÁXFWXDWLRQV 1Q ZDWHU 0HYH0V $00 RI WKHVH IDFWRUV FRQWU1EXWLQJ WR UHGXFWLRQV 1Q WKH DUHD RI VXLWDE0H 1QWHUWLGD0 ÁDWV IRU ZDGH IRUDJ1Q J

7KH UHGXFHG IUHVKZDWHU 1QÁRZV 1QWR WKH 0DJRRQV FRXS0HG Z1WK HYDSRUDWRQ KDV VHHQ HVFD0DWLQJ VD0LQL\ 1Q WKH 6RXWK /DJRRQ 1Q SDUWLFX0DU WR DERVH WKH WR0HUDQFHV RI P DQ\ IRUDJH VSHF1HV VHH 6HFWLRQ 7K1V FRX G EH GD P SHQHG WR VR P H H[WHQW E\ 0HVV VD0LQH ZDWHU IUR P WKH 8SSHU 6RXWK (DVW 'UD1QDJH 6FKH P H G1VFKDUJ1Q 1QWR WKH 0DJRRQ DW 6D0W &UHHN KRZHYHU WKHVH ÁRZV WR GDWH KDYH EHHQ WRR 0RZ WR 1QGXFH Z1GHVSUHDG RU VXVWD1QDE0H decreases in salinity.

$QRWKHU IDFWRU LV WKDW WKH KL J KHU WKDQ QRU P D0 ZDWHU 0HYH0V WKDW RFFXU 1Q Z1QWHU GXH WR 0RFD0 UXQRII JURXQG ZDWHU 1QÁR Z V HWF GH0HWHULRX\ 1 P SDFW RQ WKH JUR ZK RI WKH DTXD1F DQ J1RVSHU P *XPSLD WXEHURVD* DV GRHV WKH GURS 1Q ZDWHU 0HYH0V WKDW RFFXU GXULQJ VSU1Q J EHIR UH WKLV HVVHQW1D0\ DQQXD0 S0DQW KDV EHEN DE0H WR UHSURGXFH 7KHVH RFFXU XQGHU WKH FXUHQW UH J L P H RI UHGXFHG 1QÁR Z V VHH 6HFWLRQ *XPSLD WXEHURVD 1V WKH NH\VWRQH VSHF1HV RI WKH HFR0R J \ RI WKH 6RXWK /DJRRQ ZK1FK RQFH IRU P HG GHQVH VWDQGV DFURVV WKH 0DJRRQ ,W 1V QR Z 0L P LWHG WR VKD0R Z HU DUHDV P GXE WR WKH WXUE1G1W\ RI WKH ZDWHU FR0X P Q DQG IXUWKHU FRQVWUD1QHG E\ KL J K ZDWHU 0HYH0V 1Q Z1QWHU DQG VSU1Q J 3DWRQ DIIHFW1Q J UHSURGXF1YH SURFHVV6HFW1RQ FRQV1GHUV WKHVH YD1RXV NH\ GHWHU P 1QDQW RI HFR0R J1FD0 FKDUDFWHU 1Q GHWD0

7DEOH &RPSDULVRQ RI WKH DEXQGDQFHV RI NH\ IRRG UHVRXUFHV IRU ZDGHUV LQ WKH 6RXWK /DJRRQ LQ DQG 7DNHQ IURP 3DWRQ E

5HVRXUFH	6HFWLRQ		6HFWLRQ		6HFWLRQ	
5XSSLD WXEHURVD seeds		0.3				
5XSSLD WXEHURVD turions						
&KLURQR P LG ODUYDH	0.2	0.2	3.0		3.0	

3DWRQ E REVHUYHV WKDW ¶,Q WKH 6RXWK /DJRRQ RI WKH &RRURQJ FKLURQR P LG ODUYDH 6 P DO P RXWKHG +DUG\KHDGV (*$WKHULQRVR P D P LFURWR P D* DQG WKH VHHGV DQG WXLRQV RI *5XSSLD WXEHURVD* DUH LP SRWDQW IRRG LWH P V IRU DTXDWLF ELUGV GXULQJ -DQXDU\ ,Q WKH QRWKHUQ SDUWV RI WKH 1RUWK /DJRRQ ZKHUH VDOLQLWLHV DUH ORZHU SRO\FKDHWH ZRP V DUH DQ LP SRWDQW IRRG VRXUFH · 3DWRQ GLYLGHG WKH &RRURQJ LQWR VHYHQ NH\ IRRG LWH P V DURJ WKH V\VWH P IRU WKH \HDUV ² 7KH GDWD DUH EDVHG RQ DQQXDO VD P SOLQJ ZLWKLQ HDFK VHFWLRQ IUR P GU\ P XGÅDWV DW WKH ZDWHULQH DQG ZKHUH WKH ZDWHU OHYHO ZDV F P $V QRWHG E\ 3DWRQ E WKHVH UHSUHVHQW WKH W\SLFDO IHHGLQJ QLFKHV RI WKH ZDGHU VSHFLHV 7R VX P P DUVH WKH ÅQGLQJV ZHUH DV IROORZV

- WKH DEXQGDQFH RI ERWK *5XSSLD WXEHURVD* (seeds and WXLRQV DQG KDUG\KHDG ÀVK KDV GHFOLQHG FRQVLGHUDEO\ LQ WKH 6RXWK /DJRRQ DQG LQ SDUWLFXODU LQ WKH WZR VRXWKHUQ P RVW VHFWLRQV
- DEXQGDQFHV RI FKLURQR P LG ODUYDH ZHUH KLJKHU LQ WKH VD P SOLQJ WKDQ LQ SUHYLRXV \HDUV ZKLFK 3DWRQ VX J JHVW V P D\ UHÅHFW WKH ORZHU QX P EHUV RI KDUG\KHDG ÀVK WKDW IHHG RQ WKHVH
- WKH DEXQGDQFH DQG GLVWULEXWLRQ RI SR\FKDHWH ZRU P V LQ WKH 1RUWK /DJRRQ KDV DVR GHFOLQHG 3DWRQ QRWHV WKDW VLWHV ZKHUH SR\FKDHWHV ZHUH YHU\ DEXQGDQ LQ ² KDG IHZ ZRU P V LQ ²

3DWRQ DVR SURYLGHV D FR P SDULVRQ IRU WKH 6RXWK /DJRRQ VHFWLRQV RI WKH &RRURQJ RI WKH GHQVLWLHV RI *5XSSLD WXEHURVD* VHHGV DQG WXLRQV DQG FKLURQR P LG ODUYDH DV UHFRUGHG LQ -DQXDU\ WKH \HDU WKLV VLWH ZDV 5D P VDU OLVWHG DQG -DQXDU\ 7KLV WDE ODH KDV EHHQ UHSURGXFHG EH0RZ 7KH QX P EHUV UHSUHVHQW P HDQV SHU FRUH VD P S0H EDVHG RQ ² FRUHV WDNHQ DW WKH VD P SOLQJ VLWHV RI ZKLFK WKHUH ZHUH ² SHU N P VHFWLRQ

7KH GDWD LQ WKH WDE ODH DERYH VKRZ F0HDU\ WKH VHYHUH decline in *5XSSLD WXEHURVD* LQ WKH 6RXWK /DJRRQ RYHU WKH SDVW \HDUV

3DWRQ E DVR SURYLGHV GHWDLOHG GDWD RQ WKH GLVWULEXWLRQ DQG DEXQGDQFH RI DTXDWLF ELUGV WKDW LV QRW RQ\ ZDGHU VSHFLHV LQ WKH &RRURQJ IRU WKH SHULRG DQG KH FRQFXGHV WKDW VHYHUDO RI WKH ÅVK HDWLQJ ELUG VSHFLHV KDG UHGXFHG QX P EHUV DQG EUHHGLQJ DFWLYLWLHV in the South Lagoon, due, it is assumed to the reduced DYDLODELOLW\ RI IRRG LWH P V KDUG\KHDG LQ SDUWLFXODU 7KLV LQF0XGHV VSHFLHV VXFK DV $XVWUDODQ 3H0LFDQ VR P H ZDWHUIR Z0 VSHFLHV)DLU\ 7HUQ DQG +RU\ KHDGHG *UHEH 7KLV LV FRQVLGHUHG IXUWKHU LQ 6HFWLRQ

2I WKH SUR P LQHQW ZDGHU VSHFLHV UHIHUUHG WR HDUOLHU LQ 7DE0H 3DWRQ E P DNHV WKH IR00RZLQJ REVHUYDWLRQV EDVHG RQ KLV VXUYH\V

- 5HG FDSSHG 3ORYHUV ³ VLJQV RI FRQWLQXLQJ GHFOLQH ZLWK 0HVV WKDQ UHFRUGHG IRU WKH AUVW WL P H LQ
- &XUOHZ 6DQGSLSHUV ³ QX P EHUHG LQ EXW LQ WKLV ZDV DSSUR[L P DWH0\ ZKDW LW KDV EHHQ LQ VXUYH\V LQ P RUH UHFHQW \HDUV
- %DQGHG 6WLOWV ³ QX P EHUV VXEVWDQWLD00\ KLJKHU LQ ZLWK WKHVH ELUGV IHHGLQJ P RVW\ RQ FKLURQR P LG ODUYDH ZKRVH QX P EHUV DUH KLJK GXH WR UHGXFHG IRUDJLQJ SUHVVXUH IUR P KDUG\KHDG ÀVK VHH DERYH
- 5HG QHFNHG $YRFHWV ³ VD P H DV IRU %DQGHG 6WLOWV

3DWRQ E FRQF0XGHV WKDW WKH 0DFN RI VSULQJ ÅRZV RYHU WKH EDUDJHV RYHU WKH SDVW ÀYH \HDUV KDV VHHQ D FRQWLQXHG GHF0LQH RI *5XSSLD WXEHURVD* IUR P WKH P RUH VRXWKHUQ SDUWV RI WKH &RRURQJ 7KLV KDV D0VR VHHQ D ULVH LQ VD0LQLWLHV DQG WKH 0RVV RI DQWKHU ZDWHUE0G IRRG LWH P WKH KDG\KHDG ÀVK ,W VHH P V 0LNH0\ WKDW WKH 0RVV RI *5XSSLD WXEHURVD* KDV FRQWULEXWHG WR WKH 0RVV RI KDG\KHDGV 7KH UHGXFWLRQ LQ WKH SRSX0DWLRQ RI KDG\KHDGV KDV VHHQ D UHGXFWLRQ LQ WKH QX P EHUV RI VHYHUD0 AVK HDWLQJ ELUGV VHH DERYH DQG 6HFWLRQ 3DWRQ E QRWHV WKDW while *5XSSLD WXEHURVD* DQG KDG\KHDGV KDYH GHF0LQHG FKLURQR P LG ODUYDH KDYH QRW DQG WKHVH KDYH EHFR P H D VWDS0H IRRG LWH P IRU P RVW RI WKH ZDGHUV 7KH FRQF0XVLRQ LV WKDW WKLV LQFUHDVH LQ WKH QX P EHUV RI FKLURQR P LG ODUYDH LV GXH WR WKH UHGXFHG SUHGDWLRQ SUHVVXUH EHFDXVH RI WKH GHF0LQLQJ KDG\KHDG SRSX0DWLRQ

*HGGHV UHSRUWV RQ WKH HFRORJLFDO KHDOWK RI WKH &RRURQJ EDVHG RQ PRQLWRULQJ GRQH LQ DQG 7KLV VWXG\ FRQGHUHG LVVXHV RI ZDWHU QXDOLW\ DQG ELRORJLFDO FRPPXQLWLHV *HGGHV DVR GUDZ FRPSDULVRQV ZLWK WKH FRQGLWLRQ RI WKH V\VWHP LQ WKH V +LV ÀQGLQJV LQ UHODWLRQ WR ZDWHU QXDOLW\ DQG ZDWHU TXDOLW\ DUH FRQVLGHUHG IXUWKHU LQ 6HFWLRQ KRZHYHU KHUH LW LV QRWHDEOH WR H[DPLQH KLV FRQFOXVLRQV LQ UHODWLRQ WR WKH RYHUDOO HFRORJLFDO KHDOWK RI WKH &RRURQJ DV IROORZV

¶7KH ELRWD RI WKH &RRURQJ ZDV RI VL PLDU OL PLWHG GLYHUVLW\ GLVWULEXWLRQ DQG DEXQGDQFH WR WKDW UHFRUGHG LQ 7KH DTXDWLF SDQWV ZHUH UHSUHVHQWHG RQ\ E\ *5XSSLD WXEHURVD*)LD P HQWRXV DOJDH DQG P DFURDOJDH ERWK RI ZKLFK DUH ¶QXLVDQFH· DOJDH ZHUH DVR SUHVHQW LQ WKH 0 XUUD\ 0 RXWK DQG QRUWK RI WKH 1RUWK /DJRRQ 1R *5 PHJDFDUSD* or seagrass was collected at any site.

7KH HVWXDULQH ODJRRQ IDXQD RI WKH 1RUWK /DJRRQ ZDV UHVWULFWHG WR WKH 0 XUUD\ 0 RXWK DQG WKH P RVW QRUWKHUQ VHFWLRQV RI WKH 1RUWK /DJRRQ LQ D VL P LDU ZD\ WR WKDW UHFRUGHG LQ 0 RVW RI WKH 1RUWK /DJRRQ ORFDWLRQV GLG QRW KDYH WKH HVWXDULQH ODJRRQ FUXVWDFHDQV SR\FKDHWHV DQG P ROOXVFV WKDW ZRXG EH H[SHFWHG LQ WKH DUHD 7KH DEVHQFH RI WKHVH LQYHUWHEUDWHV LV SUREDE\ WKH UHVXOW RI KLJK VDOLQLWLHV LQ VX P P HU DQG DXWX P Q EHIRUH WKH 0 D\ -XQH LQARZ RI VHDZDWHU 7KHVH DQL P DO ZRXG WDNH VR P H WL P H WR GLVSHUVH DQG HVWDEOLVK YLDEOH SRSXODWLRQV LQ QHZ\ ¶UHIUHVKHG· DUHDV ,Q WKH 6RXWK /DJRRQ YHU\ IHZ VSHFLHV ZHUH FROOHFWHG The chiromonid *7DQ\WDUVXV EDUEWDUXV* was low in DEXQGDQFH DQG VDOW 0DNH LVRSRGV ZHUH SUHVHQW LQ VR P H FROOHFWLRQV WKH K\SHU P DULQH P LFURFUXVWDFHDQ WKDW RFFXUHG SUHYLRXV\ LQ WKH 6RXWK /DJRRQ *HGGHV ZHUH QRW FROOHFWHG 6XSSULVQJ\ EULQH VKUL P S *3DUDWHP PLD]LHW]LDQD* ZHUH FROOHFWHG UHSUHVHQWLQJ WKH ÀUVW WL P H WKLV VDOW 0DNH EULQH VKUL P S KDV EHHQ FROOHFWHG LQ the Coorong.

,W DSSHDUHG WKDW ÀVK QX P EHUV ZHUH 0R Z DQG GLVWULEXWLRQV UHVWULFWHG LQ WKH 1RUWK /DJRRQ ,Q WKH 6RXWK Lagoon only hardyheads, *$WKHULQRVRPD PLFURVWRPD*, were collected and these were in low numbers. At the VRXWKHUQ HQG RI WKH 6RXWK /DJRRQ WKH DEXQGDQFH RI hardyheads seemed to be lower than in 2003.'

*HGGHV

7KH DEXQGDQFH DQG GLVWULEXWLRQ RI SR\FKDHWH ZRU P V LQ WKH 1RUWK /DJRRQ has declined

. H \ GULYHUV DQG ⁰HYHUV	
' ULYHUV DQG ⁰HYHUV	' HVFULSWLRQ
: LQGV DQG WLGHV	&RRURQJ 0 L[LQJ LQ WKH 0 XUD\ 0 RXWK (VWXDU\ LV GULYHQ E\ WLGD⁰ VLJQDO\ ZKLFK DUH LQ WXQ GHSHQGHQ RQ WKH 0 XUD\ 0 RXWK 2 SHQLQJ ,QGH[/D P RQWDJQH HW D⁰ 7KH WLGD⁰ VLJQDO\ WHU P LQDWHV DW 3HULFDQ 3RLQW WKXV ⁰LWWH WLGD⁰ HQHUJ\ UHDFKHV WKH &RUURQJ /DJRRQV DQG P L[LQJ LQ WKH 1RUWK DQG 6RXWK /DJRRQV LV SUL P DUU\ FDXVHG E\ Z LQGV ZKLFK FDXVH ZDWHU WR ¶V⁰RVK· EDFN DQG IRUWK /D P RQWDJQH HW D⁰ 7KLV UHVXOW LQ D ZH⁰ P L[HG ZDWHU FR⁰X P Q DQG ⁰RZHU SUREDELOLW\ RI VWUDWLÀFDWLRQ DQG DVVRFLDWHG DQR[LD DQG QXWULHQW UH⁰HDVH IUR P VHGL P HQWV 7KH LQJUHVV RI VHD ZDWHU WKD⁰ GR RFFXU LQWR WKH 1RUWK /DJRRQ DFW LQ FRQFHUW Z LWK WKH Z LQG LQGXFHG P L[LQJ WR FUHDWH UH⁰DWLYH\ XQIRU P VD⁰LQW\ D⁰RQJ WKH 1RUWK /DJRRQ 7⁰GD⁰ ÁX[HV GHWHU P LQH WKH H[WHQW RI H[SRVHG P XG DQG VDQG ÁDW LQ WKH (VWXDU\ DURXQG WKH 0 XUD\ 0 RXWK ZK⁰VW WKH Z LQG P D\ FDXVH GD⁰\ FKDQJHV LQ ZDWHU ⁰HYH⁰ RI F F P DFURVV WKH &RRURQJ /DJRRQV ZKLFK LV DQ L P SHGL P HQW WR *5XSSLD* growing LQ WKH P RUH VKD⁰RZ ZDWHUV ZKHUH ⁰LJKW LV QRW ⁰L P LWLQJ : DWHU FDQ EH SXVKHG LQWR WKH 6RXWK /DJRRQ IUR P WKH 1RUWK /DJRRQ ZKHQ WLGHV DQG VWURQJ Z LQGV FRLQFLGH /DNHV 7KH⁰H LV QR WLGD⁰ LQÁXHQFH QRZ WKDW EDUDJHV DUH LQ S⁰DFH D⁰WKRXJK VHDZDWHU LQWUXVLRQV GR RFFXU FDXVHG E\ UHYHUVH KHDG RYH⁰ WKH EDUUDJHV : LQG FR P EL QHG Z LWK VKRU⁰LQH HURVLRQ FDQ FDXVH LQFUHDVHG IUHVKZDWHU LQWUXVLRQV RU VS⁰DVKLQJ RQ VD⁰LQH VD P SKLH DUHDV : DYH DFWLRQ H[DFHUEDWHV HURVLRQ RI WKH D⁰XYLD⁰ ⁰D\HUV WKDW RYH⁰\ WKH VDQG GHSRVLW RQ WKH ⁰DNH VKRU⁰LQH	&RRURQJ 7KH SHQWUDLRQ RI WLGHV LQWR WKH /DJRRQV LV VWURQJ⁰\ GHSHQGHQ RQ WKH GHJUHH RI 0 XUD\ 0 RXWK 2 SHQLQJ /D P RQW⁰D JQH HW D⁰ 7KH WLGD⁰ ÁX[HV DUH QRW JUHDW HQRXJK WR ÁXVK WKH &RRURQJ /DJRRQV WLGD⁰ VLJQDO⁰ WHU P LQDWHV DW 3HULFDQ DQG RQ\ DFW WR ÁXVK WKH 0 XUD\ 0 RXWK (VWXDU\ DUHD LWVH⁰I 6HD ZDWHU WKD⁰ HQWHUV WKH 1RUWK /DJRRQ FRXQW WKH VD⁰LQ\ ULVH IUR P HYDSRUDWLRQ WR VR P H H[WHQW EXW D⁰VR DGGV WR VD⁰ ⁰RDGV LQ WKH &RRURQJ V\VWH P J LYHQ WKH SDXFLW\ RI IUHVKZDWHU LQÀR ZV IUR P HLWKHU WKH 5LYHU 0 XUD\ RU WKH VRXWK HDVWHUQ HQG RI WKH V\VWH P /DNHV /DNE ⁰HYH⁰V DUH P DQD J HG WR SURYLGH ZDWHU WR 0 XUD\ 0 RXWK DQG &RRURQJ DQG WKXV K\GURJ\ RI WKH ⁰DNE LV L P SDFWHG XSRQ E\ UH⁰HDVHV 7KH ¶A⁰ DQG VS⁰· SK⁰RVRSK\ WKD⁰ KDV JRYHUQHG EDUD J H RSH⁰DWRQ LV EHLQJ UHS⁰DFHG Z LWK D ULVN P DQD J H P HQW DSSURDFK WKD⁰ Z⁰⁰ GH⁰LYHU ZDWHU LQ D P RUH HFR⁰RJ L FD⁰\ VHQVLWLYH P DQQHU | &RRURQJ 5LYHU ÁRZV SURYLGH IUHVKZDWHU LQSXW WR IUHVKHQ WKH HVWXDULQH DQG ⁰DJRRQ HQY⁰RQP HQW 7KH \ DUH FU⁰LFD⁰ IRU WKH ⁰LH F\F⁰HV RI P DQ\ P DFURLQYHU⁰HE⁰DWHV ÀVK DQG KHQFH E⁰⁰GV)⁰RZV FRQ⁰LEXWH WR P DL⁰WDL⁰QJ WKH RSHQJ RI WKH 0 RXWK VXSS⁰H P HQ⁰QJ WKH G⁰HG J LQJ HIIRU DQG S⁰D\ D P D⁰RU UR⁰H LQ WKH VD⁰LQW\ FD⁰ERQ DQG QXWULHQW F\F⁰HV RI WKH (VWXDU\ DQG ⁰DJRRQV 8SSHU 6RXWK (DVW ' UDLQDJH 6FKP H ZDWHU UH⁰HDVHV 5HG⁰⁰FWHG JURXQGZDWHU LV VWR⁰HG LQ 0 R⁰H⁰⁰D %DVLQ IRU FRQWR⁰HG UH⁰HDVH LQWR WKH 6RXWK /DJRRQ YLD 6D⁰ &⁰HHN ,QÁRZV DUH FDSSHG D⁰ \HD⁰ UR⁰LQJ DYH⁰DJH 7R GD⁰H ÁRZV KDYH EHHQ LQ WKH R⁰GH⁰ RI ² * / SHU \HD⁰ LW LV XQNRZQ ZKWKHU YR⁰X P HV DSSURDFKLQJ * / D⁰H ⁰LNH⁰\ WR EH DYD⁰DE⁰H ,QÁRZV IUR P WKH 6RXWK (DVW RFFX⁰⁰HG XQGH⁰ QD⁰XD⁰ FRQG⁰LRQV EXW H[WHQVLYH G⁰DLQDJH VFKP HV FRQW⁰XFWHG IUR P (XRSHDQ VHW⁰H P HQW RQZD⁰GV KDYH P RG⁰ÀHG ⁰QÁRZV WR WKH &RRURQJ DQG ⁰HG⁰HFWHG VX⁰IDFH DQG J⁰RXQGZDWHU ÁRZV WR WKH VHD)⁰RVKZDWHU ⁰QÁRZV G⁰HFW\ ⁰QWR WKH &RRURQJ ⁰D J RRQV IUR P I⁰HVKZDWHU VRDNV LV WKRXJKW WR KDYH D⁰VR GHF⁰QHG VLJQÀFDQW⁰\ V⁰QFH WKH V VHH 6HF⁰RQ /DNHV 0 D⁰QW⁰QJ H YD⁰D⁰RQ ⁰LW⁰H YD⁰LRQ ⁰DNH ⁰HYH⁰V ⁰Q R⁰GH⁰ WR VHUY⁰FH ⁰⁰⁰J D⁰RQ QHHGV KD⁰V ⁰HGXFHG H[SRVX⁰H RI ZDGH⁰ KDE⁰WD⁰ D⁰RQ J WKH VKR⁰H⁰QHV DQG ⁰V FRQW⁰EXW⁰Q J WR ⁰DNHVKR⁰H HURV⁰RQ DQG ⁰HVKHQ⁰Q J RI WKH VD⁰⁰QH VD P SK⁰⁰H FR P P XQ⁰HV VX⁰⁰RXQG⁰⁰Q J WKH ⁰DNHV 6SHF⁰HV GHSHQGHQ RQ YD⁰DE⁰H ZDWHU ⁰H J⁰ P H VXFK DV VR P H H P HU J HQW S⁰DQW⁰ L P SR⁰DQW IRU QHV⁰Q J D⁰H QRZ XQGH⁰ ⁰H S⁰HVHQHG⁰ LQ WKH ⁰DNHV HQY⁰RQ P HQW

. H\ HFRV\VWHP FRP SRQHQWV DQG SURFHVVHV	
(FRV\VWHP FRP SRQHQWV DQG SURFHVVHV	' HVFULSWLRQ
6DULQH\	&RRURQJ 9DULDWLRQ LQ VDULQH\ IUR P P DULQH WR K\SHUVDULQH 6DULQH\ LQ WKH /DJRRQV LV D SURGXFW RI IUHVKZDWHU ÁRZV WKURXJK WKH EDUDJHV P DULQH ZDWHU H[FKDQJH IUR P WKH 6RXWKUQ 2FHDQ DURQG WKH GUHG JHG FKDQQHO HYDSRUDWLRQ GLVFKDUJHV IUR P WKH 8SSHU 6RXWK (DVW ' UDLQDJH 6FKP H LQWR WKH 6RXWK /DJRRQ JURXQGZDWHU LQÁRZV H J IUHVKZDWHU VRDNV UDLQID RQ WKH ODJRRQ VXUIDFHV DQG WKH P RYH P HQW RI K\SHUVDULQH ZDWHU IUR P WKH 6RXWK /DJRRQ LQWR WKH 1RUWK /DNHV 9DULDWLRQ LQ VDULQH\ LV D SURGXFW RI 5LYHU 0 XUD\ DQG WULEXWDU\ LQÁRZV UDLQID RQ WKH ODNHV JURXQGZDWHU G\QD P LFV ZDWHU H[FDFWLRQ DQG HYDSRUDWLRQ 6LQFH WKH \HDU RQZDUG VDULQH\ ODYHHV LQ /DNH $UH[DQGULQD KDYH UDQJHG EHWZHHQ (& WR QHDU\ (& DQG LQ /DNH $UEHUW IUR P DERXW (& WR QHDU\ (& 6HH $SSHQGL[+ ³ VHH 6HFWLRQ
' LVVROYHG R[\JHQ	&RRURQJ 7KH VKDORZ ZDWHU GHSWK DQG WKH ZLQG LQGXFHG P L[LQJ LQ WKH (VWXDU\ JHQHUDWHV WUHX LQ D ZH ODP P L[HG R[\JHQDWHG ZDWHU FROP Q LQ WKH 1RUWK /DJRRQ 0 ' %& +RZHYHU WKHU P DO RU VDLQLW\ LQGXFHG VWUDWLÁFDWLRQ FDQ RFFXU DQG UHVXOW LQ QXWULHQW UHDHVHV DQG QHJ DWLYH HIIHFWV WR EHQWKLF RUJDQLVP V /D P RQWDJ QH HW D0 /DNHV $V VKDORZ ZDWHU ERGLHV LW LV ULNH\ WKDW ZLQG LQGXFHG P L[LQJ SUHYHQWV VWUDWLÁFDWLRQ LQ WKH ODNHV P RVW RI WKH \HDU 7KLV LV QRW ZH0 XQGHUVWRRG DW SUHVHQW
7XUELGLW\	&RRURQJ 7XUELGLW\ FDXVHV D UHGXFWLRQ LQ OLJKW DYDLODEOH IRU SKRWRV\QWKHVLV IRU VXE P HU JHG DTXDWLF SUDQW FKDQJHV WKH FRQGLWLRQV WR IDYRXU WKH JURZWK RI SK\WRSODQNWRQ RYHU DTXDWLF P DFURSK\WHV +LJK ODYHOV RI WXUELGLW\ FDQ DVR UHGXFH WKH VXFFHVV RI YLVXDO IHHGHUV VXFK DV ZDWHUELUGV DQG FDQQLYRURXV ÀVK WKDW UHTXLUH DGHTXDWH YLVLELLW\ WR VHH SUH\ +LJK WXUELGLW\ ODYHOV UHVWULFW JURZWK IRU *5XSSLD* VSS WR VKDORZHU ZDWHUV /DNHV $V DERYH H[FHSW WKH DIIHFWHG SUDQW DUH IUHVKZDWHU P DFURSK\WHV VXFK DV *9DLVQHLD DP HULFDQD 0 \LRSK\XP* and *&HLDWRSK\XP* VSS
6HGL P HQWDWLRQ VHGL P HQW VL]H DQG HURVLRQDO SURFHVVHV	&RRURQJ 6HGL P HQWDWLRQ QHHGV WR EH EDODQFHG EHWZHHQ WKH D P RXQWV QHHGHG WR UHSOHQLVK WKH RU J DQLF P DWWHU DQG QXWULHQWV IRU WKH VDQG DQG P XGADWV DQG WKH D P RXQWV WKDW ZLO QRW FDXVH GHFLQH LQ DTXDWLF SUDQW JURZWK GXH WR OL JKW OL P LWDWLRQ DQG EURA0 P JURZWK ([FHVV VHGL P HQWDWLRQ P D\ DVR FKDJH WKH WRSRJUDSK\ RI WKH ARRU RI WKH 0D J RRQV A0LQJ LQ KRHV DQG FRYHULQJ VDQG P XG DQG VWRQ\ ADWV WKDW DUH L P SRWDQW IRU AVK IHHGLQJ DQG VSDZQLQJ $QRWKHU FRQVLGHUDWLRQ KHUH LV WKH 0RVV RI WKH AQHU VHGL P HQWV SUHYLRXV\ GHSRVLWHG E\ VH P L UH J X0DU ULYHULQH ARRG\QJ DQG WKH UHS0DFH P HQW RI WKHVH VXEVWUDWHV ZLWK FRDUVHU P DLQH VDQGV ' HFR P SRVLQJ D0J DH LV GHSRVLWLQJ RQ WKH URFN\ VKRUHlQHV ² F P WKLFN D\ : RRGV : H0 V P RWKHULQJ DQG LQÀXLQJ WKH P LFUR WRSRJUDSKLFD0 IHDWXUHV WKHUHE\ UHGXFLQJ URFN\ VKRUHlQH SRR habitats. /DNHV $V IRU WKH &RRURQJ VXE P HU JHG DTXDWLF S0DQWV LQ WKH 0DNHV DUH EHLQJ DGYHUVH\ L P SDFWHG XSRQ E\ KLJK WXUELGLW\ 6KRUHlQH HURVLRQ DGGV WR WKH 5LYHU 0 XUD\ VHGL P HQW 0RDG DQG EUHDNV GRZQ IUQJ LQJ UHHGEHGV ZKLFK WHQGV WR IQFUHDVH WKH RSSRUWXQLWLHV IRU IUHVKZDWHU LQWXVLRQ LQWR WKH VDlQH VD P SKlUH FR P PXQLWLHV EHKlQG VHH DERYH
: DWHU 0HYH0V	&RRURQJ : DWHU 0HYH0V LQ WKH (VWXDU\ DUH 0RZHVW LQ)HEXDU\ ² $ S5L0 DQG KLJKVW -X\ ²6HSWH P EHU FKDQJLQJ VHDVRQD0\ E\ DS S5R[L P DWHU\ P /D P RQWD J QH HW D0 7KLV YDULDWLRQ DQG WLGD0 ÁX[HV LQ WKH 1RUWK /DJRRQ DUH L P SRUWDQW IRU H[SRVLQJ PXGÁDWV ,Q DGGlWLRQ VXE P HU JHG DTXDWLF YHJHWDWLRQ UHTXLUHV ZDWHU 0HYH0V EHWZHHQ DQG P LQ Z LQWHU DQG VSUlQJ IRU UHSURGXFWLRQ DQG JURZWK 2 ERUQH *5XSSLD WXEHURVD* UHTXLUHV WKLV IRU WKH ZKROH RI VSUlQJ &KDJHV LQ ZDWHU 0HYH0 QHHG WR EH JUDGXD0 WR D0RZ IRU E\RWD WR DGDSW H J VHWWlQJ RI VHHGV IRU DTXDWLF SUDQW RU 0D\lQJ RI HJ JV IRU LQYHUWHEUDWHV /DNHV 0 DLQWDlQJ UH0D0LYH0\ FRQVWDQW ZDWHU 0HYH0V LQ WKH 0DNHV lQFUHDVHV WKH IUHVKZDWHU lQWXVLRQ IUR P ZDYH DQG VSUDVK DFWLRQV lQWR VD P SKlUH FR P PXQlWLHV WKDW IUlQJH WKH 0DNHVKRUH WKD\ ZHUH IRU P HU0\ 0HVV IUHTXHQW\ AXVKHG DQG P RUH VDlQH DUHDV DQG WKHUHIRUH IDYRXUHG E\ ZDGHUV 7KH 0DFN RI P HGlX P DQG 0DJH ARRGV P HDQV VDlQDV DQG VD P SKlUH FR P PXQlWLHV HWF WKD\ lLH EHkIQG WKH IUlQJ lQJ YHJHWDWLRQ DQG KLJKU RQ WKH ARRGS0DQ GR QRW UHFHlYH WKH IUHVK ZDWHUV WKH\ QHHG RQ D VH P l UHJXlDU EDVl 7KXV VR P H VD P SKlUH FR P PXQlWLHV DUH UHFHlYlQJ WRR P XFK IUHVKZDWHU DQG RWKHUV DUH QRW UHFHlYlQJ HQRXJK ([WHQVlYH DUHDV RI WKHVH FR P PXQlWLHV DUH QRZ JUD]HG (DWK7HFK
%LRORJLFDO	
1XWULHQW DQG FDUERQ F\FlQJ	&RRURQJ 1XWULHQW FRQFHQWUDWLRQV lQ WKH 1RUWK /DJRRQ DUH W\SlFD0\ KLJKHU WKDQ WKRVH QHD0 WKH 0RXWK DQG 0RZHU WKDQ WKH 6RXWK /DJRRQ 0 ' %& +RZHYHU QXWULHQW F\FlQJ DQG WKH QXWULHQW UHTXlUH P HQW RI DTXDWLF SUDQW lQ WKH &RRURQJ lV QRW ZH0 XQGHUVWRRG /D P RQWDJ QH HW D0 1lFKR0V &DUERQ F\FlQJ VlP lD0\ KDV EHHQ SRR0\ VWXGlHG EX W lV lNH0\ WKDW WKH lQFUHDVlQJ VDlQlW\ 0HYH0V DQG KLJK\ 0DElH FDUERQ 0RDG IUR P D0J DH FI UH0DWLYH0\ UHlUDFWlH FDUERQ IUR P SUDQW ZL0 IDYRXU DQDHURElF RYHU DHURElF GHFR P SRVlWLRQ SDWlFXlD0\ VX0SKDWH UHGXFWlRQ /DNHV 1XWULHQW DQG FDUERQ F\FlQJ lQ WKH 0DNHV lV SRR0\ XQGHUVWRRG

ª FRQWlQXHG RYHUHDI ª

.H\ HFRV\VWHP FRPSRQHQWV DQG SURFHVVHV FRQWLQXHG	
%LRJLFDO	
+DELWDW DYDLODELOLW\	&RRURQJ 7KH GRPLQDQW SLPDU\ SURGXFHUV DQG WKXV KDELWDW IRXQGDWLRQ LQ WKH ØDJRRQV DUH *XSSLD VSS *XSSLD PHJDFDUSLD KDV QRZ JRQH IURP WKH 1RUWK /DJRRQ 1LFR *XSSLD WXEHURVD KDV GHFOLQHG LQ WKH 6RXWK /DJRRQ DQG EHJXQ WR FRORQLVH WKH 1RUWK /DJRRQ SUHVXPDEO\ GXH WR WKH LQFUHDVLQJ VDOLQLW\ IRXQG WKHUH *XSSLD IRUPV WKH EDVLV RI WKH IRRG FKDLQ IRU ZDWHUIRZ ZKLFK IHG RQ VHHGV ØHDYHV DQG WXLRQV DQG SURYLGH GHWULWXV IRU VWLPXODQJ QXWULHQW F\FOLQJ LQ WKH VHGLPHQWV DQG IRRG IRU GHWULWRVHV VXFK DV ÀVK DQG PDFURLQYHUWHEUDWHV 5 WXEHURVD is not being UHSODFHG E\ DQRWKHU SØDQW VSHFLHV LQ WKH 6RXWK /DJRRQ EXW UDWKHU E\ DØJDH DV WKH GRPLQDQW SUHPDU\ SURGXFHU LQGLFHVLQJ D IXQGDPHQWDO VKLIW LQ HFRRJLFDØ FKDUDFWHU	&RRURQJ 7KH GRPLQDQW SUHPDU\ SURGXFHUV DQG WKXV KDELWDW IRXQGDWLRQ LQ WKH ØDJRRQV DUH 5XSSLD VSS 5XSSLD PHJDFDUSLD KDV QRZ JRQH IURP WKH 1RUWK /DJRRQ 1LFR 5XSSLD WXEHURVD KDV GHFOLQHG LQ WKH 6RXWK /DJRRQ DQG EHJXQ WR FRORQLVH WKH 1RUWK /DJRRQ SUHVXPDEO\ GXH WR WKH LQFUHDVLQJ VDOLQLW\ IRXQG WKHUH 5XSSLD IRUPV WKH EDVLV RI WKH IRRG FKDLQ IRU ZDWHUIRZ ZKLFK IHG RQ VHHGV ØHDYHV DQG WXLRQV DQG SURYLGH GHWULWXV IRU VWLPXODQJ QXWULHQW F\FOLQJ LQ WKH ØDJRRQV DUH 5XSSLD WXEHURVD is not being UHSODFHG E\ DQRWKHU SØDQW VSHFLHV LQ WKH 6RXWK /DJRRQ EXW UDWKHU E\ DØJDH DV WKH GRPLQDQW SUHPDU\ SURGXFHU LQGLFHVLQJ D IXQGDPHQWDO VKLIW LQ HFRRJLFDØ FKDUDFWHU /DNHV 6XE PHUJHG DTXDWLF SØDQWV VXFK DV 9DOLVQHULD DPHULFDQD 0 \ØLRSK\ØXP VS DQG &HUDWRSK\ØXP VS RQFH JUHZ RXW VHYHUDØ NØR P HWUHV LQWR WKH ØDNHV IUR P WKH VKRUHØLQH 6ØP DQG 0 XØHU 7KH\ DUH QRZ FRQÀQHG WR WKH QHDU VKRUH HQYLURQ P HQW F P IUR P VKRUH FKDQQHØV GUDLQV DQG IØLQJ J ØLQJ ZHWDQGV WKDW SURYLGH VXLWDEØH OLJKW F\ P DWHV DQG VXEVWUDWH VWDEØLW\
5HSURGXFWLRQ	See Section 5.3 regarding bird breeding.
&R P SHWLWYH H[WHQW	&RRURQJ 5XSSLD VSS LV DQ L P SRUWDQW IRRG VRXUFH IRU SURYHUV VDQGS LSHUV VWLQV VLØV DYRFHWV GXFNV DQG VZDQV : KØVW WKH 6 P DØ P RXWKHG +DUG\KHDG ÀVK WKDW GHSHQG XSRQ WKH 5XSSLD are P DØRU IRRG VRXUFH IRU J UHEHV SHØLFDQV DQG WHUQV 3DWRQ 1RYH P EHU SUHVHQWDWLRQ E\ *HGGHV *RØZD 1RYH P EHU *UHHQVKDQN %DQGHG 6WØW DQG 5HG QHFNHG $YRFHWV ZØØ DØVR WDNH V P DØ ÀVK DW WL P HV ' 3DWRQ SHUV FR P P %RWK SØDQW DQG ÀVK IRRG VRXUFH DUH QRZ VHYHUHØ\ GHSØHWHG DQG FR P SHWLWYH SUHVVXUH LV KLJK /DNHV 6XE PHUJHG DTXDWLF SØDQWV VXFK DV 0 \ØLRSK\ØXP VS /HSØHDQD VS DQG 9DOLVQHULD DPHULFDQD DUH GØHFW IRRG VRXUFH IRU KHUELYRURXV EØGV VXFK DV VZDQV DQG GXFNV : KØVW WKH V P DØ QDWLYH ÀVK WKDW GHSHQG RQ WKH P DFURØQYHUWHEUDWHV ØLYLQJ LQ WKH VXE P HUJHG SØDQW EHGV DUH L P SRUWDQW IRRG VRXUFH IRU SØVFLYRURXV EØGV DQG ØDUJHU ÀVK VSHFLHV VXFK DV *RØGHQ 3HUFK 6XE P HUJHG DTXDWLF SØDQWV DQG V P DØ QDWLYH ÀVK WHQG WR EH GHSHQGHQW RQ YDLDEØH ZDWHU UHJL P H DQG WKXV DUH QRZ XQGHU UHSUHVHQWHG LQ WKH ØDNHV HQYØRQ P HQW SØDFLQJ FR P SHWLWYH SUHVVXUH RQ the waders.

/L P LWV RI DFFHSWDEØH FKDQJH DQG WUDIÀF ØL JK W DVVHVV P HQW)RU WKLV DVVH P EØDJH RI ZDGLQJ VSHFLHV ZLWKLQ WKH ZHWDQG GHSHQGHQW EØG FR P PXQW\ RI WKH &RRURQJ DQG /DNHV 5D P VDU VLWH WKHUH DUH D QX P EHU RI ØL P LWV RI DFFHSWDEØH FKDQJH WKDW QHHG WR EH FRQVLGHUHG DV IRØRZV

3RSXØDWLRQ VL]H ³ VXUYH\ GDWD WR GDWH FDQ EH XVHG RØ\ WR LQGLFDWH WUHQGV DQG LW LV QRW SRVVLEØH WR XVH LW WR VHW UREXVW ØL P LWV RI FKDQJH 7KH GDWD LV DØVR LQ P RVW FDVHV KLJK\ YDØLDBEØH DQG WKLV ZLGH QDWXUDØ YDØLDWLRQ DØVR KLQGHUV WKH VHWWLQJ RI /$& ,W LV UHFR P P HQGHG WKDW IXWXUH VXUYH\V IRFXV RQ WKH IRØRZLQJ ZDGHU VSHFLHV 6KDUS WDØØHG 6DQGS LSHU 5HG QHFNHG 6WLQW &XØHZ 6DQGS LSHU %DQGHG 6WØW *UHHQVKDQN 5HG QHFNHG $YRFHW DQG 5HG FDSSHG 3ØRYHU WR HVWDEØLVK P HDQLQJIXØ /$& ,Q WKH LQWHUP WKH /$& VKRXØG EH WR VHE WKHVH SRSXØDWLRQV UHWDLQHG DW RU EHWWHU WKDQ WKHLU ØHYHØV DV UHFRUGHG LQ 3DWRQ)RU WKHVH VSHFLHV WKRVH SRSXØDWLRQ HVWL P DWHV IRU WKH &RRURQJ ZHUH DV VKRZQ EHØRZ ,W LV UHFR JQLVHG WKDW WKHVH DUH VR P HZKDW DUELWUDU\ EXW WKH\ DUH SURYLGHG LQ WKH LQWHUHVW RI SURYLGLQJ DQ LQWHUL P /$& XQWØ P RUH V\VWH P DWLF VXUYH\V FDQ SURYLGH VWURQJ HU GDWD RQ ZKLFK to base them.

3UR P LQHQW ZDGHU VSHFLHV RI WKH &RRURQJ	SRSXØDWLRQ HVWL P DWH 3DWRQ E
6KDUS WDØØHG 6DQGS LSHU	
5HG QHFNHG 6WLQW	
&XØHZ 6DQGS LSHU	
%DQGHG 6WØW	
*UHHQVKDQN	
5HG QHFNHG $YRFHW	
5HG FDSSHG 3ØRYHU	

5HG QHFNHG 6WLQNV

' LVWULEXWLRQ DQG EUHHGLQJ VXFFHVV RI FHUWDLQ VSHFLHV ³ 6HH 6HFWLRQ +DELWDW IRRG DYDLODELOLW\ DQG FRQGLWLRQ ³ 7KUH D QX P EHU RI HYHUV FR P SRQHQWV DQG SURFHVVHV WKDW L P SDFW RQ WKH DYDLODELOLW\ DQG FRQGLWLRQ RI KDELWDW DQG IRRG LWH P V IRU WKHVH VSHFLHV 7KHVH DUH FRQVLGHUHG LQ 6HFWLRQ

*UHHQ LQWHUYHQWLRQ LV ZDUUDQWHG EDVHG RQ VXUYH\ GDWD DQG WKH ÀQGLQJV RI 3DWRQ D E DQG *HGGHV LQ SDUWLFXODU 7KHLU GDWD FOHDU\ VKRZ KRZ WKH HFRORJLFDO FKDUDFWHU RI WKH 1RUWK DQG 6RXWK /DJRRQV KDYH FKDQJHG and are continuing to change, in ways that DUH GHWUL P HQWDO WR WKH ZDWHUELUG DQG ÀVK ³ VHH 6HFWLRQ FR P P XQLHV 7KH ORVV RI NH\ VWRQH DTXDWLF SUDQW VSHFLHV DQG NH\ IRRG LWH P V VXFK DV KDUG\KHDG ÀVK LQGLFDWH WKLV SDUW RI WKH 5D P VDU site is critically endangered, and warrants listing as VXFK XQGHU WKH &R P P RQZHDOWK (3%& $FW VHH 6HFWLRQ

*UHHQ LQWHUYHQWLRQ LV ZDUUDQWHG EDVHG RQ VXUYH\ GDWD DQG WKH ÀQGLQJV RI 3DWRQ D E DQG *HGGHV LQ SDUWLFXODU 7KHLU GDWD FOHDU\ VKRZ KRZ WKH HFRORJLFDO FKDUDFWHU RI WKH 1RUWK DQG 6RXWK /DJRRQV KDYH FKDQJHG and are continuing to change, in ways that DUH GHWUL P HQWDO WR WKH ZDWHUELUG DQG ÀVK ³ VHH 6HFWLRQ FR P P XQLHV 7KH ORVV RI NH\ VWRQH DTXDWLF SUDQW VSHFLHV DQG NH\ IRRG LWH P V VXFK DV KDUG\KHDG ÀVK LQGLFDWH WKLV SDUW RI WKH 5D P VDU site is critically endangered, and warrants listing as VXFK XQGHU WKH &R P P RQZHDOWK (3%& $FW VHH 6HFWLRQ

Q 7KH VLWH VXSSRUWV D GLYHUVH FRP P XQLW\ RI ZHWODQG GHSHQGHQW ELUG VSHFLHV

4XDOLWDWLYH GHVFULSWLRQ

$V RXWOLQHG LQ WKH LQWURGXFWLRQ WR WKH SUHFHGLQJ VHFWLRQ RQFH ZHWODQG GHSHQGHQW ELUG VSHFLHV WKDW EUHHG DW WKH VLWH 6HFWLRQ DQG WKH ZDGHU VSHFLHV DUH DGGUHVVHG 6HFWLRQ WKLV 0HDYHV D VKRUW OLVW RI RWKHU VLJQLÀFDQW ZHWODQG GHSHQGHQW VSHFLHV WR EH FRQVLGHUHG 7KHVH DUH OLVWHG LQ WKH WDE0H EH0RZ D0RQJ ZLWK VR P H VX P P DU\ 0LIH KLVWRU\ LQIRUP DWLRQ DQG DQ LQGLFDWLRQ RI ZKHUH ZLWKLQ WKH Ramsar site they are known to occur.

([D P LQDWLRQ RI WKLV LQIRU P DWLRQ VKRZV WKDW ZLWK RQH H[FHSWLRQ &DSH %DUHQ * RRVH VHH IR0RZLQJ SDJH WKHVH VHYHQ VSHFLHV DQG WKHU HFR0RJLFDO QHHGV DQG UR0HV KDYH EHHQ DGGUHVVHG LQGLUHFW\ LQ WKLV UHSRUW LQ HLWKHU 6HFWLRQV RU : KL0H WKH\ DUH QHLWKHU ZDGLQJ VHFWLHV QRU EUHHG DW WKH VLWH WKHVH VHFWLHV WR D 0DUJH H[WHQW KDYH HFR0RJLFD0 QHHGV WKDW P LUURU WKRVH FRQVLGHUHG LQ WKHVH HDULHU VHFWLRQV $V VXFK QR DWWH P SW KDV EHHQ P DGH KHUH WR SURYLGH GHWDL0HG SURA0HV RI WKHVH KDELWDW UHTXLU P HQWV DQG WKH XQGHU0\LQJ SURFHVVHV DQG GLYHUV RU WR VHW 0L P LWV RI DFFHSWDE0H FKDQJH ,W LV DVVX P HG WKDW LI WKH 0L P LWV RI DFFHSWDE0H FKDQJH IRU WKHVH RWKHU ELUG DVVH P E0DJHV DUH DS S0LHG WKHQ WKH VHFLHV XQGHU FRQVLGHUDWLRQ EH0RZ ZL00 D0VR EHQHÀW

,W LV DVVX P HG WKDW LI WKH 0L P LWV RI DFFHSWDE0H FKDQJH IRU WKHVH RWKHU ELUG DVVH P E0DJHV DUH DS S0LHG WKHQ WKH VHFLHV XQGHU FRQVLGHUDWLRQ EH0RZ ZL00 D0VR EHQHÀW

&DSH %DUHQ * HHVH

7DEOH 2WKHU VLJQLÀFDQW ZDWHUEUGV ZLWKLQ WKH 5DPVDU VLWH DQG VXP PDU\ OLIH KLVWRU\ LQIRUP DWLRQ

&RP PRQ QD P H	6FLHQWLÀF QD P H	**Ramsar** FULWHULD	- &$ 0%$ RU & 0 6	6$ 6WDWXV	6\VWH P XQLWV	+DELWDW DQG RWKHU OLIH KLVWRU\ LQIRU P DWLRQ
*UHEHV)D P LO\ 3RGLFLSHGLDH						
*UHDW &UHVWHG *UHEH	*3RGLFHPV FULVWDWXV*			R		)RXQG LQ ULYHUV ODNHV VZD P SV HWF SUHIHUULQJ ODUJH RSHQ ZDWHU DUHDV 1RQ EUHHGLQJ JURXSV IRU P RQ VDLQH ODNHV HVWXDULHV DQG ED\V +$1=$% (DVW SUL P DUL\ DTXDWLF DUWKURSRGV AVK P ROXVNV YHJHWDWLYH P DWWHU DQG VHHGV 6FKR]
+RDU\ KHDGHG *UHEH	*3RGLFHPV SROLRFHSKDLXV*					3UHIHUV ODUJH SHU P DQHQW RU VH P L SHU P DQHQW DQG RSHQ ZDWHUERGLHV FRDVWDO XS WR DSSUR[P ASL. Seems WR DYRLG ZDWHUV FRYHUHG ZLWK GHQVH YHJHWDWLRQ SUHIHUULQJ ZDWHU ² P GHHS ZLWK VR P H VXE P HU JHG YHJHWDWLRQ +$1=$% (DVW SUL P DUL\ DTXDWLF DUWKURSRGV DQG ÀVK 6FKR]
*HHVH VZDQV DQG GXFNV)D P LO\ $QDWLGDH						
&DSH %DUHQ *RRVH	*&HUHRSVLV*		& 0 6	R		*UDVVODQGV DQG WHUUHVWULDO ZHWODQGV JUD]LQJ RQ YHJHWDWLRQ VXFK DV JUDVV SDVWXUH FHUHDV DQG VR P HV P HV WKH IULQJLQJ DTXDWLF YHJHWDWLRQ +$1=$%
*UH\ 7HD	*$QDV JUDFLOLV*	5.3	& 0 6			)HHGV LQ VKDOORZ RSHQ ZDWHUV RI OHVV WKDQ P GHSWK :LGHVSUHDG IUR P terrestrial wetlands to sheltered estuaries etc. +$1=$% (DVW P RVW\ VHHGV DQG YHJHWDWLYH matter, sedges, smartweeds and grasses 6FKR]
5DLOV FUDNHV VZD P SKHQV FRRW)D P LO\ 5DOLGDH						
Lewin's Rail	*5DOXV SHFWRUDOLV*	3		V		' HQVH\ YHJHWDWHG IUHVKZDWHU WR VDLQH ZHWODQGV XVXDO\ ZLWK DUHDV RI VWLO ZDWHU (DVW P ROXVFV HDUWKZRUP V DUWKURSRGV DQG RFFDVLRQDO\ IURJV RU ELUGV· HJJV 6FKR]
&XOHZV VDQGSLSHUV VQLSHV JRGZLWV SKDODURSHV)D P LO\ 6FROOPDFLGDH						
/DWKD P ·V 6QLSH	*DOLQDJR KDUG Z\FNL*		- &$ 0%$ & 0 6	V		3UHIHUV P DUVK\ DUHDV IHHGLQJ P RVW\ RQ LQYHUWHEUDWHV IROQG LQ VRIW P XGG\ VRLOV DURXQG OR Z YHJHWDWLRQ VXFK DV VHGJHV DQG KHUEV +$1=$%
*XOV WHUQV HWF)D P LO\ /DULGDH						
Little Tern	*6WHUQD DOELIURQV*		- &$ 0%$	V		6KHOWHUHG FRDVWDO DUHDV IRUDJHV LQ VKDOOR Z ZDWHUV RI HVWXDULHV DQG FRDVWDO OD J RRQV %UHHGV RQ VDQGVSLWV EDQN DQG ULG JHV RI ODNHV RU HVWXDULHV +$1=$%

6\VWH P XQLWV ZKHUH IRXQG
² 0 XUD\ 0 RXWK DQG (VWXDU\ ² 1 RUWK /D J RRQ ² 6RXWK /D J RRQ ² /DNH $OEHUW ² /DNH $OH[DQGULQD ² 7ULEXWDU\ ZHWODQGV
7KH 5D P VDU FLWHULD DUH SURYLGHG LQ 7DEOH

&DSH %DUUHQ * RRVH

$V QRWHG DERYH WKH &DSH %DUUHQ * RRVH GXH WR LWV XQLTXH HFRORJLFDO QLFKH LV ZRUWK\ RI QRWH LQ WKLV GHVFULSWLRQ RI HFRORJLFDO FKDUDFWHU : KLOH D JHQHUDOLVW LQ WHU P V RI ZKHUH LW IHHGV WKH VSHFLHV LV FRQVLGHUHG UDUH LQ 6RXWK $XVWUDOLD DQG KDV VR P HZKDW RI DQ LFRQLF SRVLWLRQ WR WKH SHRS0H RI WKLV UHJLRQ ,W WKHUHIRUH VHH P V DSSURSULDWH WR FRQVLGHU DSS0\LQJ D OL P LW RI DFFHSWDE0H FKDQJH WR WKLV VSHFLHV SXUH0\ LQ WHU P V RI LWV SRSX0DWLRQ VL]H ZLWKLQ WKH 5D P VDU VLWH WR HQVXUH WKDW WKLV DUHD UH P DLQV D UHIX JH IRU LW DQG WKLV UDWKHU XQLTXH SDUW RI WKH Ramsar site is monitored.

/L P LWV RI DFFHSWDE0H FKDQJH DQG WUDÀF OL JKW DVVHVV P HQW 7KH VSHFLHV EUHHGV DZD\ IUR P WKH &RRURQJ RQ .DQJDURR ,V0DQG DQG RWKHU RIIVKRUH LV0DQGV IXUWKHU WR the west.

,W LV QRW SRVVLE0H WR HVWDE0LVK WKH VL]H RI WKH SRSX0DWLRQ RI WKLV VSHFLHV DW RU DURXQG WKH WL P H WKH VLWH ZDV 5D P VDU 0LVWHG LQ ,Q UHFHQW \HDUV WKH SRSX0DWLRQ VL]H RI WKH Ramsar site and immediately adjacent areas has been HVWL P DWHG DW DSSUR[L P DWH0\ 7L P : LOVRQ SHUV FR P P

)XUWKHU ZRUN LV UHTXLUHG WR GHWHU P LQH ERWK WKH SRSX0DWLRQ VL]H DQG H[WHQW RI WKH KDELWDWV UHTXLUHG E\ WKLV UDUH VSHFLHV ZLWKLQ WKH 5D P VDU VLWH VR WKDW DSSURSULDWH S0DQQLQJ DQG P DQDJH P HQW FDQ EH SURYLGHG)UR P WKH SHUVSHFWLYH RI VHWWLQJ 0L P LWV RI DFFHSWDE0H FKDQJH WKHUH DUH IRXU SUL P DU\ FRQVLGHUDWLRQV DV IR0R ZV

3RSX0DWLRQ VL]H ³ WKH HVWL P DWH LV DSSUR[L P DWH0\ KRZHYHU QDWXU0 YDULDEL0LW\ RI WKLV AJXUH LV QRW NQRZQ DW SUHVHQW 8QWL VXFK WL P H DV D P RUH SUHFLVH SRSX0DWLRQ HVWL P DWH LV SRVVLE0H DQG QDWXU0 YDULDWLRQV DUH EHWWHU XQGHUVWRRG WKH SUHFDXWLRQDU\ DSSURDFK VXJJHVWV D 0L P LW RI DFFHSWDE0H FKDQJH QRWLQJ WKH JHQHUDOLVW

IRUD JLQJ EHKDYLRXU RI WKH VSHFLHV

$UHD0 H[WHQW RI SUL P DU\ KDELWDWV XVHG E\ WKH VSHFLHV 1RW NQRZQ DW SUHVHQW

&RQGLWLRQ RI WKH SUL P DU\ KDELWDWV XVHG E\ WKH VSHFLHV 1RW NQRZQ DW SUHVHQW D0WKRXJK VHH ZHW0DQG 7\SH LQ 6HFWLRQ

&RQQHFWLYLW\ EHWZHHQ SUL P DU\ KDELWDWV XVHG E\ WKH VSHFLHV DVVX P LQJ WKLV LV DQ L P SRUWDQW IDFWRU LQ VXVWDLQLQJ WKH SRSX0DWLRQ 1RW NQRZQ DW SUHVHQW

7UDÀF OL JKW DVVHVV P HQW

7KHUH DUH QR LQGLFDWLRQV DW SUHVHQW WKDW WKLV VSHFLHV GHVSLWH EHLQJ UDUH LQ 6RXWK $XVWUDOLD LV IDFLQJ DQ\ L P P HGLDWH WKUHDW RU WKDW WKH SRSX0DWLRQ KDV GHF0LQHG RYHU UHFHQW \HDUV %HLQJ D JHQHUDOLVW IHHGHU 0HVV UHODQW RQ DTXDWLF UHVRXUFHV WKDQ RWKHU EUGV IUR P WKLV VLWH DQG EHHGLQJ RQ RII VKRUH LV0DQGV P D\ KDYH LQVX0DWHG WKLV VHFLHV IUR P VR P H RI WKH L P SDFWV QRWHG IRU RWKHU EUG VSHFLHV LQ WKH SUHFHGLQJ VHFWLRQV)XUWKHU LQYHVWL JDWLRQV DUH QHHGHG WR VHW UREXVW /$& IRU WKH DVSHFWV UHIHUHG WR DERYH

Q 7KH VLWH VXSSRUWV VLJQLÀFDQW QXPEHUV DQG GLYHUVLW\ RI QDWLYH ÀVK LQF0XGLQJ PLJUDWRU\ VSHFLHV

7KH &RRURQJ DQG /DNHV 5DPVDU VLWH LV VLJQLÀFDQW IRU QDWLYH ÀVK VSHFLHV ZKLFK EHWZHHQ WKH P FRQWULEXWH WR TXDOLI\LQJ WKH VLWH DJDLQVW WKH ILUVW HLJKW FULWHULD VHH $SSHQGL[& $WWDFKPHQW $ PRQJ WKHVH VSHFLHV DUH WKH IR0R ZLQJ

- AYH VSHFLHV WKDW DUH 0LVWHG DV YX0QHUDE0H DW HLWKHU J0RED0 RU QDWLRQD0 0HYH0V
- IXUWKHU VSHFLHV WKDW DUH F0DVVLAHG DV SURWHFWHG RU KDYH EHHQ SURYLVRQD0\ 0LVWHG DV RI FRQVHUYDWLRQ concern within South Australia
- VSHFLHV WKDW XWLLVH WKH VLWH DW FULWLFD0 VWD JHV RI WKHLU 0LIH F\F0H VXFK DV GLDGUP RXV VSHFLHV HVWXDULQH VSHFLHV WKDW VSDZQ RU KDYH 0DUJH SRSX0DWLRQV DQG DQ\ IUHVKZDWHU VSHFLHV WKDW VSDZQ RU UHFUXLW ZLWKLQ WKH wetland
- D IXUWKHU IRXU VSHFLHV RI QRWH EHFDXVH WKH\ FRQWULEXWH WR WKH RYHUD0 ELRGLYHUVLW\ DQG ELRGLVSDLW\ ZLWKLQ WKH ÀVK FR P PXQLW\

)RU WKH SXUSRVH RI WKLV GHVFULSWLRQ RI HFR0RJLFD0 FKDUDFWHU WKHVH VSHFLHV KDYH EHHQ EURNHQ XS LQWR WKH IR0R ZLQJ JURXSV EDVHG RQ WKHLU 0LIH KLVWRU\ VWUDWHJ\

2 E0LJDWH IUHVKZDWHU VSHFLHV
' LDGUP RXV VSHFLHV
(XU\KD0LQH DQG HVWXDULQH VSHFLHV
0 DULQH VWUDJ J0HUV

2 E0LJDWH IUHVKZDWHU ÀVK VSHFLHV

4 XD0LWDWLYH GHVFULSWLRQ

7DE0H LQ 6HFWLRQ SURYLGHG GHWDLOV RI WKRVH RE0LJDWH IUHVKZDWHU QDWLYH ÀVK FRQVLGHUHG ¶VLJQLÀFDQW· LQ WKH 5DPVDU ,QIRUP DWLRQ 6KHHW IRU WKLV VLWH $SSHQGL[& $V LV WR EH H[SHFWHG WKHVH VSHFLHV RFFXS\ WKH IUHVKZDWHU SDUWV RI WKH 5DPVDU VLWH /DNH $0EHUW DQG /DNH $0H[DQGULQD DQG LWV WULEXWDULHV 2Q RFFDVLRQ VR P H RI WKHVH VSHFLHV P D\ P RYH WKURXJK WKH EDUUDJHV GXULQJ UH0HDVH HYHQWV EXW WKHVH P RUH VD0WZDWHU HQYLURQ P HQWV DUH QRW SUHIHUUHG $GGHG WR WKH ÀVK FR P P XQLW\ RI WKH /DNHV DW WL P HV DUH WKH GLDGUP RXV VSHFLHV WKDW P RYH LQWR IUHVKZDWHU HQYLURQ P HQWV IRU VSDZQLQJ VHH WKH IR0R ZLQJ VHFWLRQ IRU FRQVLGHUDWLRQ RI WKHVH VSHFLHV

: HGGHUEXUQ DQG +D P P HU LQ WKHLU VXUYH\ RI WKH ÀVK IDXQD RI WKH /DNHV QRWHG WKH GLYHUVLW\ RI WKLV FR P P XQLW\ IUR P D 6RXWK $XVWUDOLDQ 0 XUUD\ ' DULQJ %DVLQ IRU P RUH WKDQ RQH GHFDGH 7KH\ QRWHG WKH P[RI GLDGUP RXV DQG RE0LJDWH IUHVKZDWHU VSHFLHV D P RQJ WKHVH DV VKRZQ EH0R DUH VHYHUD0 FRQVLGHUHG WKUHDWHQHG RU RI FRQVHUYDWLRQ FRQFHUQ QDWLRQD0\ RU within South Australia.

7R TXRWH : HGGHUEXUQ DQG +D P P HU

$ 0DJH SURSRUWLRQ RI WKH WRWD0 QDWLYH VSHFLHV RI WKH 0 XUUD\ ' DULQJ %DVLQ ZHUH FDSWXUHG LQ WKH /DNHV RI VSHFLHV LQF0XGLQJ DERXW D WKUG RI RI WKH IUHVKZDWHU RE0LJDWH VPHFLHV 7KH DUHD LV WKH H[F0XVLYH KDELWDW LQ WKH %DVLQ IRU VHYHUD0 VPHFLHV QRWDE0\ WKH <DUD 3\J P\ 3HUFK DQG D0R KRXVHV UDUH SRSX0DWLRQV RI RWKHU WKUHDWHQHG VPHFLHV VXFK DV WKH 0 XUUD\ +DG\KDG DQG 6RXWKUQ 3\J P\ 3HUFK 6L P L0D00\ IUR P D 6RXWK $XVWUDOLDQ SHUVSHFWLYH VPHFLHV ULFKQHVV DFFRXQWV IRU D WKUG RI WKH 6WDWH·V VPHFLHV ZWK D QX P EHU RI WKRVH RQ\ UHFRUGHG LQ WKH 0 XUUD\ ' UDLQD J H +HQFH WKH ELR0RJLFD0 VLJQLÀFDQFH S0DFHG XSRQ WKH /DNHV DV D 5DP VDU &RQYHQWLRQ : HWDQG RI ,QWHUQDWLRQD0 , P SRUWDQFH H[WHQGV WR DQ LP SRUWDQW ÀVK IDXQD ZWK WKH DUHD D 0RFD0LVHG KRWVSRW IRU ÀVK GLYHUVLW\ 2Q D QHJDWLYH QRWH WKHUH LV LQGLFDWLRQ WKDW KLVWRULFD00\ WKLV XQLTXHQVV ZDV HYHQ P RUH SURQRXQFHG DV VHYHUD0 VPHFLHV QR 0RJHU DSSHDU WR EH UHSUHVHQWHG

0 XUUD\ +DG\KDG

<DUD 3\ J P \ 3HUFK

: HGGHUEXQ DQG +D P P HU DÛVR QRWHG WKDW WKLV AVK FR P P XQLW\ FRXG EH GLYLGHG LQWR WZR VXE VHWV WKRVH P RUH P RE LH DQG J HQHUDLVW VSHFLHV WKDW ZHUH IUHTXHQW\ HQFRXQWHUHG RQ WKH RSHQ H[SRVHG ÛDNH HG J H DQG WKRVH P RUH VSHFLDLVW GH P HUVDÛ VSHFLHV WKDW SUHIHU WKH IULQJ LQJ ZHWDQG DUHDV ZLWK P RUH FRYHU 7KH\ QRWHG WKDW ¶ZHWDQGV WKDW SURYLGHG KDELWDW IRU WKUHDWHQHG VSHFLHV LQYDLDE\ KDG GHQVH VXE P HU J HG RU H P HU J HQW YH J HWDWLRQ DQG ZHUH FKDUDFWHUL VHG E\ VR P H IRU P RI ÅR Z H J 0 RXQW /RI\ 5DQJHV VWUHD P GLVFKDU J H WKURX JK FKDQQHÛ ZDWHU P RYH P HQW ·

%HÛR Z P RUH GHWDLÛHG LQIRU P DWLRQ LV SURYLGHG RQ ZKHUH HDFK RI WKHVH VSHFLHV RFFXUV LQ WKH &RRURQ J DQG /DNHV 5D P VDU VLWH SÛXV KDELWDW LQIRU P DWLRQ VRXUFHG IUR P : HGGHUEXQ DQG +D P P HU DQG WKH 6 . 0 UHSRUW RI WKDW UHYLHZHG IUHVKZDWHU AVK VSHFLHV RI WKH 0 XUD\ ' DÛLQ J %DVLQ 7DE ÛHV WDNHQ IUR P WKH 6 . 0 UHSRUW SURYLGLQ J VX P P DU\ LQIRU P DWLRQ RI WKH KDELWDW DQG RWKHU QHHGV RI WKHVH VSHFLHV GXULQ J VSDZQLQ J DQG IRU ÛDUYDÛ DQG ÛXYHQÛH IRU P V DUH SURYLGHG LQ $ SSHQGL['

7\ SLFD AVK KDELWDW

7DEOH 6XPPDU\ RI FXUUHQW DQG KLVWRULF ÀVK GLVWULEXWLRQV IRU WKH UHJLRQ·V /DNHV : HGGHUEXUQ DQG +DPPHU

6SHFLHV	&XUUHQF\ &UHHN	Finniss 5LYHU	+LQGPDUVK .VDQG	5LYHU 0XUD\ &RQÁXHQFH	/DNH $0H[DQGULQD	/DNH $0EHUW
&RPPRQ *DD[LDV	;	;	:	:	;	;
0RXQWDLQ *DD[LDV		*				*
Australian Smelt	;	;	:	:	;	;
%RQ\ +HUULQJ	:	:	:	:	:	:
6DQG\ 6SUDW					;	
0XUUD\ 5DLQERZÀVK		*				
6PDOO PRXWKHG +DUG\KHDG	;	;	:		;	;
)OY\SHFNHG +DUG\KHDG	:	:	:			:
0XUUD\ +DUG\KHDG		*	:		*	;
6RXWKHUQ 3\JP\ 3HUFK		;	;		;	
<DUUD 3\JP\ 3HUFK	*	;	;		*	
&KDQGD 3HUFK		*				
3XSOH VSRWWHG *XGJHRQ		*				
0XUUD\ 'DUQJ &DUS *XGJHRQ		:	:		:	
0LGJOH\·V &DUS *XGJHRQ					;	
:HVWHUQ &DUS *XGJHRQ		*			*	
)ODWKHDG *XGJHRQ	;	;	:	:	;	;
'ZDUI)ODWKHDG *XGJHRQ	:	:	:	:	:	:
/DJRRQ *RE\	:	3	:	:	:	:
7DPDU *RE\			3		;	;
:HVWHUQ %OXH VSRW *RE\	;	;	;	;	;	;
Congolli	;	;	:		;	;
6KRUW ÀQQHG (HO					*	
0XUUD\ &RG		*			*	
(VWXDU\ 3HUFK			*		*	
*RGHQ 3HUFK		;	3		3	;
6LYHU 3HUFK					*	
)UHVKZDWHU &DWÀVK		*			*	
3RXFKHG /DPSUH\			3		*	
6KRUWKHDGHG /DPSUH\			3		*	
,QWURGXFHG VSHFLHV						
Tench	*					
*DPEXVLD	;	;	;	;	;	;
*RGÀVK		;	:	:	;	;
&DUS	:	:	:		:	:
5HGÀQ	;	;	;	;	;	;
7RWDO QDWLYH DQG H[RWLF						

; ² FXUUHQW UHFRUG KLVWRULFDO UHFRUG 3 ² UHFRUGHG UHFHQW\ EXW QRW IRXQG GXULQJ WKLV VXUYH\

7DE0H 2 E0L JDWH IUHVKZDWHU ÀVK WKHU SUHIHUUHG KDE LWDWV DQG RWKHU 0LIH KLVWRU\ LQIRU P DWLRQ			
&R P P RQ QD P H *VFLHQWLÅF QD P H*	3UHIHUUHG V\VWH P XQLWV	3UHIHUUHG KDE LWDW LQIRU P DWLRQ DGXW TXRWHG H[WDFW IUR P 6. 0 DQG : HGGHUEXU DQG +D P PHU	
		6RXUFH +DE LWDW UHTXLUH P HQWV RI QDWLYH ÀVK RI WKH 0 XUUD\ 'DULQJ %DVLQ 6. 0	6RXUFH /DNHV)LVK ,QYHQWRU\ : HGGHUEXU DQG +D P PHU
2 0LYH 3HUFK0HW &KDQGD SHUFK $ J DVL]·V J0DVVAVK *$ P EDVLV DJDVVJL*		¶7KLV AVK LV D 0RZ0DQG WR P LG V0RSH VSHFLHV ZLWK KDE LWDW SUHIHUHQFH IRU V0RZ ZDU P ZDWHUV LQ ULYHUV FUHHNV DQG ARRGS0DLQV DQG UH0LHV RQ LQVWUHD P FRYHU VXFK DV DTXDWLF YHJHWDWLRQ DQG ZRRG\ GHEUV 6SDZQLQJ LV SURDE0\ LQGXFHG E\ ULVHV LQ ZDWHU 0HYH0V DQG ZDWHU WH P SHUDWXUH ·	¶6L P L0DU K LVWR0LF DFFRXQWV DV IRU WKH 0 XUUD\ 5DLQERZAVK RFFXU0LQJ LQ WKH)LQQLVV DU P KLVWR0LFD0\ H[FHSW GLVDSSHDL0LQJ LQ WKH HD0\ V 8QIR0XQDWH0\ GHWDL0HG VWXGLHV RI their habitat requirements and ecology to KH0S DVVHVV UHDVRQV IRU GHF0LQH ZHUH QR W FRQGXFWHG LQ WKH /RZHU 5LYHU 0 XUUD\ UH J IRQ SUR WR WKHU SUHVX P HG 0RFD0 H[WLQF WLRQ 7KH YDUDE L0W\ DQG H[WHQW RI KDE LWDW LQ WKH)LQQLVV DU P VWL0 RIIHUV VR P H KRSH RI V P D0 UHIXJH SRSX0DWLRQV RI WKHVH VSHFLHV ·
		7H P SHUDWXUH 3UHIHUV ZDU P ZDWHU 6DL0LQW\ P J / ' ' 'LVVR0YHG R[\ JHQ &DQ SUREDE0\ WR0HUDWH 0RZ ' 2	+DE LWDW VSHFLDOLVW 0 +D P PHU SHUV FR P P
0 XUUD\ +D0G\KHDG *&UDWHURFHSKDLXV ÁXYLDWLLV*		¶0 XUUD\ +D0G\KHDGV KDYH D SDWFK\ RFFXU0HQFH LQ 0RZ0DQG ULYHUV 0DNHV EL00DERQJV DQG ZHW0DQGV LQ WKH VRXWKHUQ %DVLQ $GXWV D0H RIWHQ DVVRFLDWHG ZLWK DTXDWLF YHJHWDWLRQ LQ 0DNHV EL00DERQJV DQG ZHW0DQGV DQG D0H RFFDVLRQDO\ IRXQG RQ LQXQGDWHG ÁRRGS0DLQV ·	¶7KH &RR0RQJ DQG /DNHV 5D P VDU VLWH VXSSR0WV D VH0I VXVWDLQLQJ SRSX0LWLRQ DQG LV WKH RQ\ UHJLRQ ZKHUH WKH VSHFLHV LV FX0UHQW\ NQRZQ WR LQKDEL W H[WHQVLYH IUHVKZDWHU KDE LWDWV ,Q R WKH VWDWHV LW LV P RVW\ IRXQG LQ GHÁ0LRQ EDVLQV ,Q WKH &RR0RQJ DQG /DNHV 5D P VDU VLWH WKH VSHFLHV 0LYHV V\ P SDWLFD0\ ZLWK WZR RWKHU $WKH0LQGV WKH 6 P D0 P RXWKHG +D0G\KHDG DQG)0\ VSHFNHG +D0G\KHDG ·
		7H P SHUDWXUH ' ' 6D0LQW\ P J / 'LVVR0YHG R[\ JHQ ' '	(QYL0RQ P HQW D0 FRQG L0LRQV D W VXUYH\ VLWHV +DE LWDW W\ SHV GUD0QV ULYHU FKDQQH0 lake, wetland 6XE P HU JHG FRYHU ² (P HU JHQW FRYHU 0–20 6HFFKL GHSWK P ²! &RQGXF WLYLW\ 6 ²)0RZ HQYL0RQ P HQW 3HU P DQHQW)0RZ FRQG L0LRQ /RZ ÁRZ +DE LWDW VSHFLDOLVW 0 +D P PHU SHUV FR P P
)0\ VSHFNHG +D0G\KHDG *&UDWHURFHSKDLXV VWHUFXV P XVFDUX P IX0YXV*		¶3RR0V DQG D0HDV RI VWL0 RU 0RZ ÁRZ L0LQJ ZDWHU D0H RIWHQ D SUHIHUUHG KDE LWDW DQG ÀVK D0H RIWHQ DVVRFLDWHG ZLWK DTXDWLF YHJHWDWLRQ ZKLFK LV XVHG DV FRYHU ·	¶7KLV VSHFLHV LV JHQHUD0\ SDWFK0\ GLVWULEXWHG L0 0 XUUD\ ZHWDQGV ZLWK D VL P L0D0 SDWWHUQ VKRZQ IRU WKH /DNHV ,W ZDV SDWFK0\ distributed and restricted in range in the /DNHV VLWHV JHQHUD0\ L0 0RZ QX P EHUV H J RQ\ WKUHH 0HFR0GHG IRU WKH /DNH $0EHU VD P S0LQJ D0HD EH0J DEXQGDQW D RQH VLWH ZLWKL0 WKH &XU0HQF\ &0HHN D0 P ÀVK D VLWH 5 $EXQGDQFHV ZHUH KLJKHU WKDQ RQH RU WZR L0GLYLGXD0V RQ\ D VLWHV ZLWK GHQVH VXE P HU JHG DTXD0LF YHJHWD0LRQ usually *0 \0LRSK\0XP* VSS 6R P H WD[RQR P LF FRQIXVLRQ EHWZHHQ WKH WKUHH /DNHV KD0G\KHDGV 0L P LWV UH0LDE0H XQGHUVWDQG L0J RI KLVWRULF GLVWULEXW LRQ KRZHYHU WKH)0\ VSHFNHG +D0G\KHDG LV 0LNH0\ WR KDYH EHHQ DVVRFLDWHG ZLWK P RUH 0RQJ WHU P I0HVK VHFWLRQV VXFK DV ZHW0DQGV D W WKH P RXWKV RI W0LEXWD0\ VW0HD P V H J &X0HQF\ &0HHN $QJDV 5LYHU)LQQLVV 5LYHU 7RRND\HU0D &0HHN ·	+DE LWDW VSHFLDOLVW 0 +D P PHU SHUV FR P P

7DEOH 2 EOLJDWH IUHVKZDWHU ÀVK WKHLU SUHIHUUHG KDELWDWV DQG RWKHU OLIH KLVWRU\ LQIRUPDWLRQ FRQWLQXHG			
&RPPRQQDPH *VFLHQWLÀF QDPH*	3UHIHUUHG V\VWHP XQLWV	3UHIHUUHG KDELWDW LQIRUPDWLRQ DGXOWV TXRWHG H[WUDFWV IURP 6.0 DQG : HGGHUEXUQ DQG +DPPHU	
		6RXUFH +DELWDW UHTXLUHPHQWV RI QDWLYH ÀVK RI WKH 0XUUD\ 'DUOLQJ %DVLQ 6.0	6RXUFH /DNHV)LVK ,QYHQWRU\ (Wedderburn DQG +DPPHU
%RQ\ %UHDP +HUULQJ *1HPDWDORVD HUHEL*		¶%RQ\ +HUULQJ LQKDELW VWLOO DQG VORZ ARZLQJ ULYHUV VWUHDPV DQG ARRGSODLQV RI WKH IRRWKLOO DQG ORZODQG]RQHV 2IWHQ DVVRFLDWHG ZLWK snags and muddy substrates, it also swims LQ RSHQ ZDWHU 6SDZQLQJ PD\ EH LQGXFHG E\ ULVLQJ ZDWHU OHYHOV RU ARRGLQJ EXW WKHUH LV OLPLWHG LQIRUPDWLRQ RQ VSDZQLQJ WULJJHUV IRU WKLV VSHFLHV · 7HPSHUDWXUH ² & 6DOLQLW\ PJ / <35,000 'LVVROYHG R[\JHQ ''	¶ : LGHVSUHDG LQ /DNH $OH[DQGULQD DQG /DNH $OEHUW VLWHV JHQHUDOO\ RYHU VDQG\ VXEVWUDWHV EXW PRVWO\ DEVHQW IURP PRUH VKHOWHUHG VLWHV LQ WKH +LQG PDUVK ,VODQG &XUUHQF\ &UHHN DQG)LQQLVV 5LYHU UHJLRQV ZKHUH YHJHWDWLRQ ZDV WKLFNHVW +LJK QXPEHUV RI ODUYDO AVK ZHUH UHFRUGHG RQ WKH QRUWKHUQ VKRUH RI /DNH $OH[DQGULQD 7KH VSHFLHV KDV SUREDEO\ LQFUHDVHG LQ DEXQGDQFH ZLWK WKH VWDEOH DQG SHUPDQHQWO\ IUHVK ODNH FRQGLWLRQV now existing.'
3XUSOH VSRWWHG *XGJHRQ *0RJXUQGD DGVSHUVD*		¶7KH 6RXWKHUQ 3XUSOH VSRWWHG *XGJHRQ KDV D SDWFK\ RFFXUUHQFH WKURXJKRXW WKH %DVLQ 7KH\ SUHIHU KDELWDWV ZLWK VORZ ÁRZLQJ ZDWHUV with suitable hard substrates such as cobbles, boulders and wood as well as aquatic YHJHWDWLRQ · 7HPSHUDWXUH ² & 6DOLQLW\ PJ / 'LVVROYHG R[\JHQ ''	¶6LPLODU KLVWRULF DFFRXQWV DV IRU WKH 0XUUD\ 5DLQERZÀVK RFFXUULQJ LQ WKH)LQQLVV DUP KLVWRULFDOO\ H[FHSW GLVDSSHDULQJ LQ WKH HDUO\ V 8QIRUWXQDWHO\ GHWDLOHG VWXGLHV RI their habitat requirements and ecology to KHOS DVVHVV UHDVRQV IRU GHFOLQH ZHUH QRW FRQGXFWHG LQ WKH /RZHU 5LYHU 0XUUD\ UHJLRQ SULRU WR WKHLU SUHVXPHG ORFDO H[WLQFWLRQ 7KH YDULDELOLW\ DQG H[WHQW RI KDELWDW LQ WKH)LQQLVV DUP VWLOO RIIHUV VRPH KRSH RI VPDOO UHIXJH SRSXODWLRQV RI WKHVH VSHFLHV · +DELWDW VSHFLDOLVW 0 +DPPHU SHUV FRPP
'ZDUI)ODWKHDG *XGJHRQ *3KLO\SQRGRQ* VS		¶7KLV VSHFLHV WHQGV WR LQKDELW VORZ ÁRZLQJ VWUHDPV ODNHV DQG UHVHUYRLUV DQG LV DOVR IRXQG LQ EUDFNLVK HVWXDULHV +DELWDW SUHIHUHQFHV include muddy and rocky substrates and DUHDV RI DTXDWLF YHJHWDWLRQ DQG VQDJV · 7HPSHUDWXUH '' 6DOLQLW\ PJ / '' 'LVVROYHG R[\JHQ ''	¶5HSUHVHQWHG LQ DOO VDPSOLQJ UHJLRQV JHQHUDOO\ LQ ORZ QXPEHUV DW VLWHV They were unusually abundant at a drain FRQQHFWHG WR +XQWHU·V &UHHN ÀVK DW VLWH ' DQG D GUDLQ RQ WKH HDVWHUQ HGJH RI WKH)LQQLVV 5LYHU ZHWODQG FRPSOH[ÀVK DW VLWH 5 7KLV VSHFLHV VHHPHG VWURQJO\ DVVRFLDWHG ZLWK FRYHU EHLQJ PRVWO\ UHFRUGHG LQ VPDOO WR PHGLXP VL]HG ZHOO YHJHWDWHG ZDWHUERGLHV associated with Lake Alexandrina and the)LQQLVV 5LYHU /LWWOH LV NQRZQ RI WKH HFRORJ\ RI WKLV VSHFLHV KRZHYHU LWV EHQWKLF QDWXUH DQG KDELWDW SUHIHUHQFH VXJJHVW WKDW LW ZRXOG EH D VORZ FRORQLVHU XQGHU YDULDEOH FRQGLWLRQV DQG WKDW SRSXODWLRQV LQ WKH /DNHV PD\ KDYH JUDGXDOO\ EXLOW XS IROORZLQJ FRQVWUXFWLRQ RI the barrages.' +DELWDW VSHFLDOLVW 0 +DPPHU SHUV FRPP

ª FRQWLQXHG RYHUOHDI ª

7DEOH 2 EOJDWH IUHVKZDWHU ÀVK WKHLU SUHIHUUHG KDELWDWV DQG RWKHU OLIH KLVWRU\ LQIRUPDWLRQ FRQWXHG			
&RPPRQ QDPH *VFLHQWLÀF QDPH*	3UHIHUUHG V\VWHP XQLW	3UHIHUUHG KDELWDW LQIRUPDWLRQ DGXOW TXRWHG H[WUDFWV IUR P 6. 0 DQG : HGGHUEXQ DQG +D P PHU	
		6RXUFH +DELWDW UHTXLUH P HQWV RI QDWLYH ÀVK RI WKH 0 XUUD\ 'DULQJ %DVLQ 6. 0	6RXUFH /DNHV)LVK ,QYHQWRU\ : HGGHUEXQ DQG +D P PHU
0 OGJ0H\·V &DUS *XGJHRQ +\SVH0HRWLV VS	5		¶7KH FDUS JXGJHRQ VSHFLHV FR P S0H[%HUWR]]LHW D0 +D P PHU DQG %X0HU KDV KLVWRULFDO0\ FDXVHG FRQVLGHUDEO0H FRQIXVLRQ ZLWKLQ VSHFLHV OLVWV RI WKH UHJLRQ 7KH FXUUHQW VXUYH\ EHQHAWHG IUR P LGHQWLÀFDWLRQ H[SHULHQFH DV SDU RI WKH 6$ 0 XVHX P·V JHQHWLF VWXGLHV LQWR WKH JURXS DQG KHQFH WZR VSHFLHV ZHUH SRVLWLYH0\ LGHQWLÀHG WKH 0 XUUD\ 'DUQJ &DUS *XGJHRQ RFFXUUHG in wetland and drain habitats with dense VXE P HUJHG FRYHU DQG 0 OGJ0H\·V &DUS *XGJHRQ ZDV LGHQWLÀHG LQ D VLQJ0H GUDLQ LW LV DQ RWKHU ZVH FR P PRQ LYHU HGJH VSHFLHV LQ WKH P DLQ FKDQQH0 RI WKH 0 XUUD\ $ JDLQ JLYHQ WD[RQR P LF FRQIXVLRQ OLWWOH LV NQRZQ RI WKH KLVWRULF GLVWULEXWLRQ ZLWK D P RU H LQ GHSWK P RUSKRORJLFD0 UHYLVLRQ RI P XVHX P VSHFL P HQV UHTXLUHG /0R\G DQG : D0NHU OLVWHG WKH : HVWHUQ &DUS *XGJHRQ IRU VHYHUDO VLWHV EXW ZLWKRXW UHYLHZLQJ YRXFKHU VSHFL P HQV LW LV OLNH0\ WKH VD P H VSHFLHV IUR P WKH FXUUHQW VXUYH\ ZHUH GH0HFWHG $0KRXJK QRW GH0HFWHG IXUWKHU FR0HFWLQJ LV UHTXLUHG WR GH0HFWHU P LQH WKH VWDWXV RI WKH : HVWHUQ &DUS *XGJHRQ +\SVH0HRWLV NUXQJLQJHUL VHQVX VWLFWD LQ WKH /DNHV DV R0KHU FR0HFWLQJ VHH P V WR VXJJHVW WKDW WKLV VSHFLHV LV QRZ UDUH RU DEVHQW EH0RZ 0RJDQ ZLWKLQ WKH 0 XUUD\ V\VWH P 0 +D P PHU SHUV REV · : HGGHUEXQ DQG +D P PHU
0 XUUD\ 'DUQJ &DUS *XGJHRQ +\SVH0HRWLV VS			6HH 0 OGJ0H\·V &DUS *XGJHRQ DERYH +DE\WDW VSHFLD0LVW 0 +D P PHU SHUV FR P P
+\EUG &DUS *XGJHRQ H J /DNHV &DUS *XGJHRQ +\SVH0HRWLV VSS			6HH 0 OGJ0H\·V &DUS *XGJHRQ DERYH
5LYHU %DFNÀVK *DGRSVLV P DU P RUDWXV*		¶7KH\ SUHIHU KDELWDW VXFK DV SRR0V DQG V0R Z ÅR ZLQJ ZDWHU ZLWK DEXQGDQW FRVHU LQ WKH IRU P RI 0R J V ERX0GHUV RYHUKDQJLQJ DQG DTXDWLF YHJHWDWLRQ DQG XQGHUFXW EDQNV DQG VDQG DQG JUDYH0\ VXEVWUDWHV +R0R Z 0R J V DUH SDUWLFXD0U\ LP SRUWDQW DV DUHDV IRU HJ J 0D\LQJ and attachment.' 7H P SHUDWXH ² & 6DLQLW\ P J / 'LVVR0YHG R[\JHQ ,QWR0HUDQW RI 0R Z ' 2	+DE\WDW VSHFLD0LVW 0 +D P PHU SHUV FR P P
0 RXQWDLQ *D0D[LDV *D0D[LDV R0GXV*		¶7KLV VSHFLHV RFFXUV IUR P VRX0KHQ Queensland to eastern South Australia LQ V P D0 P RXQWDLQ VWUHD P V WKDW DUH ZH0 VKDGHG DQG FRQWDLQ DEXQGDQW FRYHU IUR P ZRRG\ GHE\LV DQG RYH0KDQJLQJ EDQNV DQG YHJHWDWLRQ 7KH VXEVWUDWH XVXD0\ FRQVLVW RI VDQG DQG JUDYH0 ·	¶3UREDE0\ RQ\ D UDUH LQKDE\WDQW KLVWRULFD0\ DV D VWUDJJHU IUR P H[WHQGHG SH0RGV RI IUHVKZDWHU GR P LQDQFH LQ WKH /DNHV $ UHFRUG IUR P WKH 3RQW 0 F0HD\ -HW\ QHD 1 DUXQJ LQ VXJJHVW WKDW LW P LJKW KDYH FRQWDQW\ RFFXSLHG VH0HFW ZH0DQG RU VZD P S KDE\WDW in the region.' 7H P SHUDWXH ² & 6DLQLW\ P J / 'LVVR0YHG R[\JHQ ' '	+DE\WDW VSHFLD0LVW 0 +D P PHU SHUV FR P P

7DEOH 2 EOJDWH IUHVKZDWHU ÀVK WKHLU SUHIHUUHG KDEWDWV DQG RWKHU OLIH KLVWRU\ LQIRUP DWLRQ FRQWXHG

&RP PRQ QD P H *VFLHQWLÀF QD P H*	3UHIHUUHG V\VWH P XQLWV	3UHIHUUHG KDEWDW LQIRU P DWLRQ DGXOW TXRWHG H[WDFW IUR P 6. 0 DQG : HGGHUEXUQ DQG +D P PHU	
		6RXUFH +DEWDW UHTXLUH P HQW RI QDWLYH ÀVK RI WKH 0 XUD\ ' DULQJ %DVLQ 6. 0	6RXUFH /DNHV)LVK ,QYHQWRU\ (Wedderburn DQG +D P PHU
0 XUD\ &UP VRQ VSRWWHG 5DLQERZ ÀVK *0 HDQRWDHQLD ÁXYLDWLOLV*		¶0 XUD\ ' DUQJ 5DLQERZ ÀVK LQKDELW VWUHD P V DQG EDFNZDWHUV RI ODUJH ULYHUV GUDLQJH GWFKHV SRQGV DQG UHVHUYRLUV 7KH\ SUHIHU VWLOO OLWWRUDO JRQHV DQG EDFNZDWHUV ZLWK FRYHU SURYLGHG E\ VXE P HUJHG P DFURSK\WHV DQG ZRRG\ GHEUL 6SZQQJ RFFXUV GXULQJ ÁRZ SHULRGV WKXV ULYHU UHJXODWLRQ ZLWK LQFUHDVHG VX P P HU ÁRZV P D\ UHGXFH UHFUXLW P HQW SRWHQWLDO · 7H P SHUD WXUH ! & 6DLQLW\ P J / <30,000 ' LVVROYHG R[\ JHQ ' '	¶(DU\ UHFRUGV IRU WKH ORZHU)LQQLVV 5LYHU DW WKH WRS RI WKH UHJLRQ LQFXGHG LQ WKH VWXG\ 5XWKHUIRUG DUVR P XVHX P VSHFL P HQV XS WR WKH V /DVW UHFRUGHG LQ WKH UHJLRQ E\ /0R\G DQG : DUNHU G\VDSSHDUQJ VKRUW\ DIWHU 6L P HW DU 6WLOO RFFXUV DW Wellington in main channel habitat, so an DEVHQFH IUR P WKH /DNHV LV VXUSULVQJ JLYHQ that there are seemingly suitable wetlands in YDULRXV 0RFDWLRQV HVSHFLDOO\ WKH)LQQLVV DU P DQG +LQG P DUVK ,V DQG · +DEWDW VSHFLDOVW 0 +D P PHU SHUV FR P P
6RXWKHUQ 3\ J P \ 3HUFK *1DQQRSHUFD DXVWUDOLV*		¶7KLV VSHFLHV SUHIHUV V0RZ ARZLQJ DUHDV RI ULYHUV DQG EDFNZDWHUV ZLWK DEXQGDQW DTXDWLF P DFURSK\WHV DQG DUHDV RI RVHUKDQJLQJ YHJHWDWLRQ · 7H P SHUD WXUH & 6DLQLW\ P J / ' LVVROYHG R[\ JHQ 7R0HUDQW RI FRQFHQWUDWLRQV EH0RZ P J /	¶7KH 6RXWKHUQ 3\ J P \ 3HUFK ZDV KLVWRULFDO\ ZLGHVSUHDG WKURXJKRXW WKH /RZHU 5LYHU 0 XUD\ DQG LWV WULEXWDULHV ZHWDQGV DQG EDFNZDWHUV 3RSXODWLRQV QRZ RQ\ RFFXU LQ IRXU 0 / 5 WULEXWDULHV DQG V P D0 VHFWLRQV RI /DNH $0H[DQGULQD WKDW UHSUHVHQW JHQHWLFDO\ GLVWLQFW VXESRSXODWLRQV +D P PHU $0 SRSXODWLRQV DUH WKUHDWHQHG ZLWK H[WLQFWLRQ DQG WKH VSHFLHV LV VRRQ WR EH OLVWHG as 'endangered' in South Australia under the 13 : 6$ 7KUHDWHQHG 6SHFLHV 6FKHGXOH /0R\G DQG : DUNHU UHFRUGHG WKH VSHFLHV IUR P WZR VLWHV LQ WKH VXUYH\ UHJLRQ ERWK LQ WKH)LQQLVV DU P ³WKH\ UH P DLQ DW %0DFN 6ZDP S VLWH 5 EXW KDYH DSSDUHQW\ GLVDSSHDUHG IUR P IXUWKHU XSVWUHD P VLWH ,Q WKH HDU\ V WKH\ ZHUH DVR UHSRUWHG DV FR P PRQ LQ WKH 0RZHU)LQQLVV UHJLRQ 5XWKHUIRUG · (QYLURQ P HQWDO FRQGLWLRQV DW VXUYH\ VLWHV +DELWDW \SH drains, backwater, wetland 6XE P HU JHG FRYHU ² (P HU JHQ FRYHU ² 6HFFKL GHSWK P ²! &RQGXFWLYLW\ 6 ²)0RZ HQYLUQ P HQW 3HU P DQHQW)0RZ FRQGLWLRQ /RZ ÁRZ P RVW\ +DELWDW VSHFLDOVW 0 +D P PHU SHUV FR P P

ª FRQWLQXHG RYHUHDI ª

7DEOH 2 EOLJDWH IUHVKZDWHU ÀVK WKHLU SUHIHUUHG KDELWDWV DQG RWKHU OLIH KLVWRU\ LQIRUPDWLRQ FRQWLQXHG			
&RP PRQQDPH *VFLHQWLAF QDPH*	3UHIHUUHG V\VWHP XQLWV	3UHIHUUHG KDELWDW LQIRUPDWLRQ DGXOWV TXRWHG H[WUDFWV IURP 6.0 DQG : HGGHUEXUQ DQG +DP PHU	
		6RXUFH +DELWDW UHTXLUHPHQWV RI QDWLYH ÀVK RI WKH 0XUUD\ 'DUOLQJ %DVLQ 6.0	6RXUFH /DNHV)LVK ,QYHQWRU\ : HGGHUEXUQ DQG +DP PHU
<DUUD 3\JP\3HUFK *1DQQRSHUFD REVFXUD*		¶<DUUD 3\JP\3HUFK DUH IRXQG LQ VPDOO VWUHDPV DQG ODNHV DQG SUHIHU KDELWDW ZLWK DEXQGDQW FRYHU IURP DTXDWLF YHJHWDWLRQ · 7HP SHUDWXUH ² & 6DOLQLW\ PJ / 7ROHUDQW RI EUDFNLVK ZDWHU 'LVVROYHG R[\JHQ ''	¶7KH SUHVHQFH RI WKH VSHFLHV LQ WKH 0XUUD\ 'DUOLQJ %DVLQ KDV RQO\ UHFHQWO\ EHHQ UHFRJQLVHG KRZHYHU 6$ 0XVHXP VSHFLPHQV GRFXPHQW D ORQJ WHUP SUHVHQFH LQ WKH /DNHV region (e.g. Lake Alexandrina and Currency &UHHN FROOHFWLRQV IURP 7KH QDWXUDO SRSXODWLRQ G\QDPLFV RI WKH VSHFLHV LV OLNHO\ WR KDYH LQYROYHG H[SDQVLRQ DQG FRQWUDFWLRQ in range according to local conditions, with UHIXJHV DW ZHWODQGV DW WKH ORZHU UHJLRQ RI VWUHDPV $Q RYHUDOO UDQJH KDV LQFOXGHG the Lake Alexandrina and Currency Creek UHJLRQV DV DERYH DQG GLVWULEXWLRQ LQ WKH)LQQLVV 5HJLRQ ZDV OLNHO\ PRUH H[WHQVLYH LH D FRUH SRSXODWLRQ VXSSRUWHG E\ PXVHXP VSHFLPHQV EHWZHHQ ² 6SHFLÀF UDSLG ÀHOG LQYHVWLJDWLRQ WDUJHWLQJ 6RXWKHUQ 3\JP\3HUFK +DP PHU DOVR GHWHFWHG WKUHH LQGLYLGXDOV RQ FKDQQHO HGJH KDELWDW GRZQVWUHDP IURP : DOO\·V : KDUI RQ WKH /RZHU)LQQLVV 5LYHU)XUWKHU VXUYH\ LV UHTXLUHG WR PRUH DFFXUDWHO\ PDS WKH UDQJH LQ WKH)LQQLVV 5HJLRQ ZLWK DQ RYHUDOO FORVH PRQLWRULQJ RI SRSXODWLRQ WUHQGV ZLWK UHVSRQVH WR FRYHU GHQVLW\ DQG HQYLURQPHQWDO FRQGLWLRQV · (QYLURQPHQWDO FRQGLWLRQV DW VXUYH\ VLWHV +DELWDW W\SHV GUDLQV ULYHU FKDQQHO ZHWODQG lagoon 6XEPHUJHG FRYHU ² (PHUJHQW FRYHU 5–20 6HFFKL GHSWK P ²! &RQGXFWLYLW\ 6 ²)ORZ HQYLURQPHQW 3HUPDQHQW)ORZ FRQGLWLRQ /RZ ÁRZ PRVWO\ +DELWDW VSHFLDOLVW 0 +DP PHU SHUV FRPP
0XUUD\&RG *0DFFXOORFKHOOD SHHOLL SHHOLL*		¶3UHIHUUHG KDELWDW LV SRROV RU KROHV ZLWK DEXQGDQW FRYHU VXFK DV ERXOGHUV ORJV XQGHUFXW EDQNV DQG RYHUKDQJLQJ YHJHWDWLRQ « 7KH UHGXFHG IUHTXHQF\ H[WHQW DQG GXUDWLRQ RI VSULQJ ARRGLQJ LQ WKH %DVLQ KDV OHDG WR DQ RYHUDOO UHGXFWLRQ LQ ODUYDO UHFUXLWPHQW DQG WKLV LV FRQVLGHUHG WR EH D PDMRU FDXVH RI WKH GHFOLQH LQ WKH DEXQGDQFH RI 0XUUD\&RG 5RZODQG D · 7HP SHUDWXUH ² & 6DOLQLW\ PJ / ² 'LVVROYHG R[\JHQ ''	

7DEOH 2 EOLJDWH IUHVKZDWHU ÀVK WKHLU SUHIHUUHG KDELWDWV DQG RWKHU OLIH KLVWRU\ LQIRUPDWLRQ FRQWLQXHG

&RPPRQ QDPH *VFLHQWLFF QDPH*	3UHIHUUHG V\VWHP XQLWV	3UHIHUUHG KDELWDW LQIRUPDWLRQ DGXOWV TXRWHG H[WDFWV IURP 6. 0 DQG :HGGHUEXUQ DQG +D P PHU	
		6RXUFH +DELWDW UHTXLPHQWV RI QDWLYH ÀVK RI WKH 0XUD\ 'DULQJ %DVLQ 6. 0	6RXUFH /DNHV)LVK ,QYHQWRU\ (Wedderburn DQG +D P PHU
* RUGHQ 3HUFK *0 DFTXDULD D P E\J XD D P E\J XD*		¶7KLV VSHFLHV LV XVXDO\ IRXQG LQ ZDU P VRZ ÁRZLQJ ULYHU KDELWDWV ZLWK WXUELG ZDWHU backwaters and anabranches. They are RIWHQ DVVRFLDWHG ZLWK ZRRG\ GHEULV LQ P!G ZDWHU VHFWLRQV RI ULYHUV F0RVH WR EDQNV RU LQ GHHSHU SRRV SDUWLFXODUO\ GXULQJ WKH GD\ $GXOW ÀVK P D\ XQGHUJR D VLJQLÅFDQW XSVWUHDP P\JUDWLRQ S\RU WR VSDZQLQJ 0\JUDWLRQ LV LQGXFHG E\ LQFUHDVHG ÁRZ DQG WHP SHUDWXUH 3H0DJLF 0DUYDH DUH WKHQ GLVSHUVHG GRZQVWHD P FDULHG E\ ÁRRGZDWHUV · 7H P SHUDWXUH ² & 6DOLQLW\ P J / <33,000 'LVVR0YHG R[\JHQ ' '	6XE DGXOW ÀVK ZHUH UHFRUGHG IUR P VLQJ0H VLWHV LQ WKH)LQQLVV DQG /DNH $0EHUW UHJLRQV 2WKHU LQG\LYLGXDOV ZHUH DlVR FDSWXUHG LQ VXSS0H P HQWDU\ VD P S0LQJ DW +XQWHUV &UHHN RQ +LQG P DUVK ,V0DQG 2WKHU P HWKRGV ZRX0G EH UHTXLUHG WR EHWWHU DVVHVV 0RFD0UDQJH RI DGXOW ÀVK 0RFD0 NQRZ0HGJH LQGLFDWHV WKH\ DUH RFFDVLRQD0\ DQJ0HG IUR P /DNH $0H[DQGULQD H J 6L P HW D0 DQG WKH\ DUH WKH WDUJHWV RI FR P P HUFLD0 ÁVKLQJ ZLWK RYHU 7RQQHV RI FD0RS EHLQJ WDNHQ DV SDUW RI WKH /DNHV DQG &RRURJ)LVKHU\ LQ WKH SDVW WHQ \HDUV .QJKW HW D0 7KH /DNHV DSSHDU WR SURY!GH VXlDE0H KDELWDW IRU WKH VSHF!HV EXW LW LV XQNQRZQ LI UHFUXLW P HQW RFFXUV 0RFD0\ RU WKDW ÀVK SHUVLVW LQ WKH DUHD DV D SRSX0DWLRQ VLQN IUR P XSVWUHD P LQ WKH 0XUD\ ·
)UHVKZDWHU (H0 WD0HG &DWÀVK *7DQGDQXV WDQGDQXV*		¶)UHVKZDWHU &DWÀVK DUH EHQWKLF IHHGHUV SUHIHUULQJ 0DNHV DQG V0RZ ÁRZLQJ ULYHUV ZLWK IULQJLQJ YHJHWDWLRQ · 7H P SHUDW0XUH & 6D0LQLW\ P J / 'LVVR0YHG R[\JHQ ' '	
6L0YHU 3HUFK *%LG\DQXV E!G\DQXV*		¶6L0YHU 3HUFK WHQGV WR EH IRXQG LQ V0RZ ÁRZLQJ ZDU P ZDWHUV LQ 0RZ0DQG ULYHU UHDFKHV DQG LV DE!H WR WR0HU!WH D !DQJH RI WXUE!G!WLHV DQG WH P SHUDW0XUHV ,W XWLOLVHV FRYHU SURY!GHG E\ P DFURSK\WHV DQG ZRRG\ GHEULV EXW LV D!VR IRXQG LQ RSHQ ZDWHUV DQG LV RIWHQ IRXQG EH0RZ UDS!GV DQG ZHLV · 7H P SHUDW0XUH ² & 6D0LQLW\ P J / 'LVVR0YHG R[\JHQ ! P J /	
Australian Smelt *5HWURS!QQD VH P RQ!*		¶$XVWUD0LQ 6 P HW LV P RVW FR P P RQ\ IRXQG LQ ULYHU HG JH DQG EDFNZD WHU KDELWDWV ZLWK FRYHU SURY!GHG E\ GHEULV DQG P DFURSK\WHV · 7H P SHUDW0XUH & 6D0LQLW\ P J / 'LVVR0YHG R[\JHQ &DQQR VXUY!YH P J /	¶ : LGHVSUHDG EXW SDWFK0\ G!VWULEXWHG VLWHV SD0LFF!D0\ DEXQGDQW LQ WKH &UHHN DU P DQG RSHQ DUHDV RI /DNH $0EHUW 7KH\ W\S!FD0\ RFFXUHG !Q 0DUJHU ZDWHUERG!HV RSHQ ZDWHU ZLWK D VDQG\ VXEVWUDWH DQG VSDUVH VXE P HU JHG YHJHWDWLRQ UDWKHU WKDQ GHQVH0\ YHJHWDWHG ZHWDQGV 7KH!U G!VWULEXWLRQ DQG DEXQGDQFH !Q WKH 0DNHV SUREDI\ UH P D!QV XQFKDJHG ZLWK UHVSHFW WR KLVWRLF FRQG!WLRQV VHYHUD0 HD0\ 6$ 0 FR0HFW!RQV DQG =!HW] P HQW!RQHG V P H0W DV D /DNH UHVLGHQW * HQHW!F UHVHDUFK !Q SUR JUHVV DW WKH 6$ 0 VXJ JHVW WKDW /DNHV SRSX0DW!RQV P!JKW EH XQ!TXH DV SHU WKH 6RX0KUQ 3\J P\ 3HUFK ·

ª FRQWLQXHG RYHUHDI ª

7DE0H 2 E0L JDWH IUHVKZDWHU ÀVK WKHLU SUHIHUUHG KDELWDWV DQG RWKHU 0LIH KLVWRU\ LQIRUP DWLRQ FRQWLQXHG		
&R P P RQ QD P H *VFLHQWLÅF QD P H*	3UHIHUUHG V\VWH P XQLWV	3UHIHUUHG KDELWDW LQIRU P DWLRQ DGXOWV TXRWHG H[WUDFWV IUR P 6. 0 DQG : HGGHUEXU DQG +D P P HU
		6RXUFH +DELWDW UHTXLUH P HQWV RI QDWLYH ÀVK RI WKH 0 XUUD\ 'DULQJ %DVLQ 6. 0
		6RXUFH /DNHV)LVK ,QYHQWRU\ (Wedderburn DQG +D P P HU
)0DW KHDGHG * XG J HRQ *3KL\ SQRGRQ JUDQGLFHSV*		¶)0DW KHDGHG * XG J HRQ KDV D Z1GH distribution throughout coastal drainages I0R P 4 XHHQV0DQG WKURX J K WR 6RXWK $ XVWUD0LD %DVLQ SRSX0DWLRQV H[WHQG L00DQG D0RQ J WKH 0 XUUD\ 5LYHU DQG VR P H RI LWV VRXWKU0 tributaries in Victoria and has also been UHFRUGHG L0 WKH 0 X0X P E1G J HH /DFK0DQ DQG 0 DFTXDU0H 5LYHUV L0 16 : +DUUV * HK0NH E ,W LV P R0H FR P P RQ L0 WKH QRUWKH0 SDUW RI LWV U0DQ J H WKDQ L0 WKH VRXWK RU L0DQG D0HDV $00HQ HW D0 E $GX0WV U0HDFK XS WR P P L0 VL]H ZKHQ P DWXU0 /DUVRQ +RHVH E · 7H P SHUDWXU0 ' ' 6D0LQL\ P J / 'LVVR0YHG R[\ J HQ 7R0HUDQW RI FRQFHQWUDWLRQV EH0RZ P J /*		¶&R P P RQ DQG Z1GHVSUHDG WKURX J KRXW WKH /DNHV V0WHV J HQHUD0\ P R0H DEXQGDQW D0 V0WHV Z1WK KL J K 0HYH0V RI FRYHU 7KH\ Z H0H FDSWXU0G L0 D00 U H J1RQV RI WKH /DNHV Z1WK QR DS SD0HQW KDELWDW SUHIHU0HQFH H[FHSW WKD0 WKH\ Z H0H DEXQGDQW L0 WKH)LQQLVV 5LYHU D0RXQG Z H00 YH J HWDWHG KDELWDW 7KH\ VKRZ VR P H U0HV0LHQFH WR GH J UDGDWLRQ H J J U0D]LQ J L P SDFWV DQG VHH P DE0H WR QH J D0H VR P H RI WKH L P SDFWV RI H[R0LF V SHF1HV VXFK DV *D P EXV0D 5HGAQ DQG J R0GÁVK FR H[V0LQJ D0 D QX P EHU RI V0WHV ,W LV 0LNH0\ WKD0 WKH KL0WR0LF and current status are similar.'

' ' – ' D0D GHAF1HO0

+DELWDW VSHF1D0LVW SUHIHU0LQJ KDELWDW Z1WK SK\V1FD0 FRYHU 0LNH VQDJ V DQG DTXD0LF YHJHWD0LRQ QRW RIWHQ HQFRXQWHU0HG L0 P R0H RSHQ ZDWHU D0HDV 0 +D P P HU SHUV FR P P

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– 0 XUUD\ 0 RXWK DQG (VWXDU\ – 1R0WK /DJRRQ – 6RXWK /DJRRQ – /DNH $0EHU – /DNH $0H[DQG0LQD – Tributary wetlands

1RWH 8Q0 0 XUUD\ 0 RXWK DQG (VWXDU\ L0F0XGHV WKH IUHVKZDWHU ÁRRG FKDQQH0 RQ +1QG P D0VK ,V0DQG

6R P H RI WKHVH VSHF1HV P D\ D0 W0 P HV P RYH L0R SD0V RI WKH &RRURQJ 0DJRRQ GX0LQJ EDUDJH RSHQ1QJ V KRZHYHU WKLV LV QR0 WKH0 SUHIHU0HG KDELWDW

. H \ GULYHUV DQG 0HYHUV	
' ULYHUV DQG 0HYHUV	' HVFULSWLRQ
)UHVKZDWHU LQSXWV ULYHU ÁRZV	)0RZ HYHQWV FDQ EH L P SRUWDQW DV FXHV IRU FHUWDLQ QDWLYH ÀVK VSHFLHV ZKHWKHU IRU P LJUDWLRQ VSDZQLQJ HWF VHH 7DE0H UH VSDZQLQJ EHKDYLRXU LQ $SSHQGL[' +LVWRULFDO\ WKH P RU H QDWXUDO SDWWHUQV RI ULYHU ÁRZ LQWR WKH 0DNHV ZHUH KLJKO\ VHDVRQDO 3HDN ÁRZV W\SLFDO\ FDP H LQ VSULQJ ZLWK 0RZHU ÁRZV LQ 0D\H VX P P HU DQG DXWXP Q $V D UHVXOW RI WKLV SULRU WR WKH FRQVWUXFWLRQ RI WKH EDUDJHV WKH /DNHV ZHUH P RVW\ IUHVKZDWHU ZLWK RFFDVLRQDO SHULRGV RI KLJKHU VDLQLW\ ZKHQ ÁRZV ZHUH 0RZ : KI H VR P H RI WKLV YDULDELW\ LV VWLO HYLGHQW DW WL P HV WRGD\ GLVFKDUJHV IUR P WKH 5LYHU 0 XUD\ KDYH GHFUHDVHG LQ WHU P V RI ZDWHU TXDQWLW\ E\ DERXW WZR WKLUGV =HUR ÁRZV QRZ RFFX LQ \HDU FR SDUHG WR DV LW ZDV LQ WKH SDVW 0 '%& F : KI H LW LV JHQHUDO\ DFFHSWHG WKDW WKH EDUDJHV KDYH KDG D QHJDWLYH L P SDFW RQ WKH &RRURQJ DQG /DNH HFRV\VWHP ¶« WKH FRQVWUXFWLRQ RI WKH EDUDJHV KDV LQDGYHUWHQW\ 0HG WR WKH À[DWLRQ RI V P D0 VHFWLRQV RI ZHWDQG KDELWDW DV UHIXJH IRU FHUDLQ IUHVKZDWHU IRRG VSHFLHV 7KHVH SRSXODWLRQV VXUH0\ ZRX0G QRW KDYH RWKHUZLVH SHUVLVWHG DV FRQGLWLRQV LQ WKH 0XUD\ ' DUQJ %DVLQ DQG WKH 0RFD0 UH J1RQ KDYH GHWHULRUDWHG DV WKH UHVXOW RI KX P DQ DJHQF\ · : HGGHUEXU DQG +D P P HU $YHUDJH ZDWHU UHVGHQFH WL P H KDV LQFUHDVHG LQ WKH /DNHV GXH WR 0RZHU LQSXW DQG F0RVXUH RI WKH EDUDJHV LQ VX P P HU 7KLV KDV LQFUHDVHG VHGL P HQWDWLRQ DQG UHGXFHG RXÁRZ RI ERWK VHGL P HQWV DQG IUHVKZDWHU LQWR WKH &RRURQJ DQG (QFRXQWHU %D\ /D P RQWJ QH D0 FlWHG LQ ' : /%& : KI H DSSURSULDWH ÁRZV IUR P WKH 5LYHU 0 XUD\ D0H VHHQ DV YLWD0 LW LV D0VR L P SRUWDQW WR DFNQZ0HG JH WKH UR0H S0D\HG E\ WKH VWUHD P V RI WKH (DVWHUQ 0RXQ /RI\ 5DQJHV HVSHFL D0\ WKH)LQQLVV 5LYHU DQG 7RRND\HU&H0HWD &UHHN %DUDJH RSHUDWLRQV)UHVKZDWHU LQSXWV DQG WKH RSHUDWLRQ RI WKH EDUDJHV D0H WKH NH\ GL0YHU RI WKH HFR0RJLFD0 FKD0DFWHU RI WKH /DNHV DQG WKH &RRURQJ VHH 6HFWLRQ 7KH 0RZ ÁRZV IUR P WKH UlYHU KDYH EHHQ RIIVHW E\ WKH F0RVX0H RI WKH EDUDJHV lQ VX P P HU WKXV P DQWDLQLQJ ZDWHU lQ WKH 0DNHV IRU D 0RQJHU SHULRG RI WL P H DW YHU\ VWDEO0H 7KHVH VWDWLF FRQGLWLRQV KDYH 0HG WR WKH HVWDE0LVK P HQW RI VLJQLÀFDQW 0DNHVKR0H UHHGEHGV EX\ D0VR D 0RVV RI S0DQW VSHFlHV lQ WKH GHHSHU UHJ1RQV RI WKH 0DNHV GXH WR lQF0HDVHG WX0E\G\W\ /DNH VX0FKDUJH HYHQWV EHKlQG WKH EDUDJHV lQ 0D\H Z\QWHU DQG VSUlQJ lQXQGDWHV VKD0RZ DQG ÁRRGS0DlQ KDE\WD\W WKDW DSSHDU WR EH L P SRUWDQW IRU WKH VSDZQLQJ DQG UHFUX\W P HQW RI VPHlHV VXFK DV 6RX\WKH\Q 3\J P \ 3H0FK : D\HU ED\DQFH RI WKH /DNHV DQG &RRURQJ JURXQGZDWHU lQSXWV HYDSR\D0WLRQ 0RVVHV 0RFD0 WLEX\WD\ lQSXWV lV FRQV\GHUHG DQ L P SRUWDQW NQRZ0HG JH JDS ' : /%& DQG SRWHQWLD0\ KDV D VlJQlÀFDQW UR0H lQ WKH K\GR0RJ\ RI WKH V\VWH P +DE\WDW 6HH G\VFXVVLRQ IR0RZ lQJ D0G\QJ UHJ1RQ KDE\WDW FRQGHF\LW\ 7KH 0RFD0LRQ RI VHDVRQD0 lQARZV DQG lQWHU P LWWHQW KDE\WD\ lQXQGD0LRQ lV 0NH0\ WR KDYH D NH\ UR0H lQ GHWHU P lQlQJ WKH 0RFD0LRQ DQG FRQlQX\ RI AVK KDE\WD\ 7KH WUlEXWDULHV FRQAXHQFH DUHDV I0lQJlQJ ZHWDQGV GUDlQV DQG FKDQQH0V RIWHQ SURYlGH VXlWDE0H ARZ UHJ1P HV DQG KDE\WD\ lQXQGD0LRQ SDWWHUQV WR VXSSRU\ AVK	
%DUDJH RSHUD0LRQV	)UHVKZDWHU lQSXWV DQG WKH RSH0D0LRQ RI WKH EDUDJHV D0H WKH NH\ GL0YHU RI WKH HFR0RJ1FD0 FKD0DFWHU RI WKH /DNHV DQG WKH &RRURQJ VHH 6HFWLRQ 7KH 0RZ ÁRZV IUR P WKH UlYHU KDYH EHHQ RIIVHW E\ WKH F0RVX0H RI WKH EDUDJHV lQ VX P P HU WKXV P D0QWD0lQlQJ ZDWHU lQ WKH 0DNHV IRU D 0RQJ HU SH0RG RI WL P H DW YHU\ VWDE0H 7KHVH VWD0LF FRQGL0RQV KDYH 0HG WR WKH HVWDE0LVK P HQW RI VLJQLÀFDQW 0DNHVKR0H UHHGEHGV EX\ D0VR D 0RVV RI S0DQW VSHFlHV lQ WKH GHHSHU UHJ1RQV RI WKH 0DNHV GXH WR lQF0HDVHG WX0E\G\W\ /DNH VX0FKDUJH HYHQWV EHKlQG WKH EDUDJHV lQ 0D\H Z\QWHU DQG VSUlQJ lQXQGDWHV VKD0RZ DQG ÁRRGS0DlQ KDE\WD\W WKDW DSSHDU WR EH L P SRUWDQW IRU WKH VSDZQLQJ DQG UHFUX\W P HQW RI VPHlHV VXFK DV 6RX\WKH\Q 3\J P \ 3H0FK : D\HU ED\DQFH RI WKH /DNHV DQG &RRURQJ JURXQGZDWHU lQSXWV HYDSR\D0WLRQ 0RVVHV 0RFD0 WLEX\WD\ lQSXWV lV FRQV\GHUHG DQ L P SRUWDQW NQRZ0HG JH JDS ' : /%& DQG SRWHQWLD0\ KDV D VlJQlÀFDQW UR0H lQ WKH K\GR0RJ\ RI WKH V\VWH P	
+DE\WD\ DYDL0DE\L0\ 3 JHR P R0SKR0RJ\	6HH G\VFXVVLRQ IR0RZ lQJ UHJD0G\QJ KDE\WD\ FRQQHF\WL\ 7KH 0RFD0LRQ RI VHDVRQD0 lQARZV DQG lQWHU P LWWHQW KDE\WD\ lQXQGD0LRQ lV 0NH0\ WR KDYH D NH\ UR0H lQ GHWHU P lQlQJ WKH 0RFD0LRQ DQG FRQlQX\ RI AVK KDE\WD\ 7KH WUlEXWDULHV FRQAXHQFH DUHDV I0lQJlQJ ZHWDQGV GUDlQV DQG FKDQQH0V RIWHQ SURYlGH VXlWDE0H ARZ UHJ1P HV DQG KDE\WD\ lQXQGD0LRQ SDWWHUQV WR VXSSRU\ AVK	

/HVV YDL0DE0H ZDWHU 0HYH0V KDYH 0HG WR WKH HVWDE0LVK P HQW RI VLJQLÀFDQW UHHGEHGV

.H\ HFRV\VWHP FRP SRQHQW DQG SURFHVVHV	
(FRV\VWHP FRP SRQHQW DQG SURFHVVHV	'HVFULSWLRQ
3K\VLFR FKHP LFD0	
6D0LQW\	)UR P WKH LQIRU P DWLRQ DERVH DQG IRXQG LQ $SSHQGL[' P RVW IUHVKZDWHU AVK VSHFLHV SUHIHU VD0LQW\HV RI 0HVV WKDQ P J / Z\WK 6RXWKHUQ 3\J P\ 3HUFK DQG 0RXQWD\Q *D0D[LDV EHLQJ WKH QRWDE0H H[FHSWLRQV Z\WK VD0LQW\ WR0HUDQFHV RI 0HVV WKDQ DQG P J / UHVSHFWLYH0\ $ VLJQLAFDQW SURSRUWLRQ RI WKH AVK IDXQD RI WKH /DNHV DUH KLJK0\ P RE0H DQG DE0H WR UHFR0RQVH DUHDV GXLQJ IDYRXUDE0H FRQGLWLRQV RU D0HUQDWLYH0\ RFFXS\ DUHDV VXE0HFW WR D Z\GH 0DQJH RI VD0LQW\HV H J V P H0W JRE\HV FR P PRQ JD0D[LDV : HGGHUEXQ DQG +D P PHU 7KH RWKHU FR P SRQHQW RI WKH IDXQD WKH GH P HUVD0 VSHF\HV LQF0XG\QJ 6RXWKHUQ 3\J P\ 3HUFK DUH DGDSWHG WR DQG WR D GHJUHH GHSHQG RQ WKH P RU0H YDULDE0H DQG QDWXD0 ARZ UHJ\P HV RI WKH IUQJ\QJ WUEXWDU\ ZHWDQGV DQG FRQAXHQFH DUHDV DQG WKH DUWLAFLD0\ LQGXFHG ARZ UHJ\P HV IRQG LQ irrigation drains and channels.
' LVVR0YHG R[\JHQ	7KH WDE0H DERVH VKRZV WKDW 0LWW0H GD0D KDV EHHQ FR0HFWHG RQ G\VVR0YHG R[\JHQ LQ UHD0WRQ WR ÀVK
7H P SHUDWXUH	7KH 6. 0 UHSRUW TXWHG IUR P DERVH DQG LQ $SSHQGL[' LQG\FDWHV WKDW P RVW VSHF\HV FDQ WR0HUDWH D Z\GH UDQJH RI ZDWHU WH P SHUDWXUHV DV DGX0V D0 0HDV 8SSHU 0L P LWV DUH W\S\FD0\ ² & +DUDV\P\Z IRXQG WKDW WKH XSSHU 0L P LW IRU 6RXWKHUQ 3\J P\ 3HUFK ZDV DSSUR[&
1XWULHQW F\FOLQJ	.QRZ0HGJH JDS
7XUE\G\W\	7XUE\G\W\ KDV D VWURQJ FRQWUR0LQJ LQAXHQFH RQ ERWK D0JD0 DQG P DFURSK\WH JURZWK LQ WKH 0DNHV DQG WKLV FDQ LQ WXU\P SDFW RQ WKH QD0LYH AVK SRSX0D0LRQV 0 DFURSK\WHV DQG DTXDWLF S0DQW DUH VWURQJ0\ IDYRXU0HG E\ P RVW RE0LJD0H IUHVKZDWHU AVK VSHF\HV
,QF\HDVHG HUR\RQ DQG VHG\P HQW UH VXSHQV\RQ KDV LQF\HDVHG WXUE\G\W\ LQ WKH /DNHV ,QÁRZV GR P LQD0HG E\ ZDWHU IUR P WKH ' D0LQJ 5LYHU RU SHURGV RI 0RZ ÁRZ FDQ D0VR FRQWLEXWH WR LQF\HDVHG WXUE\G\W\ $VVRFLDWHG Z\WK WKLV LV WKH SRWHQWLA0 IRU D0J D0 E0RR P V DV QXWULHQW 0HYH0V FKDQJH DQG IDYRXU E0XH J\HHQ D0J DH /D P RQ0D J QH HW D0 F\WHG LQ ' : /%& 7KH DUHDV RQ DQG DRXQG +LQG P DUVK ,V0DQG DQG WKH WULEXWD\ ZHWDQGV WKD0 FXUHQW\ KDYH 0RZ VXSHQGHG FR0RGD0 P DWHULA0 DQG WKXV 0RZ WXE\G\W\ DUH FRQVGHUHG NH\ KDE\WDWV IRU GH P HUVD0 ÀVK VSHF\HV DQG VXE P HU J HG DTXDWLF S0DQW\
7XUE\G\W\	*9D0LVQHUD D P HULFDQD* LV D VXE P HU J HQW S0DQW WKDW Z DV EH0LHYHG WR EH Z\GHVSUHDG LQ WKH /DNHV 6W\XG\HV KDYH VKRZQ WKDW IRU SRVLWLYH S0DQW JURZWK 0L JK SHQHWUD0RQ LQ WR WKH ZDWHU LV D FU\LFA0 IDFWRU $W 178 WKH FU\LFD0 GHSWK LV EHWZHHQ ² F P EH0RZ WKH VXUIDFH D0 178 WKH S0DQW ZRX0G EH DE0H WR JURZ WR GHSWKV RI DURXQG F P DQG D0 178 WKH S0DQW FDQ JURZ WR GHSWKV RI F P *DQI *0\UL RSK\0XP* VSS 0 0IRL0 WKDW IRU P V H[WHQVLYH EHGV LV D0VR TXWH L P SRU0DQW H J P D0RU\ RI KDE\WD0 LQ WU\EXWD\ ZHW0DQGV DQG SDU\V RI +LQG P DUVK ,V0DQG
0 RYH P HQW RI ZDWHU LQ R DQG RX W RI WKH 0DNHV	6HH DERVH XQGHU G0LYHUV DQG 0HYHUV
6HG\P HQW D0LRQ DQG HURVLRQD0 SURFHVVHV	' XH WR LQFUHDVHG UHVLGHQFH WL P HV RI ZDWHU LQ WKH 0DNHV DQG UHGXFHV RXWARZ VHG\P HQW 0RDGV KDYH LQF\HDVHG LQ WKH 0DNHV (URVLRQD0 SURFHVVHV KDYH LQF\HDVHG DV D UHVX0W RI WKH VWD0LF ZDWHU 0HYH0V Z\WK ZDYH DF\LRQ FDXVLQJ HURVLRQ RI WKH VKRUH0LQH VR0V 6KRUH0LQH HURVLRQ SRWHQW0\ WKUHDWHQV IU0QJ\QJ YH JHWD0LRQ RI L P SRU0DQFH IRU QD0LYH ÀVK ' HSRVLW0RQ RI VHG\P HQW D0VR FKDQJHV WKH VXEVW0DWHV WKD0 D0H L P SRU0DQW IRU FHUWD\Q ÀVK VSHF\HV IHHG\QJ VSDZQ\QJ HWF
+DE\WD0 DYDI0DE0L0\ DQG FRQQHF\LY\	2QH RI WKH F0L0FD0 DE\R0F IDF\WRUV WKDW VW0XF\XUH AVK FR P P XQ\WHV LV KDE\WD0 DYD0DE0L0\ DQG G\YHU0V\ /DNH EHG DQG VW0HD P P RUSKR0RJ\LQAXHQFH HFR0RJ\FD0 LQ\WHU0DF\RQV SURFHVVHV VXFK WH P SHUD0XU DQG R[\JHQ UH J\P HV 0DNH VXUIDFH D0HD LQAXHQFHV ZDYH DF\RQ ZKLFK FDQ 0HDG WR WKH IRU P D0RQ RU 0RVV RI KDE\WD0 L P SRU0DQW IRU G\IIHU0HQ0LH VW0D J HV Z\WK D0HDV Z\WK P R0H FR P S0H[KDE\WD0V EH\QJ VKRZQ WR HQKDQFH IRRG UHVRXU\FHV IR0D J\QJ RS SRU0XQ0\HV DQG UHIX J H IUR P SUHGD0RQ ³ D0 RI ZK\FK FDQ 0HDG WR \QFF0HDVHG G\YH0V\ -DFNVRQ H W D0 : IWK\Q WKH 0DNHV WKH P VH0YHV VR P H WKU0HD0HQHG DQG 0HVV P RE0H VSHF\HV 6RXWKHUQ 3\J P\ 3HUFK IRU H[D P S0H VXUYLYH \Q V P D0 UH P QDQW SRSX0D0LRQV 7KHVH \VR0D0WHG SRSX0D0LRQV D0H YX0QHUDE0H WR 0RFD0 H[WLQF\RQ XQHVV G\VSHUVD0 FDQ EH DVVLVWHG WKURXJK KDE\WD0 UH HVWDE0\K P HQW DQG WKH SURWHF\RQ RI H[\VW\J KDE\WD0V)RU H[D P S0H WKH SRSX0D0LRQ RI <D0UD DQG 6RXWKHUQ 3\J P\ 3HUFK RQ +\QG P D0VK ,V0DQG P D\ EHQHÂW IUR P WKH FD0HIX0 P DQD J H P HQW DQG SRWHQ\D0 HQKDQFH P HQW RI WKH GU0LQ V\VWH P D0 : \QG J D0H 7KH ZHW0DQG HQY\URQ P HQW WKD0 P DQ\ RI WKH V P D00HU 0HVV P RE0H VSHF\HV IRXQG D0H D0VR FRQVGH0HG L P SRU0DQW IRU SUHGD0RU DYR\GDQFH : HGGHUEXQ DQG +D P P HU $00RZ\LQJ SDVDJH SDW WKH EDUUDJHV LV RI F0L0FD0 L P SRU0DQFH IRU G\DGUR P RXV AVK VXFK DV &RQJR0L ,W LV D0VR QRWHG WKD0 D00RZ\LQJ VXFK SDVVDJH QHHGV WR EH FD0HIX0\ GHVLJQHG WR H[F0XGH SRWHQ\D0 SUHGD0RU VSHF\HV *0X00RZD* IRU H[D P S0H RI WKH WKU0HD0HQHG AVK WD[D UHV\G\QJ \Q WKH 0DNHV

. H\ HFRV\VWHP FRP SRQHQWV DQG SURFHVVHV FRQWLQXHG	
(FRV\VWHP FRP SRQHQWV DQG SURFHVVHV	' HVFULSWLRQ
%LRORJLFDO	
0 DLQWDLQLQJ DQG FRQQHFWLQJ KDELWDW UHIXJLD	6HH DGDFHQW UH KDELWDW FRQQHFWLYLW\ )RU VR P H VSHFLHV LW LV SRVVLEOH WKDW GUDLQV KDVH SURYLGHG DGGLWLRQDO VKHOWHU ZH00 YHJHWDWHG SHU P DQHQW DTXDF KDELWDWV ZKLFK FDQ DFW DV UHIXJHV H J 3\J P\ 3HUFK VSHFLHV : HGGHUEXUQ DQG +D P P HU 7KH ÁVK SRSX0DWLRQV VXSSRUWHG RQ +LQG P DUVK ,VDQG DQG VXURXQGLQJ DUHDV ' XQQ·V /DJRRQ 0XG ,VDQG DQG -DFREV %LJKW UHÁHFW WKH GLYHUVLW\ DQG H[WHQW RI KDELWDW DYD0DE0H ZLWK WKH FULFD0 H0H P HQWV EHLQJ WKH ULFK VXE P HU JHQW YHJHWDWLRQ 2WKHU VLJQLÁFDQW DUHDV ZLWKLQ WKH /DNHV LQF0XGH WKH XS SHU UHDFKHV RI WKH)LQQLVV 5LYHU WKH HQWUDQFH WR : DWRZD 6ZDP S DQG GUDLQV HQWHULQJ /DNH $0H[DQGULD &RQVGHUDWLRQ RI ERWK WKH KLJK YD0XH QDWXUD0 VLWHV DQG WKH KDELWDW FUHDWHG E\ WKH D0HUHG K\GR0R J\LFD0 UHJ\P H GUDLQV LV LP SRUWDQW LQ GHYH0RS0Q J WDU JHWV IRU FRQVHUYDWLRQ DQG UHJ\RQD0 P DQD JH P HQW : HGGHUEXUQ DQG +D P P HU
5HSURGXFWLRQ	)0RZ HYHQWV FDQ EH LP SRUWDQW DV FXHV IRU FHUWDLQ QDWLYH AVK VSHFLHV ZKHWKHU IRU P LJUDWRQ VSDZQLQJ HWF VHH WDE0H UH VSDZQLQJ EHKDYLRU DERVH
	7KH UHHGEHGV DQG RWKHU IUQJLQJ YHJHWDWLRQ SURYLGH SURWHFWHG ZHWDQGV RQ WKH LQVKRUH DUHDV ZKLFK D00RZ WKH HVWDE0LVK P HQW RI P RUH G\YHUVH DTXDWLF JURZWK LQ WKH VKD00RZ ZHWDQG DUHDV 7KHVH DUH LP SRUWDQW IRU WKH EUHHGLQJ RI P DQ\ VSHFLHV
3UHGDWLRQ	3UHGDWLRQ LV DQ LP SRUWDQW IDFWRU DIIHFWLQJ ÀVK FR P P XQLWLHV D0KRXJK WKH UH0DWLYH LP SRUWDQFH LV QRW FUHDU\ XQGHUVWRRG 6R P H ZRUN VXJ JHVWV WKDW LQ 0DU JHU 0DNH \\VWH P V ! KD SRSX0DWLRQV RI SUHGDWRUV DQG SUH\ FDQ FRE[LVW GXH WR IQFUHDVHG KDELWDW KHWHURJHQHLW\ DQG IQKUHQW VSDWLD0 FR P SRQHQWV IQ WKH SRSX0DWLRQ G\QD P LFV RI WKH VSHFLHV -DFNVRQ HW D0
&R P SHWLWLRQ	&DUS DUH EH0LHYHG WR S0D\ D UR0H IQ WKH 0RVV RI VXE P HU JHG DTXDWLF S0DQWV DQG IQFUHDVHG WXUE\G\W\ ZKLFK IQ WXUQ KDV LP SDFWV RQ RWKHU E\RWD 7KH DUIYD0 RI &DUS IQWR WKH /DNHV ZDV UHSRWHG WR KDYH RFFXUUHG IQ WKH V ZKLFK KDV EHHQ QRWHG WR KDYH FRQFLGHG ZLWK WKH 0RVV RI VXE P HU JHQW YHJHWDWLRQ 6LP HW D0 FWHG IQ : HGGHUEXUQ DQG +D P P HU : KUVW UHGAQ KDYH EHHQ UHFRUGHG IUR P WKH 0DNHV WKH\ WHQG QRW WR KDYH WKH VD P H KDELWDW UHTXUH P HQWV RI P DQ\ QDWLYH AVK 2WKHU H[RWLF VSHFLHV IRXQG IQ WKH 0DNHV IQF0XGH J R0GAVK DQG * D P EXVLD : HGGHUEXUQ DQG +D P P HU ,W LV 0NH0\ WKDW WKH KDELWDW G\YHUVW\ DQG SUHGDWRU DUH P RUH LP SRUWDQW WKDQ FR P SHWLWLRQ IQ VWUXFWXQJ WKH ÁVK FR P P XQW\ RI WKH /DNHV

3RSX0DWLRQ WUHQGV

$ SDUW IUR P WKH REVHUYDWLRQV DERVH IQ UH0DWLRQ WR VSHFLHV VXFK DV WKH 6RXWKUQ 3\J P\ 3HUFK DQG LWV QRZ UHVWULFWHG GLVWULEXWLRQ IQ WKH IUHVKZDWHU V\VWH P XQLWV WKHUH LV HYLGHQFH WR VXJ JHVW GHF0QHV IQ RWKHU VSHFLHV VHH 7DE0H 7KH H P HU JLQJ YLHZ LV WKDW KDELWDW VL P S0ÀFDWLRQ GXH WR UHGXFHG YDULDE0LW\ RI ZDWHU 0HYH0V LV D SUL P DU\ FDXVH 7KLV LP SDFWV RQ WKH JURZWK RI P DFuRSK\WHV D NH\VWRQH JURXS IQ WKHVH KDELWDWV ZLWK WKH UHVX0W EHIQJ IQFUHDVLQJ 0RVV RI KDELWDW FRQQHFWLYLW\ DQG FRQVGHU WKHVH IXWKHU

&R P P HUFL0 AVKIQJ GDWD

(FRQ6HDUFK QRWH WKDW WKHUH KDYH EHHQ GHF0QHV IQ WKH TXDQWLWLHV RI FR P P HUFL0 ÀVK VSHFLHV FDXJKW IQ WKH &RRURQJ DQG /DNHV RYHU WKH SDVW \HDU VHH 6HFWLRQ ,W LV DFNQZ0HGJHG E\ WKH DXWKRUV RI WKLV GHVFULSWLRQ RI HFR0RJLFD0 FKDUDFWHU WKDW D P RUH GHWDL0HG DQD0\VLV RI FR P P HUFL0 ÀVK IQJ GDWD ZRX0G HQKDQFH WKH XQGHUVWDQGIQJ RI SRSX0DWLRQ WUHQGV IRU VR P H WKH 0DU JHU VSHFLHV +RZHYHU VXFK DQ DQD0\VLV ZDV EH\RQG WKH VFRSH RI WKLV VWXG\ 7KH DXWKRUV ZLVK WR QRWH WKDW QR

IQIHUHQFH VKRX0G EH GUDZQ DERXW WKH P DQD J H P HQW RI FR P P HUFL0 ÀVK IQJ IQ WKH 5D P VDU VLWH EHDXVH RI WKH DPSDUHQW GHF0QHV IQ VR P H VSHFLHV)XUWKHU LW LV QRWHG WKDW VXVWDIQDE0H FR P P HUFL0 ÀVK IQJ LV IX00\ FRQVLVWHQW ZLWK 5D P VDU·V ZLVH XVH SUIQF\S0H DQG SUDFWLVHG IQ P DQ\ QDWLYH AVK 2WKHU H[RWLF VSHFLHV IRXQG IQ WKH 0DNHV IQF0XGH J R0GAVK DQG * D P EXVLD : HGGHUEXUQ DQG +D P P HU

,W LV 0NH0\ WKDW WKH KDELWDW G\YHUVW\ DQG SUHGDWRU DUH P RUH LP SRUWDQW WKDQ FR P SHWLWLRQ IQ VWUXFWXQJ WKH ÁVK FR P P XQW\ RI WKH /DNHV

Ramsar sites around the world.

,Q DGGLWLRQ WR WKH DERVH YLHZV WKHUH LV D0VR DQHFGR0D DGYLFH IUR P WKH 1 J DUIQG WHUL FR P P XQW\ VHH 6HFWLRQ IRU WKH IX00 RUD0 KLVWRU\ DFFRXQW VXSSRUWQJ WKH YLHZ WKDW WKH SRSX0DWLRQV RI D QX P EHU RI WKHVH 0DU JHU RE0LJDWH IUHVKZDWHU VSHFLHV KDYH GHF0QHG P DUNHG0\ RYHU WKH SDVW IHZ GHFDGHV

Ngarrindjeri community

There has been a widespread loss of large fish particularly Murray Cod, Callop, Blackfish, Tench (introduced) and Catfish since the 1970s. Carp are the only fish that are now caught consistently in the lakes. Callop appear to have returned in small numbers about 3–4 years ago presumably because the carp are targeted and fished out of the lakes.

Bony Bream are almost gone from the lakes; very few are still seen, whereas they were once plentiful. When the barrage gates have been open in recent years, Bony Bream have been caught in the Coorong but only small ones, the big ones are not caught anymore. Bony Bream are important in Ngarrindjeri lore and the creation story associated with how the Bony Bream was created tells of the need to not be greedy and is an important lesson.

/L P LWV RI DFFHSWDE0H FKDQJH DQG WUDIÅF 0L JKW DVVHVV P HQW ,W LV QRW SRVVLE0H WR HVWDE0LVK WKH SRSX0DWLRQ VL]HV IRU WKHVH VSHFLHV HLWKHU DURXQG WKH WL P H WKH VLWH ZDV 5D P VDU 0LVWHG RU WRGD\ )XUKHU VXUYH\ ZRUN LV QHHGHG WR SURYLGH UREXVW HVWL P DWHV RI SRSX0DWLRQ VL]HV DQG H[WHQW RI WKH KDE LWDWV HDFK UH0\ XSRQ)UR P WKH SHUVSHFWLYH RI VHWWLQJ 0L P LWV RI DFFHSWDE0H FKDQJH WKHUH DUH IRXU SUL P DU\ FRQVLGHUDWLRQV DV IR0R Z V

3RSX0DWLRQ VL]H ³ WKHVH FDQQRW EH GHWHU P LQHG DW SUHVHQW DWKRXJK RI FRQFHUQ DUH WKH VXJ J HVWLRQV E\ : HGGHUEXUQ DQG +D P P HU WKDW D QX P EHU RI WKH V P D0HU VSHFLHV HLWKHU KDYH SDWFK\ RU TXLWH UHVWULFWHG GLVWULEXWLRQ P DN LQJ WKH P SRWHQWLD0\ YX0QHUDE0H 8QWLO VXFK WL P H DV D P RUH SUHFLVH SRSX0DWLRQ HVWL P DWH LV SRVVLE0H DQG QDWXUD0 YDULDWLRQV DUH EHWWHU XQGHUVWRRG WKH SUHFDXWLRQDU\ DSSURDFK VXJ J HVWV D 0L P LW RI DFFHSWDE0H FKDQJH IRU WKRVH VSHFLHV ZLWK UHVWULFWHG RU SDWFK\ GLVWULEXWLRQ DQG IRU WKRVH DUH P RUH ZLGHVSUHDG DQG 0HVV VSHFLD0LVHG LQ QLFKH UHTXLUH P HQWV $UHD0 H[WHQW RI SUL P DU\ KDE LWDWV ³ VHH 6HFWLRQ ZKHUH WKHVH DUH LGHQWLÅHG E\ ZHW0DQG W\SH DQG /$& indicated.

: DWHU TXD0LW\ ³ VHH 6HFWLRQV DQG ZKHUH /$& are indicated in relation to salinity and turbidity, UHVSHFWLYH0\

&RQQHFWLYLW\ EHWZHHQ SUL P DU\ KDE LWDWV ³ DV QRWHG DERVH IRU VR P H RI WKHVH VSHFLHV WKHUH LV FRQFHUQ WKDW KDE LWDW SDWFKHV DUH EHFR P LQJ LVR0DWHG DQG VR P H W\SHV DUH EHFR P LQJ 0HVV FR P P RQ GXH WR WKH VL P SLÅFDWLRQ RI WKH 0DNH HQYLURQ P HQW FDXVHG LQ 0DU J H SDUW E\ WKH 0DFN RI ARZ DQG ZDWHU 0HYH0 YDULDWLRQV 7KLV P HDQV WKDW DUHDV VKRZLQJ J UHDWHU KDE LWDW GLYHUVLW\ VXFK DV WKH XSSHU UHDFKHV RI WKH)LQQLVV 5LYHU WKH HQWUDQFH WR : DWRZD VZD P S DQG GUDLQV HQWHULQJ Lake Alexandrina, are becoming more and more L P SRUWDQW IRU VR P H VSHFLHV ,Q 6HFWLRQ DQG VH DVR 6HFWLRQ ² WKLV LV QRWHG XQGHU WKH UH0HYDQW ZHW0DQG W\SHV DQG /$& KDYH EHHQ LQGLFDWHG

7UDIÅF 0L JKW DVVHVV P HQW

3RSX0DWLRQ QX P EHUV DUH QRW FRQFU P HG DW KRXJK VR P H RI WKH V P D0HU VSHFLHV KDYH UHVWULFWHG distributions and increasingly isolated habitats. This DVVHVV P HQW 0HYH0 LV WKHUHIRUH UHFR P P HQGHG WR UHAHFW D SUHFDXWLRQDU\ DSSURDFK DQG WKDW VR P H RI WKH L P SRUWDQW NH\ KDE LWD W DUHDV VHH DERVH DUH NQRZQ WR IDFH WKUHDWV VHH 6HFWLRQ

: HW0DQG W\SH 1 6HFWLRQ 6XFK FKDQQHV DUH QRZ SUL P H KDE LWD W IRU VR P H RI WKH V P D0HU QDWLYH ÀVK VSHFLHV

' LDGUR P RXV ÀVK VSHFLHV

4 XDOLWDWLYH GHVFULSWLRQ

7KHUH DUH VHYHQ GLDGUR P RXV VSHFLHV IRXQG LQ WKH Coorong and Lakes site that contribute to the Ramsar VWDWXV RI WKH VLWH VHH 7DEOH $ EXW RQH RI WKHVH VSHFLHV LV LQF0XGHG RQ WKH 6RXWK $XVWUDOLDQ SURYLVLRQDO 0LVW RI VSHFLHV RI FRQVHUYDWLRQ FRQFHUQ ,W LV XQGHUVWRRG WKDW WKLV VWDWXV LV \HW WR EH DJUHHG ZLWKLQ JRYHUQP HQW DQG VR WKLV P D\ UHTXLUH UHYLHZ GHSHQGLQJ RQ WKH RXWFR P H RI WKDW consideration.

$ P RQJ WKHVH VSHFLHV P LJUDWLRQ LV D SUH VSDZQLQJ EHKDYLRXU ZLWK IRXU RI WKH VSHFLHV P RYLQJ GRZQVWUHD P WR WKH (VXDU\ RU WR VHD DQG WKH RWKHU WKUHH P RYLQJ XSVWUHD P IUR P WKH VHD $0RZLQJ WKLV SDVVD JH WKURXJK WKH EDUUD JHV LV DQ LP SRUWDQW P DQDJH P HQW FRQVLGHUDWLRQ

7KH WL P LQJ RI WKHVH P LJUDWLRQV DVR GLIIHUV VLJKW\ EHWZHHQ VSHFLHV WKXV SURYLGLQJ D P DQDJH P HQW FKDOOHQJH 7KHVH GLIIHUHQFHV LQ WL P LQJ RI P LJUDWLRQ FDQ EH VHHQ LQ VHH)LJXUH EH0RZ

%H0RZ LQ 7DE0H P RUH GHWDLOHG LQIRU P DWLRQ LV SURYLGHG RQ ZKHUH HDFK VSHFLHV RFFXUV LQ WKH &RRURQJ DQG /DNHV 5D P VDU VLWH S0XV KDE\WDW LQIRU P DWLRQ VRXUFHG IUR P : HGGHUE XQ DQG +D P P HU DQG WKH 6. 0 UHSRUW RI WKDW UHYLHZHG IUHVKZDWHU ÀVK VSHFLHV RI WKH 0 XUUD\ ' DULQJ %DVLQ 7DE0HV J LYLQJ VX P P DU\ LQIRU P DWLRQ RI WKH KDE\WDW DQG RWKHU QHHGV RI WKHVH VSHFLHV GXULQJ VSDZQLQJ DQG IRU 0DYD0 DQG WXYHQ0H IRU P V DUH SURYLGHG LQ $ SSHQGL[(

COMMON NAME	Life History stage	J	F	M	A	M	J	J	A	S	O	N	D
Climbing Galaxias (A)	Larvae						Washed to sea						
	Juvenile								Upstream migration from sea				
	Adult							UNKNOWN					
Common Galaxias* (A)	Larvae						Washed to sea						
	Juvenile								Upstream migration from sea				
	Adult			Downstream migration to estuary to spawn									
Pouched Lamprey (A)	Ammocoete (larvae)							UNKNOWN					
	Downstream migrant												
	Parasitic young adult						movements at sea unknown						
	Upstream migrant												
Short-headed Lamprey (A)	Ammocoete (larvae)							UNKNOWN					
	Downstream migrant												
	Parasitic young adult						movements at sea unknown						
	Upstream migrant												
Shortfin Eel (C)								UNKNOWN					
Estuary Perch (C)	Larvae / Juveniles							UNKNOWN					
	Adults						downstream	spawning migration to estuary					
Congolli (C / ER)	Larvae	upstream									upstream		
	Juveniles				Downstream								
	Adults							UNKNOWN					
Jumping Mullet (EM)								UNKNOWN					
Yellow-eye Mullet (EM / R)								UNKNOWN					
River Garfish (EM / R)								UNKNOWN					
Black Bream (ER)								UNKNOWN					
Bridled Goby (ER)								UNKNOWN					
Smallmouth Hardyhead (ER)													
Tamar Goby (ER)								UNKNOWN					
Bluespot or Swan River Goby (ER)								UNKNOWN					
Greenback Flounder (ER)								UNKNOWN					
Lagoon Goby (ER)								UNKNOWN					
Flathead Gudgeon (FM)								UNKNOWN					
Silver Perch (FS)	Larvae / Juveniles							UNKNOWN					
	Adults										upstream		
Goldfish# (FS)								UNKNOWN					
Murray Hardyhead (FS)								UNKNOWN					
Fly Specked Hardyhead (FS)								UNKNOWN					
Carp# (FS)								UNKNOWN					
River Blackfish (FS)						No apparent migration, but are nocturnal and sedentary							
Mountain Galaxias (FS)								UNKNOWN					
Eastern Gambusia# (FS)								UNKNOWN					
Carp Gudgeon Complex (FS)								UNKNOWN					
Spangled Perch (FS)								UNKNOWN					
Murray Cod (FS)								UNKNOWN					
Golden Perch (FS)	Larvae / Juveniles							swept downstream					
	Adults					downstream					upstream		
Crimson Spotted Rainbowfish (FS)								UNKNOWN					
Purple Spotted Gudgeon^ (FS)								UNKNOWN					
Southern Pygmy Perch (FS)								UNKNOWN					
Bony Bream (FS)								UNKNOWN					
Rainbow Trout# (FS)								UNKNOWN					
Redfin# (FS)								UNKNOWN					
Dwarf Flathead Gudgeon (FS)								UNKNOWN					
Australian Smelt (FS)		upstream migration of juvenile and adult smelt											
Brown Trout# (FS)								UNKNOWN					
Freshwater Eel-tailed Catfish (FS)							No apparent migration						
Tench# (FS)								UNKNOWN					
Mulloway (MM)								UNKNOWN					
Sea Mullet (MM)								UNKNOWN					

Upstream migration
Downstream migration

KEY

$ $QDGURP RXV ² & &DWDGURP RXV ² & (5 &DWDGURP RXV (VWXDULQH 5HVLGHQW ² (0 (VWXDULQH 0LJUDQW ² (0 5 (VWXDULQH 0LJUDQW 5HVLGHQW (5 (VWXDULQH 5HVLGHQW ²) 0)UHVKZDWHU 0LJUDQW ²)6)UHVKZDWHU 6WUDJJOHU ² 0 0 0 DULQH 0LJUDQW ,I0DQG0RFNHG * P DFX0DWXV FDQ UHSURGXFH HQWLUH0\ LQ IUHVKZDWHU – # denotes exotic taxa – ^ denotes locally extinct taxa

)LJXUH 7L P LQJ V DQG R WKHU GHWDLOV RI ÀVK P LJUDWLRQV LQ WKH &RRURQJ DQG /DNHV 5D P VDU VLWH

7DEOH 'LDGURPRXV ÀVK WKHLU SUHIHUUHG KDELWDWV DQG RWKHU OLIH KLVWRU\ LQIRUPDWLRQ			
&RPPRQ QDPH *VFLHQWLÀF QDPH*	3UHIHUUHG V\VWHP XQLWV	3UHIHUUHG KDELWDW LQIRUPDWLRQ DGXOWV 6HH \$SSHQGL[(IRU LQIRUPDWLRQ UHODWLQJ WR VSDZQLQJ DQG IRU ODUYDO DQG MXYHQLOH IRUPV	
		6RXUFH +DELWDW UHTXLUHPHQWV RI QDWLYH ÀVK RI WKH 0XUUD\ 'DUOLQJ %DVLQ ZLGH 6.0	6RXUFH /DNHV)LVK ,QYHQWRU\ :HGGHUEXUQ DQG +DPPHU
6KRUW ÀQQHG (HO *\$QJXLOOD DXVWUDOLV*		¶+DELWDW UDQJHV IURP RFHDQV WR HVWXDULHV WR ULYHUV EXW WKH\ DUH PDLQO\ IRXQG LQ FRDVWDO ZHWODQGV \$GXOWV KDYH EHHQ IRXQG LQ ULYHUV FUHHNV ODNHV DQG VZDPSV ZLWK IHZ UHSRUWHG IURP WKH 0XUUD\ 'DUOLQJ 5LYHU V\VWHP ,Q ULYHUV DGXOW HHOV DUH XVXDOO\ DVVRFLDWHG ZLWK DFFXPXODWLRQV RI ZRRG\ GHEULV· 7HPSHUDWXUH ' ' 6DOLQLW\ PJ / +LJK WROHUDQFH 'LVVROYHG R[\JHQ ' '	¶7KH HQWUDQFH WR WKH 0XUUD\ 'DUOLQJ V\VWHP UHSUHVHQWV SDUW RI WKH PRVW ZHVWHUO\ GLVWULEXWLRQ IRU WKH PLJUDWLRQ RI ODUYDO HHO along the Australian coast, with occasional 6\$0 VSHFLPHQV UHFRUGHG LQ GUDLQV DQG SXPSLQJ DUHDV DURXQG WKH IULQJHV RI /DNH \$OH[DQGULQD %DUUDJHV DQG UHGXFHG ÀRZV WKURXJK WKH 0XUUD\ 0RXWK OLNHO\ LPSHGH WKH PLJUDWRU\ UHTXLUHPHQWV RI WKLV VSHFLHV·
&OLPELQJ *DOD[LDV **DOD[LDV EUHYLSLQQLV*		¶&OLPELQJ *DOD[LDV DUH PRVW RIWHQ IRXQG LQ VPDOO IDVW ÁRZLQJ URFN\ VWUHDPV ZLWK DEXQGDQW RYHUKDQJLQJ YHJHWDWLRQ 7KH\ FDQ WUDYHO ORQJ GLVWDQFHV LQODQG EHLQJ DEOH WR QHJRWLDWH ZDWHUIDOOV DQG other barriers due to their ability to 'climb' YHUWLFDO REVWDFOHV 0F'RZDOO)XOWRQ E &RDVWDO SRSXODWLRQV DUH QRUPDOO\ GLDGURPRXV WKXV WKLV VSHFLHV FDQ UHDGLO\ IRUP ODQGORFNHG SRSXODWLRQV· 7HPSHUDWXUH & 6DOLQLW\ PJ / <35,000 'LVVROYHG R[\JHQ ' '	¶\$GXOW KDELWDW UHFRUGHG IURP RQH VWUHDP WULEXWDU\ EXW SUREDEO\ PRUH ZLGHVSUHDG SULRU WR EDUUDJHV +DPPHU 6SDZQLQ ORZHU VWUHDP UHDFKHV ZLWK ODUYDH GULIWLQJ WR VHD -XYHQLOHV ZRXOG HQWHU V\VWHP DQG PRYH WKURXJK /DNHV DQG RU SRWHQWLDOO\ UHFUXLWHG LQ ODNH HQYLURQPHQWV ZLWK SHODJLF ODUYDH· 0 +DPPHU SHUV FRPP
&RPPRQ *DOD[LDV **DOD[LDV PDFXODWXV*		¶7KLV VSHFLHV LV DQ LPSRUWDQW FRPPHUFLDO ÀVK DQG LV D PDLQVWD\ RI WKH ZKLWHEDLW ÀVKLQJ LQGXVWU\ LQ WKH 6RXWKHUQ +HPLVSKHUH &RPPRQ *DOD[LDV DUH PLJUDWRU\ DQG IRXQG DW ORZ HOHYDWLRQV LQ ULYHUV VWUHDPV DQG HVWXDULHV IURP 4XHHQVODQG WR 6RXWK \$XVWUDOLD 7DVPDQLD DQG VRXWK HDVWHUQ :HVWHUQ \$XVWUDOLD 7KH\ DUH IRXQG LQ WKH ORZHU UHDFKHV RI WKH 5LYHU 0XUUD\ LQ 6RXWK \$XVWUDOLD 7KH\ DUH WROHUDQW RI D UDQJH RI VDOLQLWLHV DQG SUHIHU KDELWDWV ZLWK VORZ ÀRZLQJ ZDWHU IULQJLQJ YHJHWDWLRQ DQG DUHDV RI GHHS VODFN ZDWHU· 7HPSHUDWXUH ²! & 6DOLQLW\ PJ / 'LVVROYHG R[\JHQ ' '	¶:LGHVSUHDG LQ WKH /DNHV VLWHV DQG RFFXSLHG D UDQJH RI KDELWDW W\SHV JHQHUDOO\ LQ RSHQ ZDWHU DORQJVLGH OLWWRUDO HGJH YHJHWDWLRQ 7KH\ QRZ H[LVW DV DW OHDVW D SDUWO\ ODQGORFNHG SRSXODWLRQ DV LV FRPPRQ LQ RWKHU ODQGORFNHG ODNH HQYLURQPHQWV H J 3LHUFH +DPPHU 7KH FXUUHQW DQG KLVWRULF UDQJH IRU WKH VSHFLHV DSSHDUV similar, although abundances are likely much UHGXFHG ZLWK WKH LQWHUUXSWLRQ RI GLDGURPRXV ZKLWHEDLW UXQV HQWHULQJ IUHVKZDWHU HQYLURQPHQWV·
3RXFKHG /DPSUH\ **HRWULD DXVWUDOLV*		¶3RXFKHG /DPSUH\ LV D PLJUDWRU\ VSHFLHV ZLWK GRZQVWUHDP PLJUDWLRQ RI \RXQJ adults to the sea where they mature and HYHQWXDOO\ UHWXUQ WR IUHVKZDWHU WR VSDZQ +DELWDW SUHIHUHQFHV LQFOXGH XSSHU UHDFKHV RI FRDVWDO VWUHDPV HVWXDULHV DQG WKH VHD GHSHQGLQJ RQ WKH VWDJH RI WKHLU OLIH F\FOH· 7HPSHUDWXUH ' ' 6DOLQLW\ PJ / ' ' 'LVVROYHG R[\JHQ ' '	¶&U\SWLF VSHFLHV UDUHO\ HQFRXQWHUHG WRGD\ ZLWKRXW VSHFLDOLVHG VXUYH\ WHFKQLTXHV ,QGLYLGXDOV RI ERWK VSHFLHV ZHUH UHFHQWO\ FDXJKW EHORZ WKH *RROZD %DUUDJH 6\$0 VSHFLPHQV IURP ZLQWHU ORGJHG E\ 6\$5',\$TXDWLF 6FLHQFHV +LVWRULFDOO\ ODUJH migrations were witnessed on weirs along the 5LYHU 0XUUD\ 7KH ODNHV SUREDEO\ RQO\ RIIHU D FRQGXLW XSVWUHDP LQWR WKH 0XUUD\ DQG WR a limited extent to smaller tributary streams PRVW RI ZKLFK KDYH VLJQLÀFDQW QDWXUDO migration barriers.'

7DEOH ' LDGUR P RXV ÀVK WKHLU SUHIHUUHG KDELWDWV DQG RWKHU OLIH KLVWRU \ LQIRU P DWLRQ FRQWLQXHG			
&R P P RQ QD P H *VFLHQWLÅF QD P H*	3UHIHUUHG V \ VWH P XQLVV	3UHIHUUHG KDELWDW LQIRU P DWLRQ DGXOWV 6HH $ S SHQGL[(IRU LQIRU P DWLRQ UHODWLQJ WR VSDZQLQJ DQG IRU ODUYDO DQG LXYHQLOH IRU P V	
		6RXUFH +DELWDW UHTXLUH P HQWV RI QDLYH ÀVK RI WKH 0 XUD \ ' DULQJ %DVLQ Z LGH 6 . 0	6RXUFH /DNHV)LVK ,QYHQWRU \ (Wedderburn DQG +D P P HU
6KRUW KHDGHG /D P SUH \ *0 RUGDF LD P RUGDÍ*		¶7KH 6KRUW KHDGHG /D P SUH \ LV D P LJUDWRU \ VSHFLHV WKDW VSHQGV WKH P DRLUW \ RI LWV DGXOW LLH LQ WKH VHD RU LQ HVWXDULHV ,WV SUHIHUUHG KDELWDW YDULHV GHSHQGLQJ RQ LWV OLIH F \ FOH IUR P IDVW AR Z LQJ VWUHD P V Z LWK P XGG \ VDQG \ DQG VLW \ VXEVWUDWHV GXLQJ VSDZQLQJ P LJUDWLRQ WR V RZ AR Z LQJ P XGG \ VWUHD P V GXLQJ WKH ODUYDO stage and coastal seas during adulthood.'	¶&U \ SWLF VSHFLHV UDUH\ HQFRXQWHUHG WRGD \ Z LWKRXW VSHFLDOLVHG VXUYH \ WHFKQLTXHV ,QGLYLGXDOV RI ERWK VSHFLHV Z HUH UHFHQW \ FDXJ KW EH0RZ WKH * RRUZD %DUDJH 6$ 0 VSHFL P HQV IUR P Z LQWHU RGJHG E \ 6$5 ', $TXDLF 6FLHQFHV +LVWRULFDO0 \ 0DUJH migrations were witnessed on weirs along the 5LYHU 0 XUD \ 7KH /DNHV SUREDE0 \ RQ\ RIIHU D FRQGXLW XSVWUHD P LQWR WKH 0 XUD \ DQG WR a limited extent to smaller tributary streams P RVW RI ZKLFK KDYH VLJQLAFDQW QDWXUD0 migration barriers.'
7H P SHUDWXUH ' ' 6DOLQLW\ P J / ' ' ' LVVR0YHG R[\ JHQ ' '			
(VWXDU \ 3HUFK *0 DF TXDLD FR0RQRUX P*		¶(VWXDU \ 3HUFK DUH P RVW FR P P RQ LQ HVWXDLHV DQG WLGD0 UHDFKHV RI ULYHUV D0WKRXJK WKH \ FDQ H[WHQG XS VWUHD P LQWR IUHVKZDWHU UHDFKHV 7KH \ FDQ WR0HUD WH D UDQJH RI KDE\D0WV EX DUH W \ S LFD0 \ IRXQG LQ GHHSHU FKDQQHV RIWHQ LQ association with submerged objects.'	+DE\D0W DQG HFR0RJ \ OLWWOH NQRZQ LQ UHJ LRQ 7KRXJK WR EH P R0H FR P P RQ S LRU WR WKH EDUDJ HV 6LP HW D0 DQG KDV D0VR LNH0 \ VXIIHUHG IUR P EURDGH0 HFRV \ VWH P FKDQJHV 0 +D P P HU SHUV FR P P
&RQJR R0L 7XSRQJ *3VHXGDSKLWLV XUY0LL*		7XSRQJ DUH XVXD0 \ IRXQG QHDU WKH FRDVW DQG DUH FR P P RQ LQ WKH FRDVWD0 GUDLQDJHV IUR P WKH 5LYHU 0 XUD \ LQ 6RXWK $XVWUDLLD WR %HJD LQ 16 : +DE\D0W SUHIHUHFHV RI DGXOV LQ ULYHUV LQF0XGH V0RZ AR Z LQJ Z DWHU D P RQJ 0HDI LWWHU DQG ZRRG \ GHE LV DQG XQGHU RYHU KDQJ LQJ EDQN $V WKLV VSHFLHV LV SUL P DU0 \ P DLQH habitat in estuaries such as sea grasses is D0VR L P SRUWDQW IRU EUHHGLQJ 7XSRQJ DUH osmoregulators and are able to withstand a UDQJH RI VDLQLWLHV	7KH \ KDYH EHHQ UHFR0GHG N P LQ0DQ DQG DUH NQRZQ WR P RYH FRQVLGHUDE0H GLWDQFHV XS WKH 5LYHU 0 XUD \ $QGUHZV E ,W LV FR P P RQ LQ WKH 0RZHU UHDFKHV RI WKH 5LYHU 0 XUD \ LQF0XGLQJ WKH /DNHV EXW IHZ DUH IRXQG DERYH /RFN LQ 6RXWK $XVWUDLLD /0R\G F	¶ : LGHVSUHDG EXW RQ\ UHFR0GHG DW QLQH VLWHV LQ 0RZ QX P EHUV GXLQJ WKH VXUYH \ P RVW RI0HQ DW VLWHV Z LWK VDQG \ URFN \ ERWR P V RQ RSHQ Z DWHU 0DNHVKRUHV $0 &RQJR R0L FDSWXUHG IN WKH VXUYH \ Z HUH DGXOV ! F P VX J JHVLQJ SRRU UHFUXLW P HQW LQ WKH /DNHV DUHD DV LXYHQLOHV VKRX0G EH H[SHFWHG RYHU WKH VSLQJ DQG VX P P HU SHURG $QGUHZV $ LXYHQLOH VHF P HQ Z DV IRXQG QHDU * RR0Z D LQ $X J XVW RI VLWH 6 0 XFK UH P DLQV WR EH NQRZQ DERXW WKH HFR0R J \ RI WKLV VSHFLHV such as where breeding occurs and the ARZ DQG RWKHU KDE\D0W UHTXLUH P HQW IRU VXFFHVVIX0 UHFUX\ P HQW H J 0RZ ARZ WKURXJK WKH 5LYHU 0 XUD \ GXLQJ DQG SUHFHG LQJ WKH VXUYH \ SHLRG P LJ KW UH0DWH WR SRR U P LJ UD0LQ RI LXYHQLOHV LQWR WKH 0DNHV DQG RU ID0XLH RI VSDZQLQJ WLJ J HU 7KLV VSHFLHV KDV GHF0LQHG in distribution and abundance in the Lakes VLQFH WKH FRQVWXFWLRQ RI WKH EDUDJ HV with mass migrations that were historically HQFRXQWHUHG QR 0RQJ HU REVH0VYHG 6LP HW D0 .

35()(55(' 6<67(0 81,76

' ' – ' DW D GHÀF LHO W

– 0 XUD \ 0 RXW K DQG (VWXD \ – 1 R0W K /DJ RRQ – 6RXW K /DJ RRQ – /DNH $0EHW – /DNH $0H[DQG0LQD – Tributary wetlands

1 RW H 8QW 0 XUD \ 0 RXW K DQG (VWXD \ LQF0XGHV WKH IUHVKZDWHU ÁRRG FKDQQH0 RQ +LQG P DVK ,VLDQG

. H \ GULYHUV DQG 0HYHUV	
' ULYHUV DQG 0HYHUV	' HVFULSWLRQ
: LQGV DQG WLGHV	7LGHV QHDU WKH 0 XUD\ 0 RXWK DUH VH P L G LXUQD0 DQG YDU\ EHWZHHQ P QHDS DQG P VSLQJ WLGHV 0 ' %& 7LGD0 H[FKDQJ H GLYHV D QX P EHU RI SURFHVVHV LQF0XG LQJ P L[LQJ RI WKH ZDWHU FR0X P Q DQG FRQVHTXHQW\ QXWULHQ UHDHDVH IUR P ERWWR P VHG L P HQW VD0LQ\ ED0DQFH ZWK IUHVKZDWHU LQÁRZ V DQG ZHWWLQJ DQG H[SRVLQJ RI P XGÁDW DQG LQWHUWLGD0 P DUVKHV IRU WKH P D LQWHQDQFH RI HFRV\VWH P KHDWK RI KDEWDW IRU QDWLYH ÀVK
2 SHQLQJ RI WKH 0 XUD\ 0 RXWK	7KH 0 XUD\ 0 RXWK RSHQLQJ GHWHU P LQHV KDE LWDW FRQQHFWLY\W\ IRU ÀVK WKDW P RYH EHWZHHQ WKH (VWXDU\ DQG WKH VHD LQF0XG LQJ WKRVH WKDW KDYH D P D LQH SKDVH LQ WKH LQ IH F \ F0H ,Q DGGLWLRQ WKH H[WHQW RI WKH 0 XUD\ 0 RXWK RSHQLQJ FRQWUR VD LQW\ QXWULHQW DQG WXE LG W\ E\ SURY LG LQJ ÁXVK LQJ WR WKH RFHDQ
5LYHU)0RZV ³ %DUDJH RSH0D LWLRQV	)UHVKZDWHU LQSXW WUL J HU VSDZQLQJ IRU D QX P EHU RI VSHFLHV 7KHVH SURY LGH QXWULHQW WXE LG W\ DQG HVSHFLD0\ ]RRS0DQNWRQ IRRG LWH P V WKDW DUH ZDVKHG LQ R WKH (VWXDU\ Z LW K RXWARZ IUR P /DNH $0H[DQG LQD 5LYHU AR Z V D0V S0D\ D UR0H LQ P DLQWDLQLQJ WKH RSHQLQJ RI 0 RXWK DQG LQ WKH VDLQ\ DQG QXWULHQ F \ F0HV RI WKH (VWXDU\

&RQ R0L W\ S LFD0\ LQKDE LW WKH VDQG\ URFN\ IUQ J HV RI WKH /DNH

.H\ HFRV\VWHP FRP SRQHQWV DQG SURFHVVHV	
(FRV\VWHP FRP SRQHQWV DQG SURFHVVHV	'HVFULSWLRQ
3K\VLFR FKHPLFD0	
6D0LQH\	$V GLDGUR P RXV VSHFLHV WKHVH VHYHQ FDQ F0HDU\ WR0HUDWH D Z\GH UDQJH RI VD0LQH\HV DW SD0LFX0DU 0LH VWDJHV +RZHYHU P RVW UH0\ RQ VD0LQH\HV 0Q WKH UDQJH RI IUHVK WR SSW DQG DV VXFK FDQQRW WR0HUDWH K\SHUVDOQH FRQGLWLRQV DQG 0LNH0\ UHTXLUH 0RZHU VD0LQH\HV SSW IRU RSW P X P JURZWK DQG VXUY\YR0VK\S 0Q DGX0W KDE\WD\ 0Q WKH /DNHV ,Q DGG\WLRQ FKDQJHV 0Q VD0LQH\ FDQ SUR P RWH VSDZQ0J VXFFHVV 0Q HVWXD0LQH ÀVK *HGGHV
'LVVR0YHG R[\JHQ	6WUDWLÁFDWLRQ 0QF\UHDVHG QX\WULHQW FRQFHQWUDWLRQV DQG K0JK SK\WRS0DQNWRQ JURZWK FDQ D0 FRQWUEXWH WR WKH 0RZHU0Q RI G0VVR0YHG R[\JHQ FRQFHQWUDWLRQV Z\WK0Q WKH ZDWHU FR0X P Q :K0H VWUDW\ÁFDWLRQ 0V QRW FR P P RQ 0Q WKH &RRUDQJ 1W KDV EHHQ UHFRUGHG 0Q WKH 1RWK /DJRRQ /D P RQWDJQH HW D0 $0 VHYHQ ÀVK VSHF\HV DUH UH0LDQW RQ R[\JHQ 0WKH ZDWHU FR0X P Q IRU VXUY\YD0 DQG FRX0G QRW VXUY\YH SH0LRGV RI DQR[\D
1XW0LHQW F\FO0J	7K\V 0V RQ\ D IDFWRU ZKHQ 1W DIIHFWV SURGXFW0LW\ HVSHF\D0\ RI]RRS0DQNWRQ
7XUE0GW\	6SHF\HV VXFK DV WKH (VWXDU\ SHUFK DUH SUHGDWRU\ DQG Y0VXD0 IHHGHUV ([FHVVLYH WXUE0GW\ ZRX0G DIIHFW WKH0U DE0LW\ WR IHHG
3$5	/NH0\ WR HIIHFW SURGXFW0LW\ DQG HVSHF\D0\ WKH HVWDE0VK P HQW RI 0WRU0D0 YH J HWDW0RQ
7H P SHUDWXUH	1HHG WR P D0QWD0Q VHDVRQD0 WH P SHUDWXUH SDWWHUQV
0RYH P HQW RI ZDWHU 1QWR DQG RXW RI WKH 0DNHV	6HH DERYH XQGHU G0LYHUV DQG 0HYHUV
0RRQ SKDVH	)RU &R P RQ *D0D[LDV DQG 6KRW ÀQQHG (H0 DQG SRVVLE0\ /D P SUH\ VSHF\HV WRR P RRQ SKDVH WU0J J HUV SUH VSDZQ0J P L J UD0LRQV
6HG0 P HQW D0LRQ DQG HURVLRQD0 SURFHVVHV	([FHVVLYH VHG0 P HQW D0LRQ DQG GHSRV0LRQ 0Q WKH 0XUD\ (VWXDU\ DQG DVVRF0DWHG FKDQQH0V KDV VL J Q0ÁFDQW0\ UHGXFHG WKH HVWXD0LQH KDE0W DQG SDVVD J H IRU WKHVH AVK VSHF\HV
+DE0W FRQQHFW0LY0\	$0RZ0J SDVVD J H WKURX J K WKH 0XUD\ 0RWK DQG SDVW WKH ED0UD J HV 0V RI F0W\FD0 L P SRW0DQFH IRU WKHVH G0DGUR P RXV ÀVK D0WKRX J K 0W 0V D0VR QRWHG WKDW D0RZ0J VXFK SDVVD J H QHHGV WR EH FD0HIX0\ GHVL J QHG WR H[F0XGH SRWHQW0L0 SUHGDWRU VSHF\HV P X0RZD\ IRU H[D P S0H RI WKH WKUHDWHQHG ÀVK taxa residing in the Lakes.
6XEVWUDWHV DQG KDE0W0V	$ P RQ J WKHVH VSHF\HV VR P H G0VS0D\ D SUHIHUHQFH IRU FHUWD0Q VXEVWUDWH KDE0W0W\SHV)RU H[D P S0H 6KRW KHDGHG 0D P SKUH\ VSHQG WKH GD\ EXUHG DQG D P RQ J 0RRVHV VWRQHV DQG &RQJR0L SUHIHU WR 0LYH D P RQ J 0HDI 0LWWHU QHDU 0R J V DQG EX0LHG 0Q VDQG 0RV RI WKHVH VSHF\HV D0VR RFFXS\ D0HDV WKDW FRQW0Q 0DU J H ZRRG\ GHE0LV RYHUKDQJ0Q J YH J HWD0LRQ RU VXE P HU J HG RE0HFWV $0 H[FHSW WKH &0L P E0Q J JD0D[LDV VHH P WR SUHIHU 0RZHU ARZ0Q J waters.
%L0R0RJ0FD0	
5HSURGXFW0LRQ	6HH DERYH 0H P RYH P HQW RI ZDWHU P RRQ SKDVH KDE0W0W FRQQHF0LY0\ DQG VXEVWUDWHV
&R P SHW0LRQ	&RQFHQWUD0LRQV RI G0DGUR P RXV ÀVK H J EH0RZ EDU0LHUV P D\ EH YX0QHUDE0H WR SUHGD0LRQ
3U P DU\ SURGXF0LRQ	.QRZ0HGJH JDS
)RRG VRXUFHV	6 P D0 DQG 0DUYD0 ÀVK IHHG RQ]RRS0DQNWRQ &RQG0W0RQV WKD0 0L P W]RRS0DQNWRQ SURGXF0LRQ DEXQGDQFH Z\0 0L P W 0DUYD0 DQG 0XYHQ0H ÀVK VXUY\YD0 $E0XSW FKDQJHV 0Q VD0LQH\ P D\ FDXVH P R0WD0W\ 0Q 0HVKZDWHU DQG HVWXD0LQH]RRS0DQNWRQ 0 *HGGHV SHUV FR P P

/L P LWV RI DFFHSWDEOH FKDQJH DQG WUDIÀF OLJKW DVVHVV P HQW ,W LV QRW SRVVLEOH WR HVWDEOLVK WKH SRSXODWLRQ VL]HV IRU WKHVH VSHFLHV HLWKHU DURXQG WKH WL P H WKH VLWH ZDV 5D P VDU OLVWHG RU WRGD\ )XUWKHU VXUYH\ ZRUN LV QHHGHG WR SURYLGH UREXVW HVWL P DWHV RI SRSXODWLRQ VL]HV DQG H[WHQW RI WKH KDELWDWV HDFK UHO\ XSRQ)UR P WKH SHUVSHFWLYH RI VHWWLQJ OL P LWV RI DFFHSWDEOH WKHUH DUH IRXU SUL P DU\ FRQVLGHUDWLRQV DV IROORZV

3RSXODWLRQ VL]H ³ WKHVH FDQQRW EH GHWHU P LQHG DW SUHVHQW DOWKRXJK DV QRWHG DERYH VL[RI WKHVH VHYHQ VSHFLHV DUH EHLQJ FRQVLGHUHG IRU LQFOXVLRQ RQ WKH 6RXWK $XVWUDOLDQ OLVW RI VSHFLHV RI FRQVHUYDWLRQ FRQFHUQ *LYHQ WKLV WKH SUHFDXWLRQDU\ DSSURDFK VXJJHVWV D OL P LW RI DFFHSWDEOH FKDQJH IRU WKHVH VSHFLHV P HDQLQJ WKH\ ZDUUDQW FRQVLGHUDWLRQ LQ WKH RSHUDWLRQV RI WKH EDUUDJHV DQG ÀVKZD\V WR HQVXUH SDVVDJH HLWKHU XSVWUHD P RU GRZQ ZKHQ LW LV UHTXLUHG $UHDO H[WHQW RI SUL P DU\ KDELWDWV ³ WRR OLWWOH LV NQRZQ RI WKH KDELWDW QHHGV RI WKHVH VSHFLHV DW SUHVHQW WR DOORZ a LAC to be recommended.

: DWHU TXDOLW\ ³ VHH 6HFWLRQV DQG ZKHUH /$& are indicated in relation to salinity and turbidity, UHVSHFWLYHO\

&RQQHFWLYLW\ EHWZHHQ SUL P DU\ KDELWDWV ³ DV QRWHG DERYH WKH SUL P DU\ FRQVLGHUDWLRQ IRU WKHVH VSHFLHV LV WR EH DEOH WR P RYH WKURXJK WKH EDUUDJHV DW FHUWDLQ WL P HV 7KH ÀVKZD\ VHH DGMDFHQW DQG %DUUDJH 2 SHUDWLQJ 6WUDWHJ\ P DNH VR P H DOORZDQFH IRU WKHVH QHHGV DW SUHVHQW

7UDIÀF OLJKW DVVHVV P HQW

3RSXODWLRQ QX P EHUV DUH QRW NQRZQ DOWKRXJK VL[RI WKHVH VHYHQ VSHFLHV DUH EHLQJ FRQVLGHUHG IRU LQFOXVLRQ RQ WKH 6RXWK $XVWUDOLDQ OLVW RI VSHFLHV RI FRQVHUYDWLRQ FRQFHUQ 7KLV DVVHVV P HQW OHYHO LV WKHUHIRUH UHFR P P HQGHG WR UHÁHFW D SUHFDXWLRQDU\ DSSURDFK DQG WKDW EHLQJ DEOH WR P RYH WKURXJK WKH EDUUDJHV LV D FULWLFDO OLIH KLVWRU\ VWUDWHJ\ IRU WKHVH VSHFLHV

)LVKZD\ ³ GHVLJQHG WR DOORZ GLDGUR P RXV ÀVK DQG RWKHU VSHFLHV WR P RYH through the barrage

(XU\KDOLQH RU HVWXDULQH VSHFLHV

4XDOLWDWLYH GHVFULSWLRQ

7KHUH DUH HXU\KDOLQH RU HVWXDULQH QDWLYH ÀVK VSHFLHV GHH P HG ¶VLJQLÀFDQW· LQ WKH GUDIW UHYLVHG 5D P VDU ,QIRU P DWLRQ 6KHHW IRU WKLV VLWH VHH $SSHQGL[& DV OLVWHG LQ 7DE0H ([FXGHG IUR P FRQVLGHUDWLRQ KHUH DUH GLDGUR P RXV VSHFLHV WKHVH EHLQJ FRQVLGHUHG VHSDUDWH0\ VHH 6HFWLRQ DV KDYH WKRVH VLJQLÀFDQW VSHFLHV considered 'marine stragglers' (see Section

$ P RQJ WKH VSHFLHV OLVWHG EH0RZ QRQH DUH FRQVLGHUHG WKUHDWHQHG RU RI FRQVHUYDWLRQ FRQFHUQ QDWLRQD0\ RU LQ 6RXWK $XVWUDOLD 1RWDE0H KRZHYHU DUH WKH IRXU VSHFLHV RI *RE\ IRU ZKLFK WKLV VLWH LV FRQVLGHUHG VLJQLÀFDQW DV LW LV WKH RQ\ 0RFDWLRQ LQ WKH 0 XUUD\ ' DUQJ %DVLQ ZKHUH they occur.

$0WKRXJK F0DVVLAHG DV HVWXDULQH UHVLGHQWV DQG EUHHGLQJ LQ WKH HVWXDULQH ZDWHUV P RVW RI WKHVH VSHFLHV RI ÀVK P RYH EHWZHHQ WKH V\VWH P XQLWV RI WKH &RRURQJ WKH 6RXWKUQ 2 FHDQ DQG WKH /DNHV ZKHQ DFFHVV LV SURYLGHG * RE\ H[FHSW IRU WKH %UG0HG * RE\ KRZHYHU DUH HTXD0\ ¶FR P IRUWDE0H· 0LYQJ EUHHGLQJ DQG UHFUXLWLQJ LQ IUHVK DQG estuarine habitat.

%H0RZ P RUH GHWD0HG LQIRU P DWLRQ LV SURYLGHG RQ ZKHUH HDFK VSHFLHV RFFXUV LQ WKH &RRURQJ DQG /DNHV 5D P VDU VLWH S0XV KDE1WDW LQIRU P DWLRQ VRU0FHG IUR P : HGGHUEXQ DQG +D P P HU DQG RWKHU VRU0FHV as indicated.

7KH XQXVXD0 0LH F\F0H UHTX0H P HQW RI /D P SU\ VSHFLHV DUH XQGHU WKUHDW

7DEOH (XU\ KDOLQH RU HVWXDULQH ÀVK WKHU SUHIHUUHG KDELWDWV DQG RWKHU OLIH KLVWRU\ LQIRUP DWLRQ		
&R P P RQ QD P H *VFLHQWLÀF QD P H*	3UHIHUUHG V\ VWH P XQLWV	3UHIHUUHG KDELWDW LQIRU P DWLRQ DGXOWV *1RWH ,QIRU P DWLRQ FLWHG IURP WKH UHSRUW /DNHV VXUYH\ E\ : HGGHUEXQ DQG* *+D P PHU LQIHUV WKDW LW DS SOLHV WR WKH IUHVKZDWHU ODNH VLGH RI WKH EDUDJHV*
6 P D[P RXWKHG +DUG\ KHDG *$WKHULQRV P D P LFURVR P D*		¶ : LGHVSUHDG VLWHV DQG JHQHUD[RU P DWLRQ DGXOWV RXJKRXW D[KDELWDW\ SHV RI WKH UHJLRQV RI WKH /DNHV D[KRXJK QRW UHFRGHG DW WKH 0 XUD\ FRQÀXHQFH SDUWLFXODU\ FR P P RQ LQ /DNH $[EHUW DQG DRXQG +LQG P D[VK ,VDQG *HQHUD[DVVRFLDWHG ZLWK VR P H HG J H RU VXE P HU J HG YH J HWDWLRQ Current and historic distribution likely remains similar.' : HGGHUEXQ DQG 0 +D P PHU 6HH D[VR 0 R[VKHU HW D[
6DQG\ 6SUDW +\ *SHUR SKXV YLWWDWXV*		¶$ QHZ UHFRUG IRU WKH IUHVKZDWHU VHFWLRQ RI WKH UHJLRQ D[EHLW LQ [RZ QX P EHUV DW WZR /DNH $[EH[DQGLQD VLWHV 7KH\ DUH P RVW OLNH\ D P D[QH YDJUDQW WKD W KDVH SDVVHG WKURXJK WKH EDUDJHV FR P P RQ LQ WKH &RRURJ (FNHUW DQG 5REL QVRQ UDWKHU WKDQ D UHVLGHQW FDSDE[H RI FR P S[HWQJ LWV OLIH F\FO[LQ IUHVKZDWHU · : HGGHUEXQ DQG 0 +D P PHU /LWW[H LV NQRZQ RI WKH VWDWXV RI WKLV VSHFLHV LQ V\ VWH P FR P SRQHQW DQG 0 +D P PHU SHUV FR P P
%ULG[HG *RE\ *$FHQWURJRELXV ELUHQDWXV*		2 Q WKH [DNH VLGH RI WKH EDUDJHV RFFXUV RYHU P XG DQG VLW JHQHUD[\ LQ DUHDV RI VWUXFWXUH H J URFNV /L P LWHG LQIRU P D[RQ RQ UDQJH DQG DEXQGDQFH LQ WKH UHJLRQ 0 +D P PHU SHUV FR P P
7D P D[*RE\ *$IXFD JRELXV WD P DUHQLV*		¶$ UDUH VSHFLHV IRU WKH VXUYH\ WKUHH VLWHV IRXQG LQ P XGG\ DQG URFN\ KDELWDW\ /RFD[LQV ZKHUH LW ZDV IRXQG ZHUH ZLGHVSUHDG EXW LW P D\ QRW IRU P UHSURGXFWLYH[YLDE[H SRSXD[LQV WKH [DNH XQLNH WKH DIRUP HQWLRQHG JRELHV 7KHUH KDVH SURREDE[\ EHHQ GHFLQHV LQ DEXQGDQFH VLQFH FRQVXLRQ RI WKH EDUDJHV · : HGGHUEXQ DQG +D P PHU 5HDVRQDE[\ FR P P RQ LQ WKH 0 XUD\ 0 RXWK UHJLRQ RYHU YDLHG VXEVWUDWHV VHH P V WR RFFXU LQ D[HDV WKDW UHFHLYH IUHVKZDWHU
: HVWHUQ %XH VSRW 6ZDQ 5LYHU *RE\ *3VHXGRJRELXV R[RUX P*		¶7KH VSHFLHV LV HVVHQWLDO\ HVWXDULQH KRZHYHU WKH\ DUH ZLGHVSUHDG DQG FR P P RQ\ HQFRXQWHUHG LQ WKH IUHVKZDWHU KDELWDW RI WKH /DNHV VLWHV DSSDUHQW\ IRU P LQJ [DQGLQD DW WKRXJK P LJUDWLRQ WR DQG IUR P WKH &RRURJ FRXG VWLOO RFFXU 7KH\ DUH JHQHUD[\ [RZ QX P EHUV RYHU VDQG RU XG ZLWK [LWWOH FRYHU KRZHYHU WKH\ ZHUH LQ KLJK DEXQGDQFH ! LQGLYLGXD[DW VKD[RZ VLWHV DW 1D[SD 6WDWLRQ /DNH $[DQGULQD DQG 1LQGHWKKD[D /DNH $[EHUW &XUHQW GLVWULEXWLRQ ZRX[G EH VL P LDU WR WKDW RFFXULQJ KLVWRULFFD[\ SHUKDSV ZLWK UHGXFHG DEXQGDQFH · : HGGHUEXQ DQG +D P PHU
/DJRRQ *RE\ *7DV P DQR J RELXV [DWL*		¶(VVHQWLD[\ DQ HVWXDULQH VSHFLHV WKDW FDQ WRLHUDWH IUHVKZDWHU DSSHDULQJ WR KDYH D ZLGH UDQJH WKURXJKRXW ERWK [DNHV 7KH\ ZHUH IRXQG LQ KLJK DEXQGDQFH LQ VR P H [DNH DQG [DJRRQ KDELWDW H J /DNH $[H[DQGULQD QHD[1D[XQJ DQG 5DXNNDQ DQG 3HULFDQ /DJRRQ JHQHUD[\ LQ D[HDV ZLWK VR P H FRYHU VXFK DV URFNV RU *9D[LVLQHULD D P HULFDQD* 7KH\ DSSHDU WR E[HHG LQ IUHVKZDWHU KDELWDW LQ /DNH $[EHUW 3UREDE[\ P RUH FR P P RQ LQ [QH ZLWK HVWXDULQH FRQGLWLRQV KLVWRULFD[\ · : HGGHUEXQ DQG +D P PHU /LWW[H LV NQRZQ RI WKH VWDWXV RI WKLV VSHFLHV LQ V\ VWH P FR P SRQHQW DQG 0 +D P PHU SHUV FR P P
5LYHU *DUAVK +\ *SRUKD P SKXV UH J X[DULV*		. QR Z[HG J H J DS
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Table Euryhaline or estuarine fish their preferred habitats and other life history information continued

Common name scientific name	Preferred system units	Preferred habitat information adults Note Information cited from the report Lakes survey by Wedderburn and Hammer infers that it applies to the freshwater lake side of the barrages
Mulloway *Argyrosomus japonicus*		'Mulloway *Argyrosomus japonicus* are distributed throughout southern Australia however there is currently only a limited understanding of stock structure for the species Hall Ferguson and Ward In the absence of reliable quantitative scientific data to support an alternative stock hypothesis the South Australian Mulloway population is managed using a precautionary approach as a self recruiting population with recruitment considered to be dependent upon local spawning within South Australian waters The first stock assessment of *Argyrosomus japonicus* in South Australia was completed in Ferguson and Ward The spawning behaviour and locations used by Mulloway in South Australia are unclear as is the proportion of the total population that use the Coorong Estuary as juvenile habitat Ferguson and Ward Adult Mulloway aggregate around the River Murray Mouth during the summer months attracted by freshwater outflows and abundance of food Hall Ferguson and Ward It is currently unclear to what extent these aggregations form part of a reproductive strategy Juvenile Mulloway utilise the waters of the Coorong Estuary as a nursery habitat for at least five years after which time they are thought to migrate out of the Estuary and into marine waters At present separate size limits are in place for Mulloway taken inside estuarine waters and outside estuarine waters on the ocean beaches This management strategy was implemented after the completion of a targeted research project undertaken by Hall mainly to protect adult Mulloway aggregating near the Murray Mouth on the ocean beaches Hall suggested that Mulloway do not reach a size of sexual maturity until five years of age or a size of cm Historical Mulloway population production was far greater than current levels due mainly to the significant reduction in available nursery habitat following the introduction of the barrage network in the s Figure represents the total commercial catch of Mulloway by all sectors in South Australia over the period to The total commercial catch of Mulloway in the financial year was tonnes Of this was taken by Lakes and Coorong fishers The remaining was taken in the marine scalefish fishery In addition to this catch Commonwealth southern shark fishery licence holders took an estimated tonnes' Extract from the *Management Plan for the South Australia Lakes and Coorong Fishery* Paper No April PIRSA
Black Bream *Acanthopagrus butcheri*		'In South Australia Black Bream are common in estuaries from the Victorian border to Port Lincoln on the west coast including the small estuaries on Kangaroo Island Hall Movement between estuaries and other sheltered bays is limited and usually only occurs during periods of flooding Hall Kailola et al Cashmore Conron and Knuckey Black Bream are considered to be an estuarine resident species that complete their life cycle within estuarine waters MDBC Black Bream are a bottom dwelling species that occur in areas where hard substrates snags or structures provide shelter Kailola et al although they are also captured over more exposed sandy bottom and seagrass beds in the Victorian Gippsland Lakes Cashmore Conron and Knuckey They can withstand a wide range of salinities and often move into the freshwater Lakes and the lower reaches of the River Murray In the Coorong lagoons temperature dependent freshwater inflows are thought to provide a critical spawning stimulus for black Bream and other estuarine dependent species MDBC In addition to spawning success the magnitude timing and duration of freshwater flows effect larval survival and development Hall Piece and Doonan There is potential for black Bream stock production levels to be significantly improved in the Coorong lagoons under an improved barrage flow strategy Hall Piece and Doonan MDBC a Future management of this species must focus on increasing the number of successful annual spawning events and maximising the opportunities for larvae survival and development through improved barrage flow manipulation There has been a significant reduction in the total commercial catch of black Bream from the Coorong lagoons since the early s when the barrage network was completed This decrease in production is largely due to reduced spawning success and lower survival rates of larvae caused by limitations on the availability of estuarine habitat disrupted natural flow regimes and changes to estuarine conditions.' Extract from the *Management Plan for the South Australia Lakes and Coorong Fishery* Paper No April PIRSA

PREFERRED SYSTEM UNITS
– Murray Mouth and Estuary – North Lagoon – South Lagoon – Lake Albert – Lake Alexandrina – Tributary wetlands
Note Unit Murray Mouth and Estuary includes the freshwater flood channel on Hindmarsh Island

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Oral history accounts—Fishermen and families

Frank Gibbs—Coorong fisher and hunter from the 1930s to present

The white bait (hardyheads) have gone from the Coorong too, we don't see them anymore. We always had Bony Bream too.

We would get up on the crow's nest of the boat and spot black patches of Mulloway. There were 20–30 lb fish right up to Salt Creek and behind Salt Creek Island which was very deep back then. Those deep holes were breeding areas for fish and always held Mulloway.

Bob Hera-Singh—Coorong fisher and hunter, 1940s to the present

Clearly in the 1940–1970 era, fishing was thriving, plenty of Mullet. Fish that like good quality water (e.g. Flounder, Bream, Mulloway, Congolli) were caught in very large numbers and were trucked to Melbourne Markets. No Flounder, Bream or Mulloway have been caught in recent years. Mullet numbers have tapered off catching less and less. The last three years, none whatsoever due to poor water quality and lack of oxygen in water**. Even the weed has stopped growing.

***Data to back up these historical records is available in terms of fish catch data (later provided by Bob for 1976 to 1984).*

We used to get 10 boxes per day of Congolli, with about 30kg per box, and the salmon were really thick. In mid-summer, we always had fish, but in the last 20 years we don't catch fish in summer anymore.

Neil and Nancy Ferguson—long-term residents of South East, Coorong fishing 30 years

About 10 years ago, Mullet were caught in August for about three weeks down at Salt Creek, not anymore.

Ngarrindjeri community

Hardyhead fish are an important part of the ecosystem, providing food for larger fish and birds. Hardyheads were found throughout the Coorong system all the way down to Salt Creek in the late 1970s but now they are almost gone, with only small populations around Pelican Point (no further south than Long Point).

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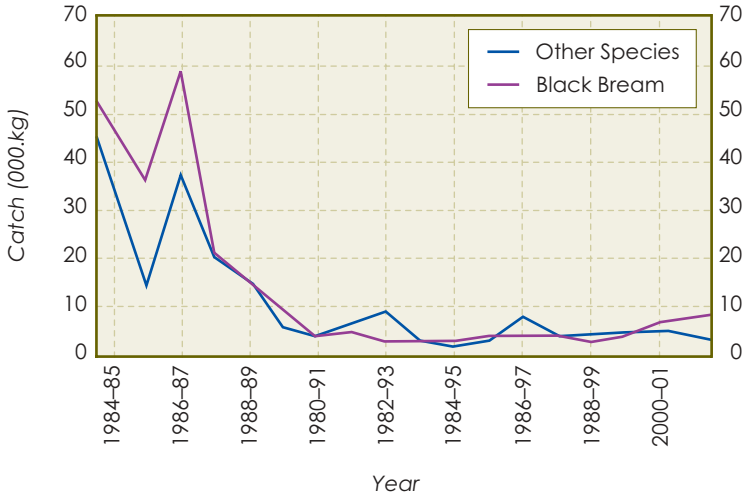
0 XOHW QX P EHUV DUH ¶DSHULQJ RII·



)LJXUH 7RWDO FDWFK RI %LDFN %UHDP DQG RWKHU VSHFLHV IUR P ² DQG ² LQ WKH /DNHV DQG &RRURQJ UHSURGXFHG IUR P WKH (FRQ6HDUFK UHSRUW 6$5',

6FLHQWLÀF VWXGLHV

3DWRQ REVHUYHV WKDW DURQJ ZLWK FKURQR P LG 0DUYDH DQG WKH VHHGV DQG WXULQV RI *5XSSLD WXEHURVD*, (see 6HFWLRQ 6P D0 P RXWKHG +DUG\KHDGV *$WKHULQRVR P D P LFURVWR P D* DUH L P SRUWDQW IRRG LWH P V IRU DTXDLF ELUGV LQ WKH 6RXWK /DJRRQ RI WKH &RRURQJ VHH 6HFWLRQ %DVHG RQ DQQXDO VD P SLQJ IRU WKH \HDUV 2 3DWRQ UHFRUGV WKDW WKH DEXQGDQFH RI ERWK *5XSSLD WXEHURVD* VHHGV DQG WXULQV DQG KDUG\KHDG ÀVK has declined considerably in the South Lagoon, and in SDUWLFXODU LQ WKH P RVW VRXWKHU\ VHFWLRQV +H DVR SURYLGHV GHWDLHG GDWD RQ WKH GLVWULEXWLRQ DQG DEXQGDQFH RI DTXDWLF ELUGV LQ WKH &RRURQJ IRU WKH SHULRG 2 DQG FRQFOXGHV WKDW VHYHUDO RI WKH ÀVK HDWLQJ ELUG VSHFLHV KDG UHGXFHG QX P EHUV DQG EUHHGLQJ DFWLYLWLHV in the South Lagoon, due, it is assumed, to the reduced DYDLODELLW\ RI IRRG LWH P V KDUG\KHDG LQ SDUWLFXODU 7KLV LQF0XGHV VSHFLHV VXFK DV $XVWUDOLDQ 3HOLFDQ VR P H ZDWHUIR ZO VSHFLHV)DU\ 7HUQ DQG +RU\ KHDGHG *UHEH

*HGGHV DVR UHLQIRUFHG WKLV YLHZ VD\LQJ WKDW LQ KLV VXUYH\V LQ -X\ ¶ÀVK QX P EHUV ZHUH 0RZ DQG GLVWULEXWLRQV UHVWULFWHG LQ WKH 1RUWK /DJRRQ ,Q WKH 6RXWK Lagoon, only *$WKHULQRVR P D P LFURVWR P D*, were collected, and these were in low numbers.'

/L P LWV RI DFFHSWDE0H FKDQJH DQG WUDÀF 0L J K W DVVHVV P HQW ,W LV QRW SRVVLE0H WR HVWDE0LVK WKH SRSX0DWLRQ VL]HV IRU WKHVH VSHFLHV HLWKHU DURXQG WKH WL P H WKH VLWH ZDV 5D P VDU 0LVWHG RU WRGD\ )XWKHU VXUYH\ ZRUN LV QHHGHG WR SURYLGH UREXVW HVWL P DWHV RI SRSX0DWLRQ VL]HV DQG WKH H[WHQW RI WKH KDELWDW HDFK UH0\ XSRQ)UR P WKH SHUVSHFWLYH RI VHWWLQJ 0L P LWV RI DFFHSWDE0H FKDQJH WKHUH DUH WKUHH SUL P DU\ FRQVLGHUDWLRQV DV IR0RZV

3RSX0DWLRQ VL]H ³ WKHVH FDQQRW EH GHWHU P LQHG DW SUHVHQW DWKRXJK DV QRWHG DERYH VHYHUD0 RI WKHVH VSHFLHV DSSHDU WR KDYH XQGHUJRQH FRQVLGHUDE0H GHF0LQHV RYHU WKH SDVW 2 \HDUV DQG VR P H VXFK DV WKH 6P D0 P RXWKHG +DUG\KHDG P RUH UHFHQW\ *LYHQ WKLV WKH SUHFDXWLRQDU\ DSSURDFK VXJJHVWV D 0L P LW RI DFFHSWDE0H FKDQJH IRU WKHVH VSHFLHV P HDQLQJ WKH\ ZDUDQW SULRULW\ FRQVLGHUDWLRQ LQ WKH P DQDJH P HQW RI WKLV VLWH DQG DFWLRQV DUH QHHGHG WR DGGUHVV DSSDUHQW SRSX0DWLRQ UHGXFWLRQV 7KH GHF0LQH RI 6P D0 P RXWKHG +DUG\KHDG LV RI VPHFLD0 QRWH J LYHQ LWV NH\ UR0H DV D IRRG LWH P IRU ZDWHUELUGV 7KLV GHF0LQH DVVRFLDWHG ZLWK WKH 0RVV RI WKH NH\VWRQH *5XSSLD* DTXDWLF S0DQW VSHFLHV LV FRQVLGHUHG IXUWKHU LQ 6HFWLRQ DQG

$UHD0 H[WHQW RI SUL P DU\ KDELWDWV ³ WRR 0LWH LV NQRZQ RI WKH KDELWDW QHHGV RI WKHVH VSHFLHV DW SUHVHQW WR D0RZ D /$& WR EH UHFR P P HQGHG +RZHYHU DV QRWHG DERYH WKH GHF0LQH RI NH\VWRQH *5XSSLD* aquatic S0DQW VSHFLHV LV 0NH0\ WR EH D SUL P DU\ IDFWRU LQ WKH GHF0LQHV RI WKHVH VSHFLHV DQG VR ZDUDQWV L P P HGLDWH P DQDJH P HQW LQWHUYHQWLRQ /$& LQ UH0DWLRQ WR *5XSSLD* KDYH EHHQ SURYLGHG LQ 6HFWLRQ : DWHU TXD0LW\ ³ VHH 6HFWLRQV DQG ZKHUH LAC are indicated in relation to salinity and turbidity, UHVSHFWLYH0\

7UDÀF 0L J K W DVVHVV P HQW

: K0H SRSX0DWLRQ QX P EHUV DUH QRW NQRZQ RU0 K LVWRU\ LQIRU P DWLRQ VR P H FR P P HU F LD0 ÀVKLQJ GDWD DQG VFLHQWLÀF VWXGLHV LQG LFDWH VHU0RXV GHF0LQHV LQ WKH SRSX0DWLRQV RI D QX P EHU RI WKHVH VSHFLHV RYHU WKH SDVW 2 \HDUV 7KH GHF0LQH RI 6P D0 P RXWKHG +DUG\KHDG LV RI VPHFLD0 QRWH J LYHQ LWV NH\ UR0H DV D IRRG LWH P IRU ZDWHUELUGV 7KLV GHF0LQH DVVRFLDWHG ZLWK WKH 0RVV RI the keystone *5XSSLD* DTXDWLF S0DQW VPHFLHV VHH 6HFWLRQV DQG

0 DULQH VWUD J J 0HUV

4 XD0LWDWLYH GHVFULSWLRQ

7KLV UHYLHZ KDV LGHQWLÀHG HLJKW VR FD00HG ¶P DULQH VWUD J J 0HUV· EHLQJ P DULQH VSHFLHV RI ÀVK WKDW UDQGR P 0\ HQWHU DQG 0HDYH LQ0HWV DQG HVWXDULHV 7KHLU LQF0XVLRQ DV VLJQLÀFDQW VSHFLHV LQ WKLV FRQWH[W UHVX0WV IUR P EHLQJ 0LVWHG DV YX0QHUDE0H E\ WKH ,8&1 ¶UHG 0LVW· IRU WKH %LJ EH00LHG 6HDKRUVH EHFDXVH WKH\ UH0\ RQ SDUWV RI WKH V\VWH P IRU FHUWDLQ NH\ SDUWV RI WKHLU 0LIH F\F0H RU WKH\ UHSUHVHQW D XQLTXH SDUW RI WKH GLYHUVH ÀVK FR P P XQLW\ VXSSRUWHG by the Coorong and Lakes Ramsar site (see decision UX0HV DVVRFLDWHG ZLWK WKH VH0HFWLRQ RI WKHVH VSHFLHV $SSHQGL[& $WWDFK P HQW

1RW VXUSULVLQJ0\ DV P DULQH VWUD J J 0HUV WKHVH VSHFLHV DUH P RVW0\ IRXQG LQ WKH 0 XUUD\ 0 RXWK DQG (VWXDU\ RU 1RUWK /DJRRQ XQLWV RI WKH 5D P VDU VLWH 1R GDWD LV DYDL0DE0H WR LQGLFDWH KRZ IUHTXHQW0\ DW ZKDW WL P HV RI WKH \HDU RU LQ ZKDW QX P EHUV WKHVH VSHFLHV DUH IRXQG LQ WKH V\VWH P DQG WKHVH IXQGD P HQWD0 NQRZ0HGJH JDSV P HDQ LW LV QRW SRVVLE0H WR VSHFLI\ WKHLU KDELWDW QHHGV

0 DQ\ P DULQH VWUD J J 0HUV DUH WKRXJKW WR LQKDELW WKH 0 XUUD\ 0 RXWK DQG (VWXDU\

7DE0H ¶0 DULQH VWUD J J 0HU· ÀVK VSHFLHV					
&R P P RQ QD P H	6FLHQWLÀF QD P H	**Ramsar** FULWHULD	1DWLRQD0 ,8&1 6WDWXV	6$ 6WDWXV	6\VWH P XQLWV
%0XH 6SUDW	*6SUDWH00RLGHV UREXVWXV*				
6DQG)LVK	*&UDSDWD0XV DUHQDULXV 0DVWL*				
*RE0LQ 6KDUN	*0 LWVXNXULQD RZVWRQL*				
%LJ EH00LHG 6HDKRUVH	*+LSSRFD P SXV DEGR P LQD0LV*		9		
6WULSHG 3HUFK	*+H0RWHV VH[0LQHDWXV*				
3ULFN0\ 7RDGÀVK	*&RQWXVXV EUHYLFDXGXV*				
6 P RRWK 7RDGÀVK	*7HWUDFWHQRV J0DEHU*				
5LFKDUGVRQ·V 7RDGÀVK	*7HWUDFWHQRV KD P L0WRQL*				

6<67(0 8 1,76

² 0 XUUD\ 0 RXWK DQG (VWXDU\ ² 1RUWK /DJRRQ ² 6RXWK /DJRRQ ² /DNH $0EHUW ² /DNH $0H[DQGULQD ² 7ULEXWDU\ ZHW0DQGV

1RWH 8QLW 0 XUUD\ 0 RXWK DQG (VWXDU\ LQF0XGHV WKH IUHVKZDWHU ÁRRG FKDQQH0 RQ +LQG P DUVK ,V0DQG

.H\ GULYHUV 0HYHUV FR P SRQHQWV DQG SURFHVVHV
$V LQGLFDWHG DERYH OLWWOH KDV EHHQ GRX P HQWHG DERXW
WKHVH VSHFLHV LQ WHU P V RI KRZ WKH\ RFFXS\ DQG XVH
WKH &RRURQJ SRUWLRQ RI WKLV 5D P VDU VLWH DQG VR LV QRW
SRVVLE0H WR FRQGHU WKH P LQ WKH VD P H GHWDL0 DV WKH RWKHU
ÀVK VSHFLHV JURXSV 1HHG0HVV WR VD\ DV VSHFLHV WKDW DUH
SUHGR P LQDQW\ P DULQH GZH00HUV SURYLGLQJ WKH P ZLWK
RS SRUWXQLWLHV IRU SDVVD J H LQWR DQG RXW RI WKH V\VWH P
LV D FULWLFD0 HFR0R J LFD0 SURFHVV &0RVXUH RI WKH P RXWK
RI WKH 0 XUUD\ ZL00 F0HDU0\ SUHYHQW WKH P IRU P LQ J SDUW
RI WKH GLYHUVH ÀVK FR P P XQLW\ RI WKLV V\VWH P 3HUKDSV
SDUDGR[LFD00\ WKHLU LQFUHDVHG SUHVHQFH LQ WKH V\VWH P
P D\ LQ IDFW LQGLFDWH FKDQJH LQ HFR0R J LFD0 FKDUDFWHU DV
WKH V\VWH P EHFR P HV P RU H P DULQH DQG 0HVV HVWXDULQH
ZLWK UHGXFHG IUHVKZDWHU LQ ÀRZV RYHU WKH EDUUD J HV

/L P LWV RI DFFHSWDE0H FKDQJH
1R 0L P LWV RI DFFHSWDE0H FKDQJH DU UHFR P P HQGHG GXH
WR NQRZ0HGJH JDSV $V QRWHG WKH LQFUHDVHG SUHVHQFH
RI WKHVH VSHFLHV LQ WKH V\VWH P SUREDE0\ LQGLFDWHV D
change in ecological character within the Coorong.
$V WKH V\VWH P EHFR P HV P RU H VD0LQH ZLWK 0 XUUD\ 0 RXWK
UHVWULFWLRQV DQG UHGXFHG IUHVKZDWHU LQ ÀRZV RYHU WKH
EDUUD J HV LW P D\ EHFR P H P RU H FRQGXFLYH WR P DULQH
VSHFLHV YLVLWDWLRQ 7KHUH LV DQHGRWDO HYLGHQFH WKDW WKLV
LV WKH FDVH VHH 6HFWLRQ

$HULDO YLHZ RI WKH 0 XUUD\ 0 RXWK